Newfoundland and Labrador Conservation and Demand Management Potential Study: 2015

Commercial Sector Final Report

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Submitted to:
Newfoundland Power Inc. and
Newfoundland and Labrador Hydro

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Executive Summary

Background and Objectives

Since the initial launch of takeCHARGE, NL's Conservation and Demand Management (CDM) market has changed both naturally and as a result of the Utilities' planned interventions. Since the last CDM Potential Study, energy efficient technologies have evolved and the takeCHARGE programs have impacted the province's awareness and adoption of CDM measures. In addition, new codes & standards have been drafted or come into effect.

Experience throughout many North American jurisdictions has demonstrated that energy efficiency and conservation have a significant potential to reduce energy consumption, energy costs and emissions.

The objective of this CDM Potential Study, referenced as *CDM Potential Study 2015*, is to identify the achievable, cost-effective electric energy efficiency and demand management potential in the province. Similar to the 2007 Study, the information in this report will be critical to developing the next generation of takeCHARGE programs that are equally responsive to customer expectations, support efforts to be responsible stewards of electrical energy resources and is consistent with provision of least cost, reliable electricity service. The *CDM Potential Study 2015*, provides a resource for the Utilities to develop a comprehensive vision of the province's future energy service needs.

Scope

The scope of this study is summarized below:

- **Sector Coverage:** This study addresses three sectors: residential households (Residential sector), commercial and institutional buildings (Commercial sector), and small, medium, and large industry (Industrial sector).

- **Geographical Coverage:** The study addresses all regions of NL that are served by the Utilities. Customers served by both the hydroelectric grid and the stand-alone diesel grids are included. The study results are estimated for three distinct regions: Newfoundland, Labrador, and Isolated Diesel.

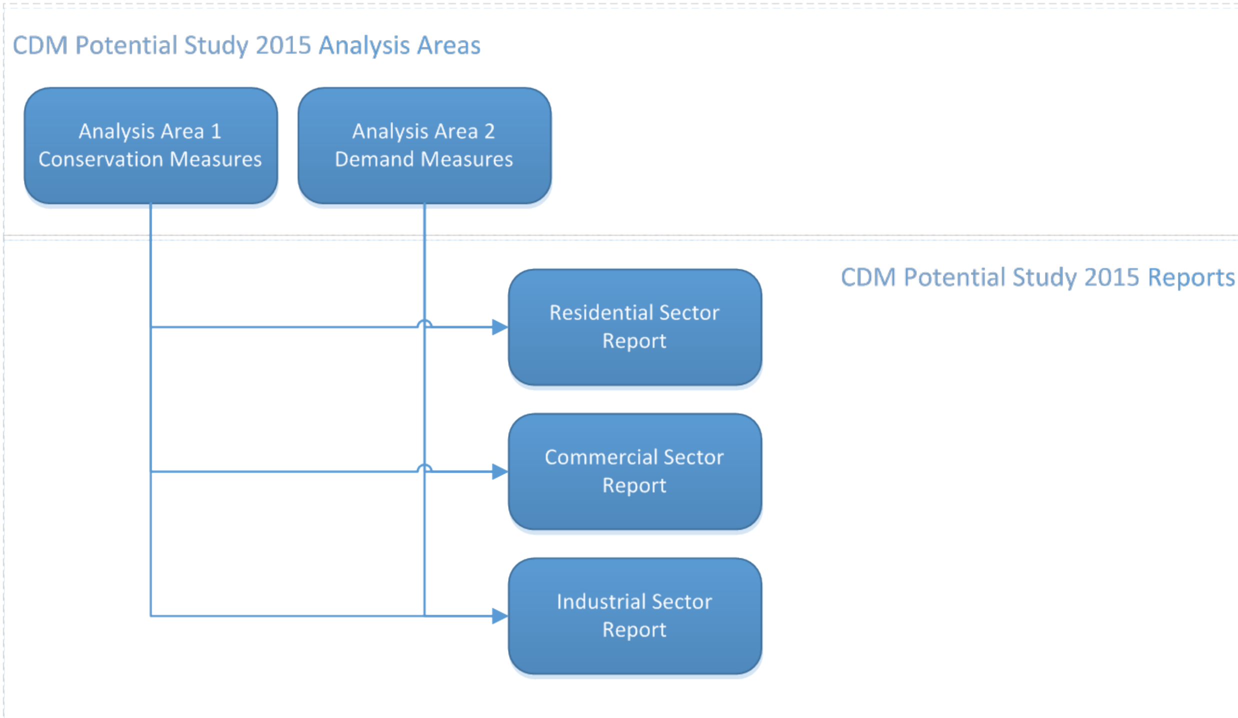
- **Study Period:** This study addresses a 15 year period. The Base Year for the study is the calendar year 2014. The Base Year of 2014 was calibrated to the 2014 actual sales data. The study milestone years will be 2017, 2020, 2023, 2026 and 2029.

  It is recognized that the weather conditions in 2014 were not typical. The CDM Potential Study 2015 follows the same assumptions as in the Utilities' Load Forecast.

- **Technologies:** This study addresses a range of electricity conservation and demand management (CDM) measures and includes all electrical efficiency technologies or measures that are expected to be commercially viable by the year 2029 as well as peak load reduction technologies.

CDM Potential Study 2015 has been organized into two analysis areas and the results are presented in three reports, as show in Exhibit ES 1, below.

Exhibit ES 1 Overview of CDM POTENTIAL STUDY 2015 Organization – Analysis Areas and Reports

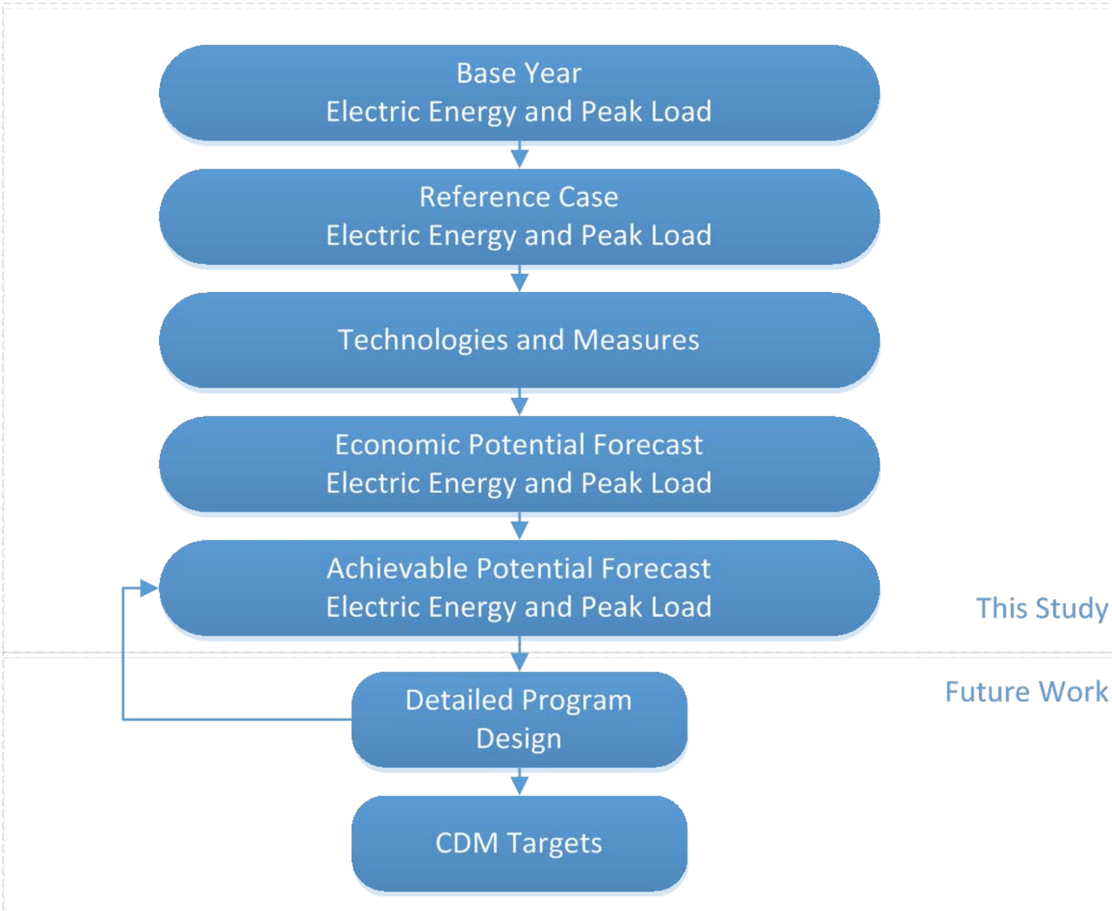


This report presents the results of both Analysis Area 1: Energy-efficiency Technologies and Behaviours and Analysis Area 2: Demand Measures, for Commercial sector customers. This report addresses all commercially available electric energy-efficiency and peak load reduction measures that are applicable to NL's Commercial sector. It includes the potential for electrical efficiency and peak load reduction technologies expected to be commercially viable by the year 2029; residential customer behaviour measures and commercial and industrial operation and maintenance (O&M) practices are also addressed.

Approach

The detailed end-use analysis of electrical efficiency opportunities in the Commercial sector employed two linked modelling platforms: CEEAM (Commercial Electricity and Emissions Analysis Model), an in-house, simulation model developed in conjunction with Natural Resources Canada (NRCan) for modelling electricity use in commercial/institutional building stock and CSEEM (Commercial Sector Energy End-use Model), which is also an ICF in-house spreadsheet-based macro model.

Exhibit ES 2 CDM POTENTIAL STUDY 2015: Main Analytic Steps



The major steps involved in the analysis are shown in Exhibit ES 2 and are discussed in greater detail in Section 2 of this report. As illustrated in Exhibit ES 2, the results of *CDM Potential Study 2015*, and in particular the estimation of Achievable Potential,[1] support on-going conservation and demand management (CDM) work; however, it should be emphasized that the estimation of Achievable Potential is not synonymous with either the setting of specific CDM targets or with program design.

Overall Commercial Study Findings

As in any study of this type, the results presented in this report are based on a number of important assumptions. Assumptions such as those related to the current penetration of efficient technologies and the rate of future growth in the building stock are particularly influential. Wherever possible, the assumptions used in this study are consistent with those used by the NL utilities. However, the reader is referred to a number of caveats throughout the main text of the report. Given these assumptions, the CDM Potential Study 2015 findings confirm the existence of significant potential cost-effective opportunities for electricity consumption and peak load savings in NL's commercial sector.

[1] The proportion of savings identified that could realistically be achieved within the study period.

Efficiency improvements would provide between 209 and 640 GWh/yr. of electricity consumption savings by 2029 in, respectively, the Lower and Upper Achievable Potential scenarios. The most significant Achievable Potential savings opportunities were in actions that addressed the HVAC end uses, specifically space heating. Besides space heating, there are significant savings to be found in lighting and refrigeration, as well as smaller opportunities in many of the other end uses, such as domestic hot water (DHW), food service and plug loads.

The electricity consumption savings would provide associated peak load reductions of approximately 32 to 118 MW during NL's winter peak period by 2029 in, respectively, the Lower and Upper Achievable Potential scenarios. Demand reduction measures would provide further peak load reductions of approximately 1.2 to 4.2 MW by 2029 in, respectively, the Lower and Upper Achievable Potential scenarios. All told, this amounts to peak load reduction potential of between 6% and 20% with respect to the Reference Case commercial peak load. Demand reductions do not include demand curtailment; rather, existing and future demand curtailment is included in the industrial sector report.

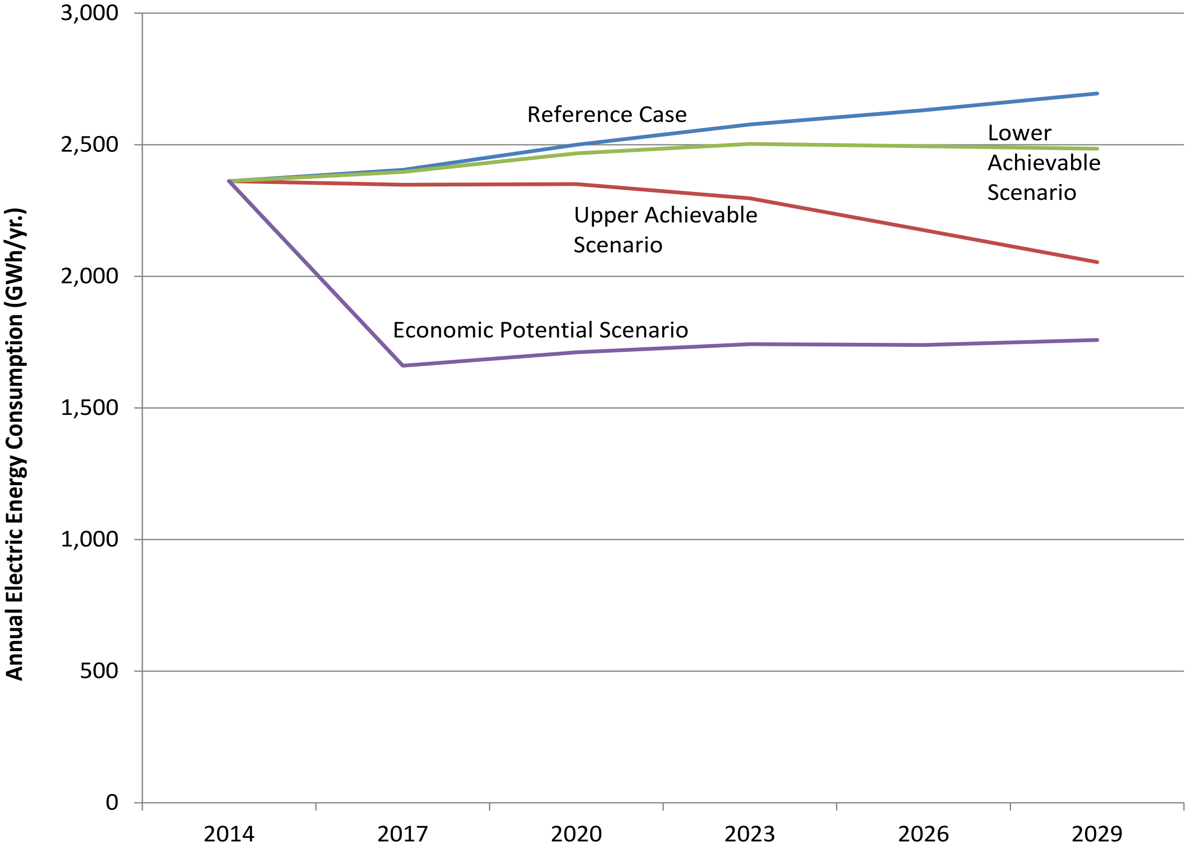
Summary of Electric Energy Savings in the Commercial Sector

A summary of the levels of annual electricity consumption contained in each of the forecasts addressed by CDM Potential Study 2015 is presented in Exhibit ES 3 and Exhibit ES 4, by milestone year.

Exhibit ES 3 Electricity Savings by Milestone Year for Three Scenarios (GWh/yr.)

Year	Economic Potential Scenario		Upper Achievable Potential Scenario		Lower Achievable Potential Scenario	
	Potential Savings (GWh/yr.)	% Savings Relative to Reference Case	Potential Savings (GWh/yr.)	% Savings Relative to Reference Case	Potential Savings (GWh/yr.)	% Savings Relative to Reference Case
2017	744	31%	56	2.3%	8	0.3%
2020	789	32%	149	6.0%	32	1.3%
2023	834	32%	280	11%	73	2.8%
2026	892	34%	456	17%	137	5.2%
2029	936	35%	640	24%	209	7.8%

Exhibit ES 4 Annual Electricity Consumption—Energy-efficiency Achievable Potential Relative to Reference Case and Economic Potential Forecast for the Commercial Sector, (GWh/yr.)



Base Year Electricity Use

In the Base Year of 2014, NL's Commercial sector consumed about 2,360 GWh/yr. Exhibit ES 5 shows that space heating accounts for about 27% of total commercial electricity use. Lighting accounts for the second largest percentage, at 17%. These are followed by HVAC Fans and Pumps at 12%, miscellaneous equipment at 9%, refrigeration at 8%, secondary lighting at 5%, and domestic hot water (DHW) at 5%. Other end uses account for 4% or less of the total. Indeed, some end uses are extremely small. Block heaters are assumed to be used only in Labrador. The same exhibit also presents the Reference Case consumption by end use in 2029, at the end of the study period, for comparison. Overall, NL's Commercial sector is forecast to rise to about 2,700 GWh/yr. by 2029 in the absence of new utility CDM initiatives.

Exhibit ES 6 shows the distribution of Base Year electricity consumption by sub sector. As illustrated, large offices account for the largest share (12%) of Commercial sector Base Year electricity use. The same exhibit also presents the Reference Case consumption by sub sector in 2029, at the end of the study period, for comparison.

Reference Case – Electric Energy

Exhibit ES 5 Electricity Use by End Use, Commercial Sector, 2014 and 2029

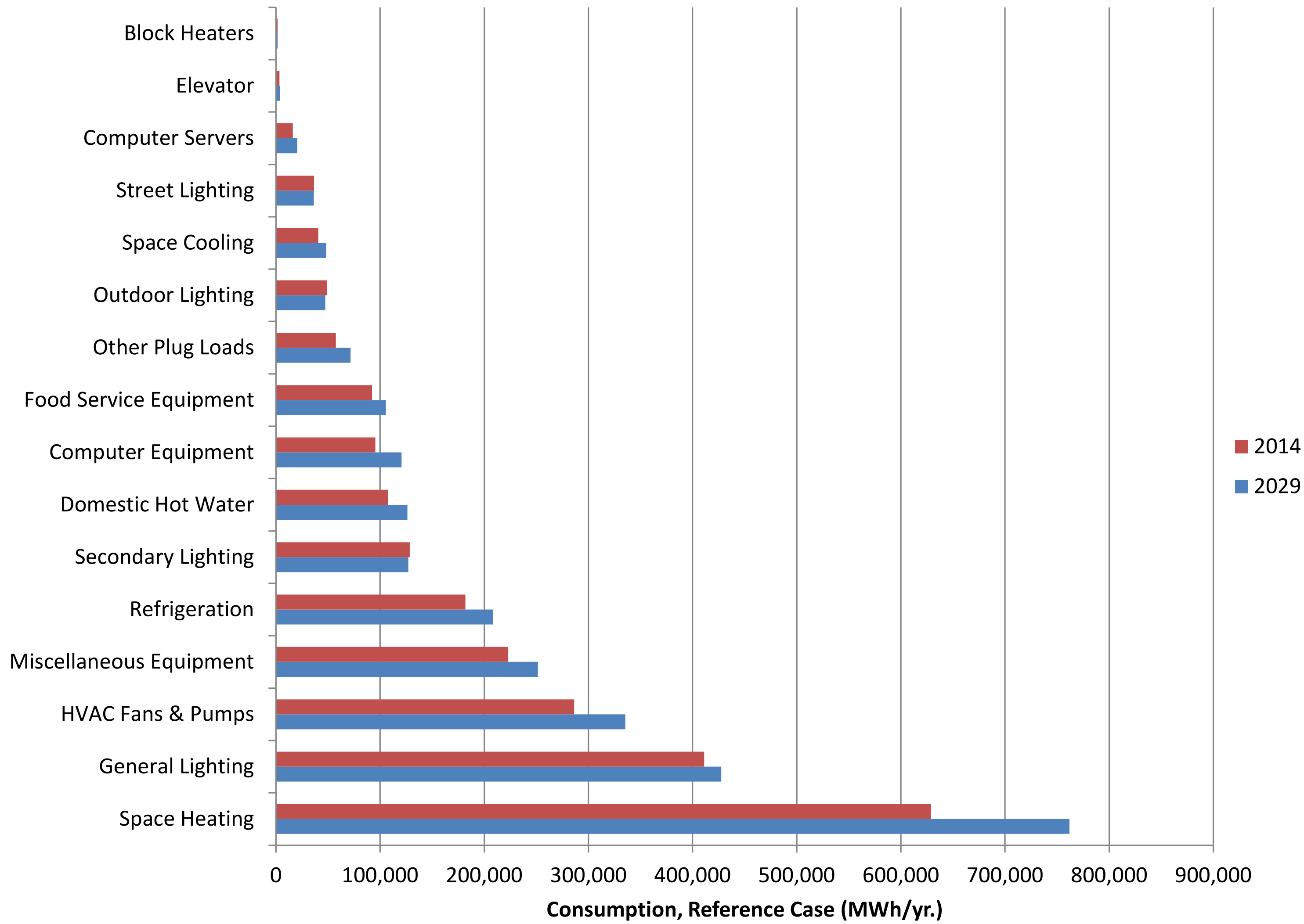
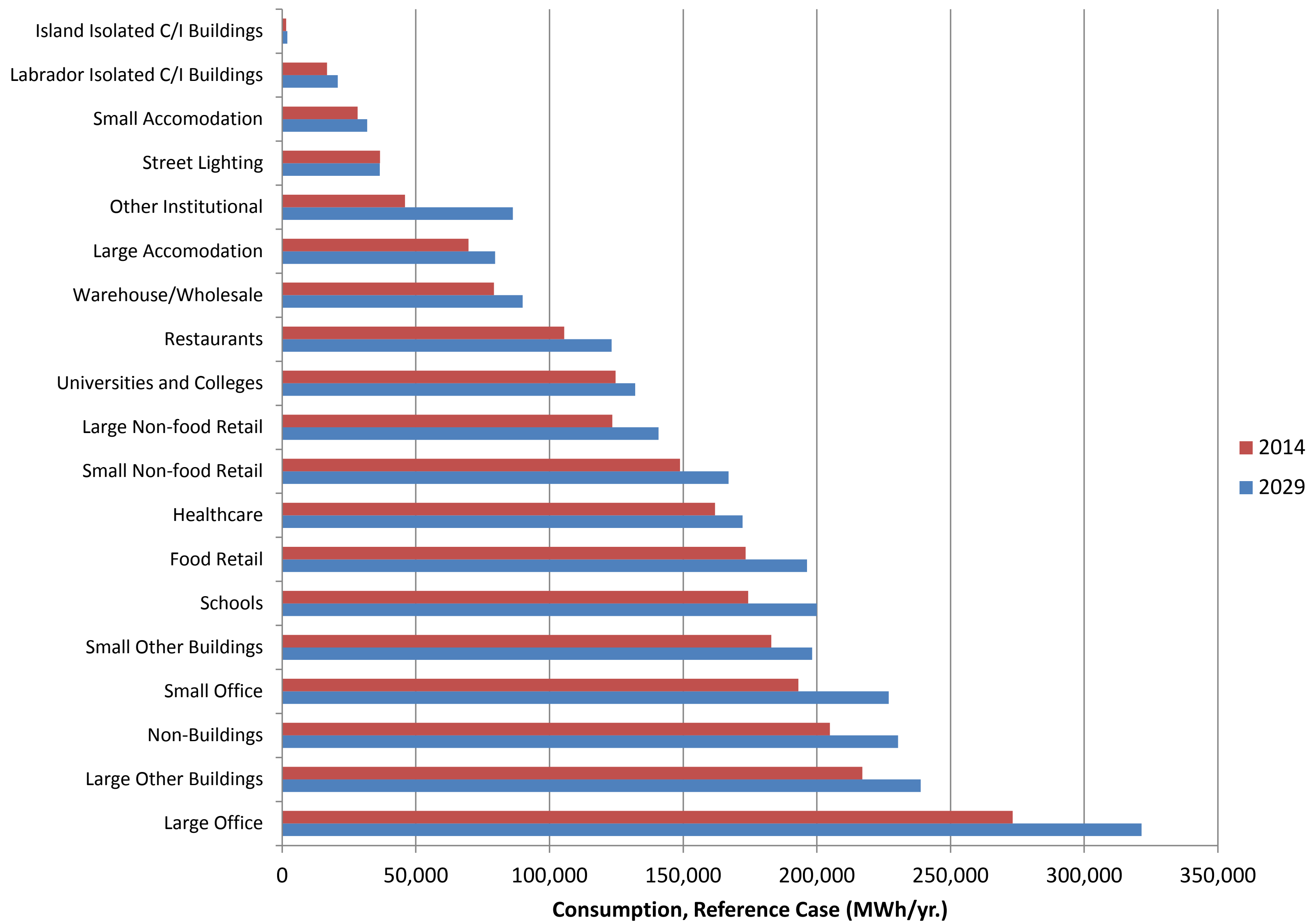


Exhibit ES 6 Electricity Use by Sub sector, Commercial Sector, 2014 and 2029



Economic Potential Forecast – Electric Energy

Under the conditions of the Economic Potential scenario,[2] the study estimated that electricity consumption in the commercial sector would decrease to approximately 1,758 GWh/yr. by 2029. Savings relative to the Reference case would be approximately 936 GWh/yr. or about 35%. The Economic Potential savings in the intermediate milestone years are 1,660 GWh/yr. in 2017, 1,711 GWh/yr. in 2020, 1,743 GWh/yr. in 2023, and 1,739 GWh/yr. in 2026. In each case, the savings amount to approximately 31-35% of the Reference case consumption. The Economic Potential savings are dominated by measures that are cost-effective based on their full cost (versus the "do-nothing" option), and therefore within the definitions of the scenario they would be adopted immediately and provide savings starting in the first milestone period.

Achievable Potential – Electric Energy

The Achievable Potential is the portion of the Economic Potential savings that could realistically be achieved within the study period.[3] In the commercial sector, the Achievable Potential for electricity savings was estimated to be 209 and 640 GWh/yr., respectively, in the Lower and Upper Achievable Potential scenarios. The savings in the intervening milestone years show a more realistic ramp-up pattern than that observed in the Economic Potential scenario.

The most significant Achievable Potential savings opportunities were in actions that addressed HVAC. In fact, savings in the HVAC end uses account for 57% of the opportunities in 2029. Of this, the ductless mini-split heating systems and building recommissioning measures offer the largest savings potential in the commercial sector. Besides HVAC, there are significant savings to be found in lighting and refrigeration as well as smaller opportunities in many of the other end uses.[4]

[2] The Economic Potential Electricity Forecast is the level of electricity consumption that would occur if all equipment and building envelopes were upgraded to the level that is cost effective against the economic threshold value , which has been set at different prices per kWh for the different regions. (One kWh from the Labrador hydroelectric grid is much less expensive than one kWh from an isolated diesel grid.)

[3] The Achievable Potential recognizes that it is difficult to induce customers to purchase and install all the electrical efficiency technologies that meet the criteria defined by the Economic Potential Forecast. The results are presented as a range, defined as lower and upper.

[4] It should be noted that measures are applied separately for each combination of region, sub sector, and milestone year. Some of the parameters that are used to assess measures in each circumstance can vary. For example, the potential savings or cost for a measure in one sub sector or region may be different from the savings or cost in another sub sector or region. In addition, the economic threshold value that is used to assess cost-effectiveness varies for each of the milestones. As such, measures that are marginally cost-effective, such as multi-split heat pumps, are only cost-effective in a subset of the regions, sub sectors, and milestone years being considered.

Summary of Peak Load Reductions

Based on discussions with utility personnel, the following peak period definition was used for this study:

Peak Period – The morning period from 7 am to noon and the evening period from 4 pm to 8 pm on the four coldest days in the December to March period; this is a total of 36 hours per year.[5]

Exhibit ES 7 and Exhibit ES 8 show the peak load reductions from both the energy efficiency measures and from measures targeted specifically at load management. More details on peak load reduction opportunities are provided in the main body of the report. Highlights of the findings include the following:

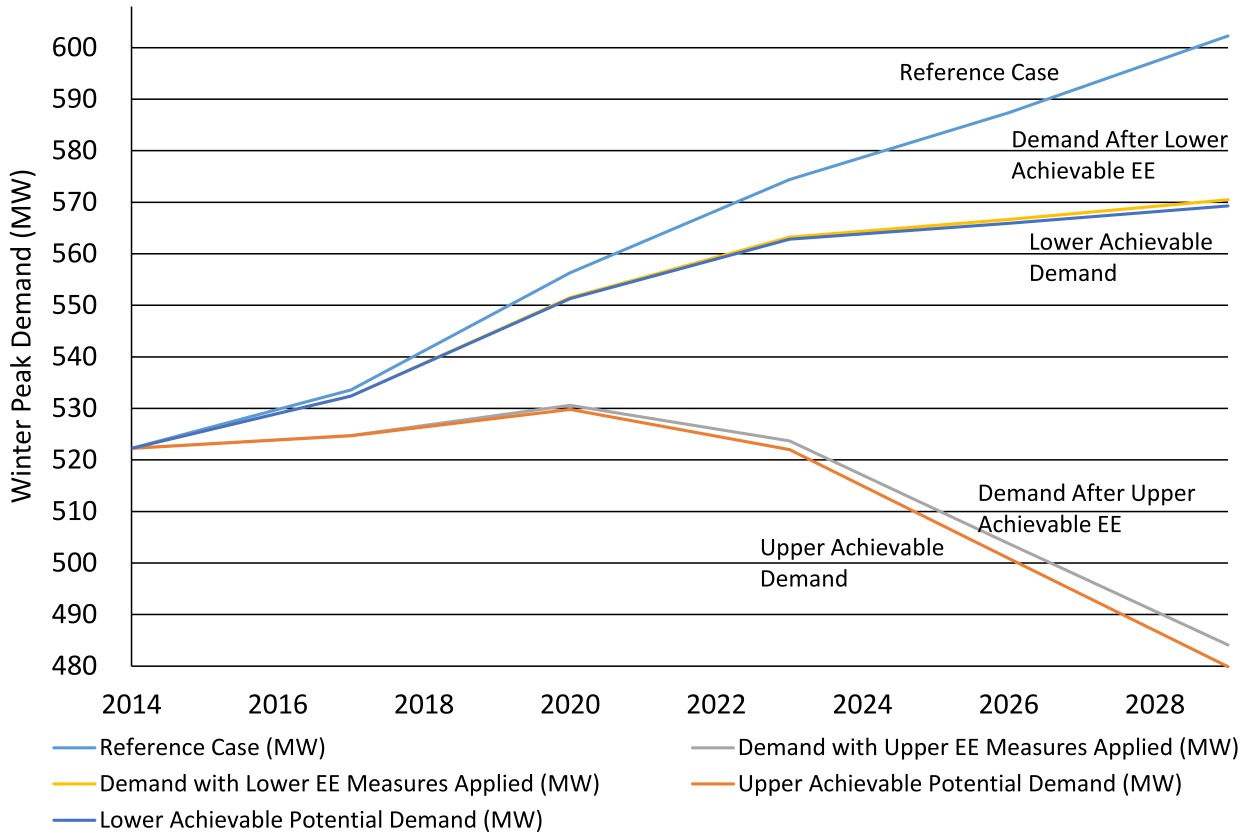
- Electricity savings offered by the Lower and Upper Achievable Potential scenarios would provide peak load reductions of approximately 32 to 118 MW by 2029, a decrease of between 5% and 20% relative to the reference case.
- Demand reduction measures under the Lower and Upper Achievable Potential scenarios would provide peak load reductions of an additional 1.2 to 4.2 MW by 2029, a decrease of up to a further 1%.
- Demand reduction potential is dominated by the reductions associated with energy efficiency measures in both of the achievable potential scenarios.

Exhibit ES 7 Peak Demand Reductions by Milestone Year for Three Scenarios (MW)

Year	Economic Potential		Upper Achievable		Lower Achievable	
	Potential Reductions (MW)	% Reduction Relative to Reference Case	Potential Reductions (MW)	% Reduction Relative to Reference Case	Potential Reductions (MW)	% Reduction Relative to Reference Case
2017	3.5	0.6%	0.0	0.0%	0.0	0.0%
2020	41.1	7.4%	0.8	0.1%	0.2	0.0%
2023	41.8	7.3%	1.7	0.3%	0.4	0.1%
2026	41.8	7.1%	2.9	0.5%	0.7	0.1%
2029	41.7	6.9%	4.2	0.7%	1.2	0.2%

[5] Source: NL (Feb 2014) http://hydroblog.nalcorenergy.com/meeting-peak-demand/

Exhibit ES 8 Peak Demand of Reference Case, Lower Achievable Potential and Upper Achievable Potential in Commercial Sector (MW)



Base Year Demand

In the Base Year of 2014, NL's Commercial sector demand was approximately 522 MW, averaged over the 36-hour peak period. This may be compared against the overall average commercial demand for the year, which is:

*2,360 GWh / 8760 hours * 1000 MW/GW = 269 MW*

Exhibit ES 9 shows that space heating accounts for nearly 40% of total commercial sector demand. General lighting accounts for the second largest percentage, at 14%. These are followed by HVAC Fans and Pumps and domestic hot water each at 8%, food service equipment and miscellaneous equipment each at 7% and refrigeration and secondary lighting at 4% each. Other end uses account for 3% or less of the total. The same exhibit also presents the Reference Case demand by end use in 2029, at the end of the study period, for comparison. Overall, NL's Commercial sector is forecast to rise to about 602 MW by 2029 in the absence of new utility CDM initiatives, an increase of approximately 13%.

Exhibit ES 10 shows the distribution of Base Year electric peak demand by sub sector. As illustrated, large offices account for the largest share (12%) of Commercial sector Base Year electricity use. The same exhibit also presents the Reference Case consumption by sub sector type in 2029, at the end of the study period, for comparison.

Reference Case – Electric Peak Demand

Exhibit ES 9 Electric Peak Demand by End Use, Commercial Sector, 2014 and 2029

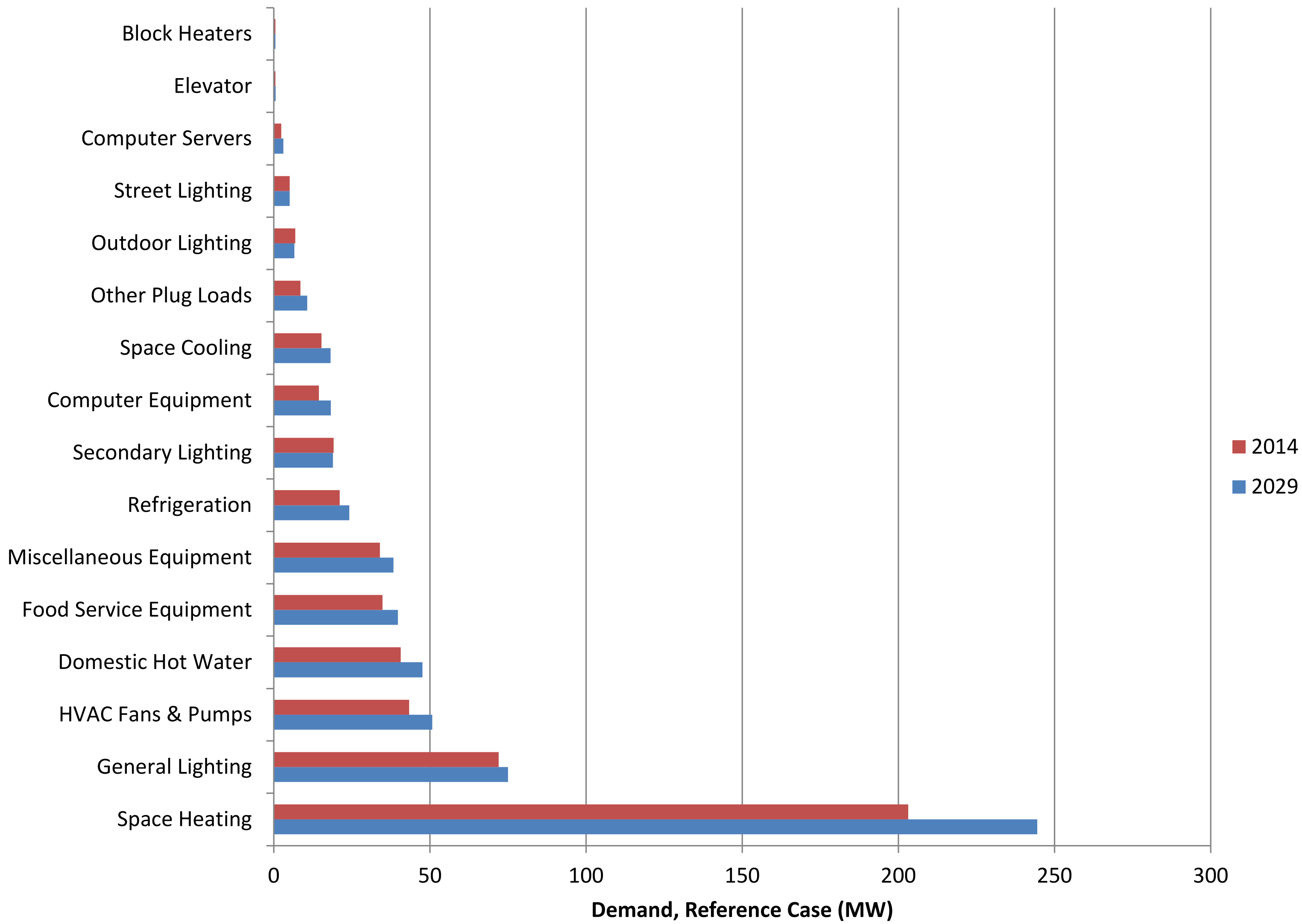
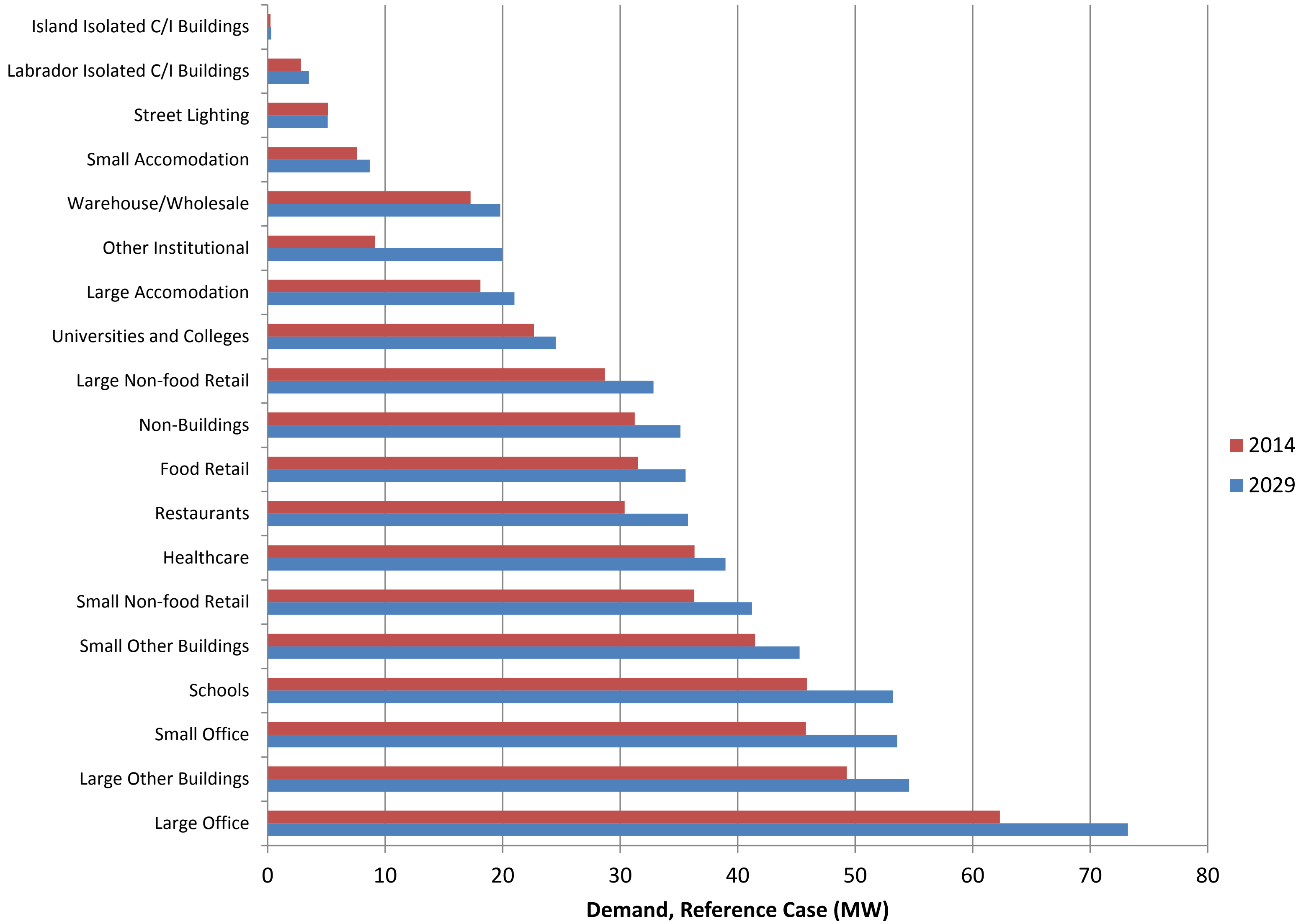


Exhibit ES 10 Electric Peak Demand by Sub Sector, Commercial Sector, 2014 and 2029



Economic Potential Forecast – Electric Peak Demand

Under the conditions of the Economic Potential scenario,[6] the study estimated that electric peak demand in the commercial sector would decrease to approximately 449 MW by 2029. Reductions relative to the Reference case would be approximately 153 MW or about 25%. The Economic Potential reductions in the intermediate milestone years are 134 MW in 2017, 137 MW in 2020, 142 MW in 2023, and 148 MW in 2026. In each case, the reductions amount to approximately 25% of the Reference case peak demand. The Economic Potential reductions are dominated by measures that are cost-effective relative to the Utilities' cost of new capacity based on their full cost (versus the "do-nothing" option), and therefore within the definitions of the scenario they would be adopted immediately and provide reductions starting in the first milestone period.

Achievable Potential – Electric Peak Demand

The Achievable Potential is the portion of the Economic Potential reductions that could realistically be achieved within the study period. In the commercial sector, electricity savings offered by the Lower and Upper Achievable Potential scenarios would provide peak load reductions of approximately 32 to 118 MW by 2029, a decrease of between 5% and 20% relative to the reference case. Demand reduction measures under the Lower and Upper Achievable Potential scenarios would provide peak load reductions of an additional 1.2 to 4.2 MW by 2029, a decrease of up to a further 1%.Thus, demand reduction potential is dominated by the reductions associated with energy efficiency measures in both of the achievable potential scenarios. The savings in the intervening milestone years show a more realistic ramp-up pattern than that observed in the Economic Potential scenario.

Among the demand reduction measures the most significant Achievable Potential savings opportunities were in actions that addressed HVAC measures. In fact, HVAC reductions account for 64-74% of the opportunities in 2029. Of this, the HVAC demand controls measure offers the largest demand reduction potential in the commercial sector, aside from the demand reduction associated with energy efficiency measures. Besides the HVAC savings, there are also potential demand savings from demand measures related to DHW, lighting, and refrigeration.

[6] The Economic Potential Electric Peak Load Forecast is the expected electric peak load that would occur in the defined peak period if demand is reduced by the reductions associated with the energy efficiency measures in the Economic Potential Electricity Efficiency Forecast, and all peak load reduction measures that are cost effective against the future avoided cost of new capacity in NL were also fully implemented.

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List of Exhibits

1 Introduction

Newfoundland Power Inc. and Newfoundland and Labrador Hydro have been successfully delivering electricity conservation programs to their customers since 2009 under the joint brand, takeCHARGE.

Since the initial launch of takeCHARGE, NL's CDM market has changed both naturally and as a result of the Utilities' planned interventions. Since the last CDM Potential Study, energy efficient technologies have evolved and the takeCHARGE programs have impacted the province's awareness and adoption of CDM measures. In addition, new codes & standards have been drafted or come into effect.

Experience throughout many North American jurisdictions has demonstrated that energy efficiency and conservation have a significant potential to reduce energy consumption, energy costs and emissions.

The objective of this CDM Potential Study, referenced as *CDM Potential Study 2015*, is to identify the achievable, cost-effective electric energy efficiency and demand management potential in province. Similar to the 2008 Study, the information in this report will be critical to developing the next generation of takeCHARGE programs that are equally responsive to customer expectations, support efforts to be responsible stewards of electrical energy resources and is consistent with provision of least cost, reliable electricity service. The *CDM Potential Study 2015*, provides a resource for the Utilities to develop a comprehensive vision of the province's future energy service needs.

1.1 Study Scope

The scope of this study is summarized below:

- **Sector Coverage:** This study addresses three sectors: residential households (Residential sector), commercial and institutional buildings (Commercial sector), and small, medium, and large industry (Industrial sector).

- **Geographical Coverage:** The study addresses all regions of NL that are served by the Utilities. Customers served by both the hydroelectric grid and the stand-alone diesel grids are included. The study results are estimated for three distinct regions: Newfoundland, Labrador, and Isolated Diesel.

- **Study Period:** This study addresses a 15 year period. The Base Year for the study is the calendar year 2014. The Base Year of 2014 was calibrated to the 2014 actual sales data. The study milestone years will be 2017, 2020, 2023, 2026 and 2029.

  It is recognized that the weather conditions in 2014 were not typical. The CDM Potential Study 2015 follows the same assumptions as in the Utilities' Load Forecast.

- **Technologies:** This study addresses a range of conservation and demand management (CDM) measures and includes all electrical efficiency technologies or measures that are expected to be commercially viable by the year 2029 as well as peak load reduction technologies.

1.1.1 Data Caveat

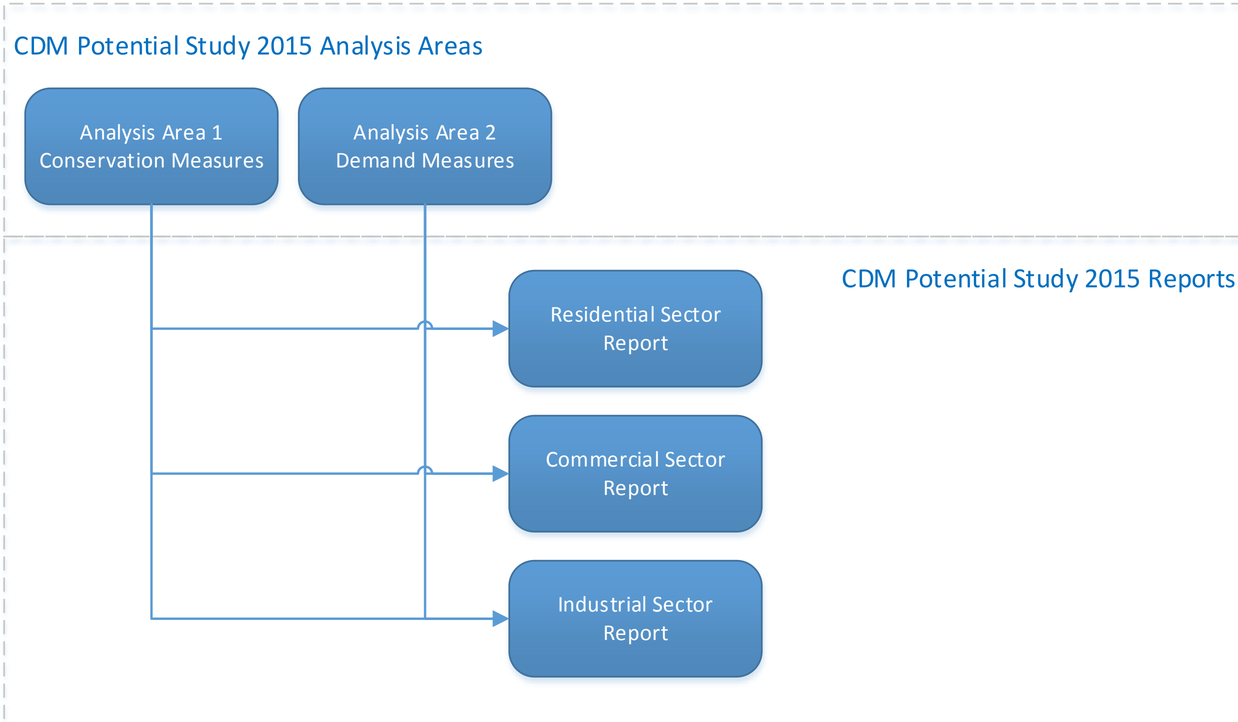
As in any study of this type, the results presented in this report are based on a large number of important assumptions. Assumptions such as those related to the current penetration of energy-efficient technologies, the rate of future growth in the stock of commercial buildings and customer willingness to implement new energy-efficiency measures are particularly influential. Wherever possible, the assumptions used in this study are consistent with those used by the Utilities and the Government of Newfoundland and are based on best available information, which in many cases includes the professional judgment of the consultant team, client personnel and local experts. The reader should, therefore, use the results presented in this report as best available estimates; major assumptions, information sources and caveats are noted throughout the report.

1.2 Study Organization

Exhibit 1 presents an overview of the study's organization; as illustrated, the study has been organized into two analysis areas and four individual reports.

A brief description of each analysis area and its report content is provided below.

Exhibit 1 Overview of *CDM Potential Study 2015* Organization – Analysis Areas and Reports



1.2.1 Analysis Area 1 – Conservation Measures

This area of the *CDM Potential Study 2015* assesses electric energy[7] reduction opportunities that could be provided by electrical efficiency technologies that are expected to be commercially viable by the year 2029; residential customer behaviour measures and commercial and industrial operation and maintenance (O&M) practices are also addressed. The results of Analysis Area 1 are presented in three individual sector reports.

1.2.2 Analysis Area 2 – Demand Measures

This area of the *CDM Potential Study 2015* assesses peak load reduction opportunities that could be provided by peak load reduction technologies that are expected to be commercially viable by the year 2029. The results of Analysis Area 2 are presented in three individual sector reports.

1.3 Report Organization

This report presents the Commercial sector results. It is organized and presented as follows:

- Section 2 presents an overview of the study methodology, including a definition of key terms and an outline of the major analytic steps involved.
- Section 3 presents a profile of Commercial sector Base Year electricity use in NL.
- Section 4 presents a profile of Commercial sector Base Year electric peak load, including the definition of peak periods that are included in this study.

[7] The term "electric energy" is used in this report to distinguish electricity consumption (in units of kWh or MWh) from electricity demand during a specific period (in units of MW).

- Section 5 presents the Reference Case, which provides a detailed estimate of electricity use in NL's Commercial sector over the study period 2014 to 2029, in the absence of new utility CDM program initiatives.
- Section 6 presents the Reference Case electric peak loads, which provide a detailed estimate of peak load requirements in NL's Commercial sector over the study period 2014 to 2029, in the absence of new utility CDM program initiatives.
- Section 7 identifies and assesses the economic attractiveness of the selected energy-efficiency technology measures for the Commercial sector.
- Section 8 presents the Commercial sector Economic Potential Electricity Forecast for the study period 2014 to 2029, including the potential for both energy efficiency measures and capacity-only peak load reduction measures.
- Section 9 presents the estimated upper and lower Achievable Potential for electric energy savings for the study period 2014 to 2029, including the potential for both energy efficiency measures and capacity-only peak load reduction measures.
- Section 10 lists sources and references.
- Section 11 is the Glossary.

1.4 Results Presentation

The preparation of CDM Potential Studies involves the compilation and analysis of an enormous amount of market and technology data and a nearly infinite number of ways of organizing and presenting the results. It is recognized that readers will have differing levels of needs with respect to the level of detail provided. Consequently, the results of this CDM Potential Studies are presented at three levels of detail.

- **Main report body:** The main body of the report provides a relatively high-level reporting of the main steps involved in undertaking each stage of the study together with a concise summary of results, including comments and interpretation of key findings. It is assumed that the content and level of detail in the main report body is suitable for the majority of readers who wish to gain an understanding of the potential contribution of CDM options to NL's long-term electricity requirements.
- **Appendices:** A separate appendix accompanies each major section of the main report. Each appendix provides more detailed information on the methodology employed, including major assumptions or sample calculations as applicable, together with additional levels of results. It is assumed that this presentation is better suited to CDM analysts and managers wishing a more thorough understanding of the study results.
- **Software:** All of the data generated by the study is provided in two custom-designed Excel models: Data Manager and the measure TRM (technical resource manual) Workbook.
    - **Data Manager** is a custom-designed Excel workbook with query protocols that enable the user to search and report the study results in a virtually infinite number of combinations. Data Manager is intended to support the most detailed level of CDM activity such as program design, preparation of regulatory submissions, etc.

- **The Measure TRM Workbook** is a custom-designed model that provides comprehensive profiles of the CDM measures assessed within the study. Because the information is provided in software form, any changes to economic, financial or performance data inputs can be easily accommodated and revised results generated automatically.

2 Study Methodology

This section provides an overview of the methodology employed for this study. More specifically, it addresses:

- Definition of terms
- Major analytic steps
- Analytic models

2.1 Definition of Terms

This study uses numerous terms that are unique to analyses such as this one and consequently it is important to ensure that readers have a clear understanding of what each term means when applied to this study.

A brief description of some of the most important terms and their application within this study is included below.

Base Year Electricity Use	The Base Year is the starting point for the analysis. It provides a detailed description of where and how electrical energy is currently used in the existing building stock. Building electricity use simulations were undertaken for the major sub sector types and calibrated to actual utility customer billing data for the Base Year. As noted previously, the Base Year for this study is the calendar year 2014.
Base Year Electric Peak Load Profile	Electric peak load profiles refer to one specific time period throughout the year when NL's generation, transmission and distribution system experiences particularly high levels of electricity demand. This period is of particular interest to system planners; improved management of electricity demand during this peak period may enable deferral of costly system expansion. This study addresses one specific peak periods, as outlined in the main text.
Reference Case Electricity Use (includes "natural" conservation)	The Reference Case electricity use estimates the expected level of electrical energy consumption that would occur over the study period in the absence of new (post-2014) utility-based CDM initiatives. It provides the point of comparison for the subsequent calculation of Economic and Achievable electricity savings potentials. Creation of the Reference Case required the development of profiles for new buildings in each of the sub sectors, estimation of the expected growth in building stock, and finally an estimation of "natural" changes affecting electricity consumption over the study period. The Reference Case is calibrated to the Utilities most recent load forecast, minus the impacts of new, future CDM initiatives.
Reference Case Electric Peak Load Profile	The Reference Case peak load profile estimates the expected electric peak loads in the defined peak period over the study period in the absence of new utility CDM program initiatives. It provides the point of comparison for the subsequent calculation of Economic and Achievable Potentials for peak load reduction.

Conservation and Demand Management (CDM) Measures	CDM measures can include energy efficiency (use more efficiently), energy conservation (use less), demand management (use less during peak periods), fuel switching (use a different fuel to provide the energy service) and customer-side generation (displace load off of grid). Customer –side generation and fuel switching are not included in this study.
The Cost of Conserved Energy (CCE)	The CCE is calculated for each energy-efficiency technology measure. The CCE is the annualized incremental capital and O&M cost of the upgrade measure divided by the annual energy savings achieved, excluding any administrative or program costs. The CCE represents the cost of conserving one kWh of electricity; it can be compared directly to the cost of supplying one new kWh of electricity.
The Cost of Electric Peak Reduction (CEPR)	The CEPR for a peak load reduction measure is defined as the annualized incremental capital and O&M cost of the measure divided by the annual peak reduction achieved, excluding any administrative or program costs. The CEPR represents the cost of reducing one kW of electricity during a peak period; it can be compared to the cost of supplying one new kW of electric capacity during the same period.
Electric Capacity-Only Peak Load Reduction Measures	Capacity-only measures are technologies or activities that result in the shifting of certain electrical loads from periods of peak system demand to periods of lower system demand.
Economic Potential Electricity Forecast	The Economic Potential Electricity Forecast is the level of electricity consumption that would occur if all equipment and building envelopes were upgraded to the level that is cost effective against the economic threshold value[8], which has been set at different prices per kWh for the different supply system types. All the energy-efficiency upgrades included in the technology assessment that had a CCE equal to, or less than, the economic threshold value for a given supply system were incorporated into the Economic Potential Forecast.
Economic Potential Electric Peak Load Forecast	The Economic Potential Electric Peak Load Forecast is the expected electric peak loads that would occur in each of the three defined peak periods if all peak load reduction measures that are cost effective against the future avoided cost of new capacity in NL were fully implemented.
Achievable Potential	The Achievable Potential is the proportion of the savings identified in the Economic Potential Forecasts that could realistically be achieved within the study period. The Achievable Potential recognizes that it is difficult to induce customers to purchase and install all the electrical efficiency technologies that meet the criteria defined by the Economic Potential Forecast. The results are presented as a range, defined as lower and upper.

[8] The economic threshold value is related to the cost of new avoided electrical supply. The values for each supply system are generally selected to provide the CDM Potential Study with a reasonably useful time horizon (life) to allow planners to examine options that may become more cost effective over time. Further discussion is provided in Section 7 of this report.

2.2 Major Analytic Steps

The study was conducted within an iterative process that involved a number of well-defined steps, as illustrated in Exhibit 2.

Exhibit 2 Major Analytic Steps

A summary of the steps is presented below.

Step 1: Develop Base Year Electric Energy and Peak Load Calibration Using Actual Utility Billing Data

Build a model of electric energy and demand for the sector, disaggregated to all the building types and end uses, calibrated to sales of electricity in NL. This includes the following sub-steps:

- Compile and analyze available data on NL's existing building stock.
- Develop detailed technical descriptions of the existing building stock.
- Undertake computer simulations of electricity use in each building type and compare these with actual building billing and audit data.
- Compile actual utility billing data.
- Create sector model inputs and generate results.
- Calibrate sector model results using actual utility billing data.
- Use end-use load shape data to convert electric energy use to electric demand in each selected peak period.

- Calibrate the weather-sensitive load shape ratios for all three sectors to produce regional demand results that agree with the actual utility peak demand.

Step 2: Develop Reference Case Electric Energy Use and Peak Load Profile

Extend the base year model to the end of the study period, based on forecast building stock growth and expected natural changes in construction practices, equipment efficiency levels and/or practices. This includes the following sub-steps:

- Compile and analyze building design, equipment and operations data and develop detailed technical descriptions of the new building stock.
- Develop computer simulations of electricity use in each new building type.
- Compile data on forecast levels of building stock growth and “natural” changes in equipment efficiency levels and/or practices.
- Define sector model inputs and create forecasts of electricity use for each of the milestone years.
- Compare sector model results with load forecasting data provided by the Utilities for the study period.
- Use end-use load shape data to convert electric energy use to electric demand in each selected peak period over the study period.

Step 3: Identify and Assess Energy-efficiency and Peak Load Reduction Measures

Compile information on upgrade measures that can save electric energy and/or reduce peak demand, and assess them for technical applicability and economic feasibility. This includes the following sub-steps:

- Develop list of energy-efficiency upgrade and peak load reduction measures.
- Compile detailed cost and performance data for each measure.
- For energy-efficiency measures, identify the baseline technologies employed in the Reference Case, develop energy-efficiency upgrade options and associated electricity savings for each option, and determine the CCE for each upgrade option.
- For each peak load reduction measure, identify the affected end use, the potential load reduction or off-peak shifting and determine the CEPR.
- Based on the above results, prepare summary tables that show the amount of potential peak load reduction provided by each measure and at what cost ($/kW/yr.).
- Apply each peak load reduction measure to the affected end use, regardless of cost, and determine total peak reduction.
- Summarize the peak load reduction impacts in a supply curve.

Step 4: Estimate Economic Electric Energy Savings Potential

Develop an estimate of the electric energy savings potential that would result from implementing all of the economically feasible measures in all the buildings where they are applicable. This includes the following sub-steps:

- Compile utility economic data on the forecast cost of new electricity generation and set an economic threshold value; different economic threshold values were selected for each region and milestone year.
- Identify the combinations of energy-efficiency upgrade options and building types where the cost of saving one kilowatt of electricity is equal to, or less than, the cost of new electricity generation.
- Apply the economically attractive electrical efficiency measures from Step 3 within the energy-use simulation model developed previously for the Reference Case.

- Determine annual electricity consumption in each building type and end use when the economic efficiency measures are employed.
- Compare the electricity consumption levels when all economic efficiency measures are used with the Reference Case consumption levels and calculate the electricity savings.

Step 5: Estimate Achievable Potential Electricity Savings

Develop an estimate for the peak load impacts associated with the measures that save electric energy. This includes the following sub-steps:

- Convert the electricity (electric energy) savings (MWh) calculated in the preceding steps to peak load (electric demand) savings (kW).[9]
- Convert electricity savings to hourly demand, drawing on a library of specific sub sector and end-use electricity load shapes. Using the load shape data, apply the following steps:
  - Disaggregate annual electricity savings for each combination of sub sector and end use by month
  - Further disaggregate monthly electricity savings by day type (weekday, weekend day and peak day)
  - Finally, disaggregate each day type by hour.
- Produce a post-efficiency case for peak demand, by region, building type, end use, and milestone year, to serve as a base case for estimating the impacts of peak load measures.

Step 6: Estimate Peak Load Impacts of Electricity Savings

Develop an estimate for the peak load impacts associated with the measures that save electric energy. This includes the following sub-steps:

- Compile utility economic data on the forecast cost of new capacity and set an economic threshold value; different economic threshold values were selected for each region and milestone year.
- Identify the combinations of energy efficiency upgrade options and building types where the cost of reducing one kilowatt of demand is equal to, or less than, the cost of new electric capacity.
- Apply the economically attractive electrical efficiency measures from Step 3 within the demand simulation model developed previously for the Reference Case, using the post-efficiency case as the starting point for the demand measures.
- Determine annual electric demand in each building type and end use when the economic demand reduction measures are employed.
- Compare the electric demand levels when all economic demand reduction measures are used with the post-efficiency demand levels and calculate the total demand reduction.

Step 7: Estimate Achievable Potential Electricity Savings and Demand Reduction

Develop an estimated range for the portion of economic potential savings and demand reductions that would likely be achievable within realistic CDM programs. This includes the following sub-steps:

- Bundle the electric energy and peak load reduction opportunities identified in the Economic Potential Forecasts into a set of opportunities.
- For each of the identified opportunities, create an Opportunity Profile that provides a high-level implementation framework, including measure description, cost and savings profile, target sub sectors, potential delivery allies, barriers and possible synergies.

[9] Peak load savings were modelled using the Cross-Sector Load Shape Library Model (LOADLIB).

- Review historical achievable program results and prepare preliminary Assessment Worksheets.
- Conduct a full day workshop involving the client, the consultant team, trade allies and technical experts to reach general agreement on the upper and lower range of Achievable Potential for both efficiency and demand reduction.
- Total potential for demand reduction includes both the demand reductions associated with the energy efficiency measures and the demand reductions from demand management measures.

2.3 Analytical Models

The analysis of the Commercial sector employed two linked modelling platforms:

- CEEAM (Commercial Electricity and Emissions Analysis Model), an in-house, simulation model developed in conjunction with Natural Resources Canada (NRCan) for modelling electricity use in commercial/institutional building stock.

- CSEEM (Commercial Sector Electricity End-use Model), an in-house spreadsheet-based macro model.

CEEAM was used to develop commercial electricity end-use intensities (EUIs) for each of the commercial and institutional building archetypes. CEEAM has been successfully employed in numerous domestic and international conservation and demand management projects.

Domestically, this includes assignments for BC Hydro, FortisBC, SaskPower, Manitoba Hydro, the Independent Electricity System Operator (IESO)[10], Enbridge Gas, Union Gas, NB Power, Newfoundland Power, Newfoundland Labrador Hydro and Natural Resources Canada. CEEAM is a robust modelling platform whose results have been verified against actual end-use metered data for commercial buildings in the cities of Ottawa and Toronto and against results from DOE-2, the widely used building simulation software tool developed by the US Department of Energy (DOE).

CEEAM was developed specifically for applications such as this study. One of its particular strengths is the capability to simulate electricity performance not only in a given building but also in an entire stock of similar buildings (e.g., all Large Offices). In particular, it is capable of tracking the penetration of multiple technologies in combinations that are not possible with other simulation software tools, such as DOE-2.

CEEAM simulates the electricity consumption and peak load for all electricity end uses present in a given commercial building segment. CEEAM calculates energy use and emissions by end use and reports them in $kWh/ft^2/yr.$ and $kg\ eCO_2/ft^2$. Because CEEAM is a full modelling program, it calculates both building heating and cooling loads (internal and transmission). It therefore accounts for interactive effects such as the increase in heating energy use and decrease in cooling energy use resulting from lighting retrofits. CEEAM also uses equipment part load performance curves to accurately model the seasonal efficiency of heating and cooling plants.

The commercial EUIs derived by CEEAM provide inputs into CSEEM. CSEEM consists of two modules:

- A general parameters module that contains general sector data (e.g., floor space, growth rates, etc.)
- A building profile module that contains the EUI data for each of the selected building sub sectors

[10] Formerly the Ontario Power Authority (OPA). The OPA merged with the IESO on January 1, 2015.

CSEEM combines data from each of these modules and provides total electricity use by service region, building sub sector and end use. CSEEM also enables the analyst to estimate the impacts of the electrical efficiency measures on a utility's on-peak system demand.

3 Base Year (2014) Electric Energy Use

3.1 Introduction

This section provides a profile of Base Year (2014) electricity use in NL's commercial sector. Development of the Commercial sector Base Year electricity profile required the following major steps:

- NL's commercial buildings were segmented into sub sectors containing buildings with similar energy use patterns
- The major energy end uses within commercial buildings were selected
- Data on end-use fuel shares and space cooling saturation were compiled for each sub sector
- Detailed building and equipment specifications were compiled and used to create building energy-use models for each sub sector
- Utility sales data were compiled for each sub sector
- Utility sales data were combined with the model results showing typical sub sector electricity use to generate an estimate of floor area for each sub sector
- CSEEM was used to combine the above data and provide the detailed Base Year profile.

A brief description of each of the above steps is provided below, together with a summary of the results. Additional information is provided in Appendix A.

3.2 Commercial Sector Segmentation

The first major task in developing the Base Year calibration involved the segmentation of the commercial building stock into specific sub sectors. The choice of building sub sectors is driven by both data availability and the need to facilitate the subsequent analysis and modelling of potential electrical efficiency improvements.

For modelling and analysis of energy-efficiency opportunities, the selected building sub sectors must be reasonably similar in terms of major design and operating considerations, such as building size, typical mechanical and electrical systems, and annual operating hours. In order to facilitate energy modelling, this report deals primarily with buildings in which energy use is dominated by space conditioning and the provision of services to occupants (e.g., lighting and water heating). As discussed below, buildings where energy use is primarily process-driven are segregated into a separate category and treated at a less detailed level.

Based on discussions with the Utilities personnel, it was agreed that NL's existing commercial stock would be segmented into the following sub sectors:

- Large Office
- Small Office
- Large Non-food Retail
- Small Non-food Retail

- Food Retail
- Large Accommodations
- Small Accommodations
- Health Care (Hospitals & Nursing Homes)
- Schools (Elementary and Secondary)
- Universities and Colleges
- Warehouse/Wholesale
- Restaurants
- Isolated C/I Buildings
- Large Other Buildings
- Small Other Buildings
- Other Institutional Buildings
- Non-Buildings
- Street Lighting

A brief description of each Commercial sub sector is included in Appendix A. Additional explanation is provided for selected sub sectors:

- **Isolated C/I Buildings:** This sub sector includes buildings such as restaurants, schools, variety stores, medical clinics and multi-purpose garages and sheds that are located in isolated communities served by local diesel-powered systems.

- **Other Buildings:** This sub sector represents buildings that do not fit into the other sub sectors, including churches, theatres, community centres, transportation buildings and recreation complexes.

- **Other Institutional Buildings:** This sub sector includes buildings such as barracks, mess halls, hangers and warehouses located at Canadian Forces Base Goose Bay.

- **Non-Buildings:** This sub sector includes facilities such as microwave repeater stations and telephone exchanges. Although these facilities are housed within a "building," the majority of their electricity use is consumed by the unique equipment that it houses. This sub sector will be tracked throughout the study but will not be subjected to detailed analysis.

3.3 End Uses

Electricity use within each of the sub sectors noted above is defined on the basis of specific end uses. In this study, an end use is defined as “the final application or final use to which energy is applied. End uses are the services of economic value to the users of energy.”

A summary of the major commercial sector end uses used in this study is provided in Exhibit 3, together with a brief description of each.

Exhibit 3 Commercial Electric End Uses

End Use	Description
General Lighting	Lighting in main areas of a building (e.g., classrooms in a school)
Secondary Lighting	Lighting in secondary areas of a building (e.g., corridors/lobbies in a school)
Outdoor Lighting	Lighting used for parking lots and exterior building illumination
Computer Equipment	Computers, monitors, printers, fax machines, and copiers
Computer Servers	Computer servers
Other Plug Loads	Other plug loads, excluding computer equipment
Food Service Equipment	Food preparation equipment, including ranges, broilers, ovens, etc.
Refrigeration	Fridges, freezers, coolers, and display cases
Elevator	Passenger and freight elevators
Miscellaneous Equipment	Air compressors, sump pumps, clothes washers, etc.
Space Heating	Electric boilers, unit heaters, baseboard heaters
Space Cooling	Air-conditioning compressors
HVAC Fans & Pumps	Fans, pumps, cooling tower fans, etc.
Domestic Hot Water	Electric water heaters
Street Lighting	Roadway lighting
Block Heaters	Block heaters and other car warming equipment plugged into outlets in commercial building parking lots

3.4 End-use Saturation and Fuel Share Data

The next step in the analysis involved an estimation of the electric fuel share for space heating, domestic hot water (DHW) and food service equipment,[11] and an estimation of saturation for space cooling.[12] Various information sources were used to derive these estimates, including analysis of NL’s sales data, the Commercial End Use Survey (CEUS) from NL, previous project team

[11] Space heating fuel share refers to the percentage of the total floor space that is electrically heated; similarly, DHW fuel share refers to the percentage of the total floor space that is served by electrically heated domestic hot water. Food service equipment fuel share refers the electric portion of end-use energy.
[12] Space cooling saturation refers to the percentage of the total floor space that is air conditioned.

experience, comparable data from other Canadian jurisdictions contained in the ICF database, and consultations with local technical advisors.

Exhibit 4 and Exhibit 5 present the estimated fuel shares and space cooling saturations for each sub sector and service region. It should be noted that the electric fuel share and space cooling saturation was not estimated for all sub sectors. Rather, the end use EUIs for the other sub sectors was derived based on a weighted average of the EUIs for specific sub sectors. Section 5.3 includes more details on how this approach was implemented.

Exhibit 4 Electric Fuel Share by Sub sector & Service Region (%)

Sub Sector	Island Interconnected			Labrador Interconnected			Isolated		
	Space Heating	DHW	Food Service	Space Heating	DHW	Food Service	Space Heating	DHW	Food Service
Large Office	85%	90%	100%	100%	100%	100%	-	-	-
Small Office	90%	95%	100%	100%	100%	100%	-	-	-
Large Non-Food Retail	85%	90%	100%	100%	100%	100%	-	-	-
Small Non-Food Retail	85%	95%	100%	100%	100%	100%	-	-	-
Food Retail	85%	90%	100%	100%	100%	100%	-	-	-
Large Accomodation	90%	90%	98%	100%	100%	100%	-	-	-
Small Accomodation	90%	90%	100%	100%	100%	100%	-	-	-
Healthcare	50%	60%	100%	100%	100%	100%	-	-	-
Schools	75%	80%	100%	100%	100%	100%	-	-	-
Universities and Colleges	20%	25%	100%	90%	100%	100%	-	-	-
Warehouse / Wholesale	75%	80%	100%	80%	100%	100%	-	-	-
Restaurant	90%	95%	98%	100%	100%	100%	-	-	-
Labrador Isolated C/I Buildings	-	-	-	-	-	-	15%	15%	50%
Island Isolated C/I Buildings	-	-	-	-	-	-	15%	15%	50%

Exhibit 5 Space Cooling Saturation by Sub sector and Service Region (%)

Sub Sector	Island Interconnected	Labrador Interconnected	Isolated
Large Office	85%	50%	
Small Office	75%	25%	
Large Non-Food Retail	75%	50%	
Small Non-Food Retail	70%	50%	
Food Retail	65%	25%	
Large Accomodation	75%	25%	
Small Accomodation	50%	25%	
Healthcare	60%	50%	
Schools	2%	50%	
Universities and Colleges	15%	35%	
Warehouse / Wholesale	5%	2%	
Restaurant	70%	25%	
Labrador Isolated C/I Buildings	-	-	10%
Island Isolated C/I Buildings	-	-	0%

3.5 Detailed Building and Equipment Specifications

The next major task involved the development of detailed technical data on building specifications, mechanical and electrical equipment, operating practices and electricity use for each sub sector and end use identified above.

To facilitate the subsequent analysis of the potential impacts of energy-efficiency measures, the detailed data on building, equipment and operating practices were compiled within ICF's Commercial/Institutional Building Energy-use Simulation Model (CEEAM). Detailed building profiles were created that represent the stock of buildings within each sub sector. The detailed technical profiles constitute a bottom-up profile of energy use in the targeted sub sectors.

The building profiles developed for the 2008 CDM Potential Study were used as a starting point for several of the building profiles that were developed for this study. Development and refinement of the detailed building profiles relied on an analysis of data sources, primarily:

- The Commercial End Use Survey (CEUS) provided by the Utilities
- Professional experience of the study team personnel, including building site visits in Newfoundland and other jurisdictions

Separate building profiles were developed for both the Island Interconnected and the Labrador Interconnected service regions. Exhibit 6 presents a sample building profile summary. Detailed profiles for each existing building sub sector are provided in Appendix A.

Exhibit 6 Sample Building Profile Summary – Existing Large Office

Building Type: Large Office **Location:** Island Interconnected

Description:

The building characterisitics used to define the Large Office archetype are as follows:
- Average gross floor area of 40,000 ft²
- Average footprint of 13,333 ft² (approx. 115 ft x 115 ft)
- Average height of 3 stories

Building Envelope						
roof construction:	0.48 W/m².°C					
wall construction:	0.71 W/m².°C					
windows:	3.97 W/m².°C					
shading coefficient	0.58					
window to wall ratio	0.4					
General Lighting & LPD	550 Lux		14.8 W/m²			
System Types	INC	CFL	T12	T8	HID	T5HO
	0%	0%	20%	80%	0%	0%
Architectural Lighting & LPD	350 Lux		31.0 W/m²			
System Types	INC	CFL			HID	T5HO
	45%	45%			5%	0%
Overall LPD	16.4 W/m²					
Plug Loads	1.2 W/m²					
Computer Equipment	4.6 W/m²					
Ventilation:						
System Type	CAV	VAV	DD	IU	100%OA	Other
	75%	25%	0%	0%	0%	
System air Flow	3.6 L/s.m²		0.70 CFM/ft²			
Fan Power	6.0 W/m²		0.56 W/ft²			
Cooling Plant:						
System Type	Centrifugal	Centri HE	Recip Open	DX	LiBr.	Other
	20%	0%	0%	80%	0%	
Calculated Capacity	84 W/m²		450 ft²/Ton			
Cooling Plant Auxiliaries						
Circulating Pumps	0.5 W/m²		0.1 W/ft²			
Condenser Pumps	0.8 W/m²		0.1 W/ft²			
Condenser Fan Size	1.7 W/m²		0.2 W/ft²			

End-Use Summary	Electricity		Fuel Oil / Propane	
	MJ/m².yr	kWh/ft².yr	MJ/m².yr	kWh/ft².yr
GENERAL LIGHTING	202	5.2		
ARCHITECTURAL LIGHTING	60	1.5		
SPECIAL PURPOSE LIGHTING	0	0.0		
OUTDOOR LIGHTING	17	0.4		
SPACE HEATING	355	9.2	89.5	2.3
SPACE COOLING	38	1.0	0.0	0.0
HVAC FANS & PUMPS	173	4.5		
DOMESTIC HOT WATER	23	0.6	3.0	0.1
COMPUTER EQUIPMENT	91	2.4		
COMPUTER SERVERS	16	0.4		
OTHER PLUG LOADS	28	0.7		
FOOD SERVICE EQUIPMENT	4	0.1	0.0	0.0
REFRIGERATION	4	0.1		
ELEVATORS	3.9	0.1		
MISCELLANEOUS	10	0.3		
BLOCK HEATERS	0	0.0		
Total	**1,025**	**26.5**	**92.5**	**2.4**

3.6 Floor Area Calculations

The addition of floor area is used to drive changes in NL's commercial building stock over the study period, including changes to equipment and electricity use. For the purposes of this study, floor space was derived by dividing the actual sales data for each building sub sector by the applicable fuel share and saturation-weighted whole-building electricity use intensity (EUI). The EUIs used in this calculation were based on the detailed building models for each of the sub sectors and the estimates for fuel share and saturation, as discussed in Sections 3.4 and 0. Exhibit 7 shows the resulting estimates of floor area within each building sub sector and service region.

Exhibit 7 Base Year Floor Area (ft^2) by Sub sector and Service Region

Sub Sector	Island Interconnected	Isolated	Labrador Interconnected	Grand Total
Large Office	10,328,000	-	-	10,328,000
Small Office	8,407,000	-	168,000	8,575,000
Large Non-food Retail	3,817,000	-	273,000	4,090,000
Small Non-food Retail	5,531,000	-	525,000	6,056,000
Food Retail	2,823,000	-	159,000	2,982,000
Large Accomodation	2,442,000	-	234,000	2,677,000
Small Accomodation	1,162,000	-	31,000	1,193,000
Healthcare	4,034,000	-	573,000	4,608,000
Schools	13,600,000	-	741,000	14,341,000
Universities and Colleges	7,391,000	-	118,000	7,509,000
Warehouse/Wholesale	5,075,000	-	370,000	5,444,000
Restaurants	994,000	-	89,000	1,083,000
Labrador Isolated C/I Buildings	-	2,179,000	-	2,179,000
Island Isolated C/I Buildings	-	205,000	-	205,000
Large Other Buildings	6,373,000	-	2,228,000	8,601,000
Small Other Buildings	6,214,000	-	1,500,000	7,715,000
Other Institutional	-	-	2,960,000	2,960,000
Non-Buildings	-	-	-	-
Street Lighting	-	-	-	-
Grand Total	78,193,000	2,383,000	9,969,000	90,545,000

Note: Any differences in totals are due to rounding.

For the Island service region, the total floor area of the modelled sub sectors is approximately 78 million square feet. The largest sub sector is Schools, which accounts for 17.4% of the total floor area, followed by Large Office at 13.2%, Small Office at 10.8% and Universities and Colleges at 9.5%.

For the Labrador Interconnected service region, the total floor area of the modelled sub sectors is approximately 10 million square feet. The largest sub sector is Other Institutional, which accounts for 29.7% of the total floor area, followed by Large Other Buildings at 22.3%, Small Other Buildings at 15.1% and Schools at 7.4%.

3.7 Summary of Commercial Base Year Electricity Use

This section presents the results of the analysis of electricity consumption for the Base Year 2014. The results are measured at the customer's point-of-use and do not include line losses; they are presented in five separate exhibits:

- Exhibit 8 presents base year electricity consumption in tabular form by sub sector type and end use
- Exhibit 11 through Exhibit 10 present the results by sub sector, by region and by end use respectively.
- Exhibit 12 presents the model results as a series of stacked bars, showing the percentage consumed by end use for each sub sector.

Additional highlights are provided below.

By Sub Sector
Large Office Buildings account for the largest share of electricity use within the sub sectors (11.6%), followed by Large Other Buildings (9.2%), Non-Buildings (8.7%), and Small Office at 8.2%.

By Region
The Island Interconnected region accounts for 88% of commercial electricity consumption, while the Labrador Interconnected region accounts for 11% of commercial electricity consumption. Commercial accounts connected to isolated diesel grids consume the remaining 1% of commercial electricity.

By End Use
Space heating is the largest end use, accounting for about 27% of Commercial sector electricity use followed by general lighting (17%), HVAC fans & pumps (12%), and Miscellaneous Equipment (9%).

By Sub Sector and End Use
The last exhibit in this section highlights the differences among sub sectors. Offices and schools show a higher percentage of consumption for HVAC and lighting than food retail where the electricity use is dominated by refrigeration. Sub sectors such as large and small accommodation and restaurants have a higher amount of electricity consumption in the domestic hot water end use.

Data Manager

As part of this report, an Excel application called Data Manager is provided. This Excel workbook has the ability to produce charts and tables looking at the data filtered and segmented in many ways. For example:

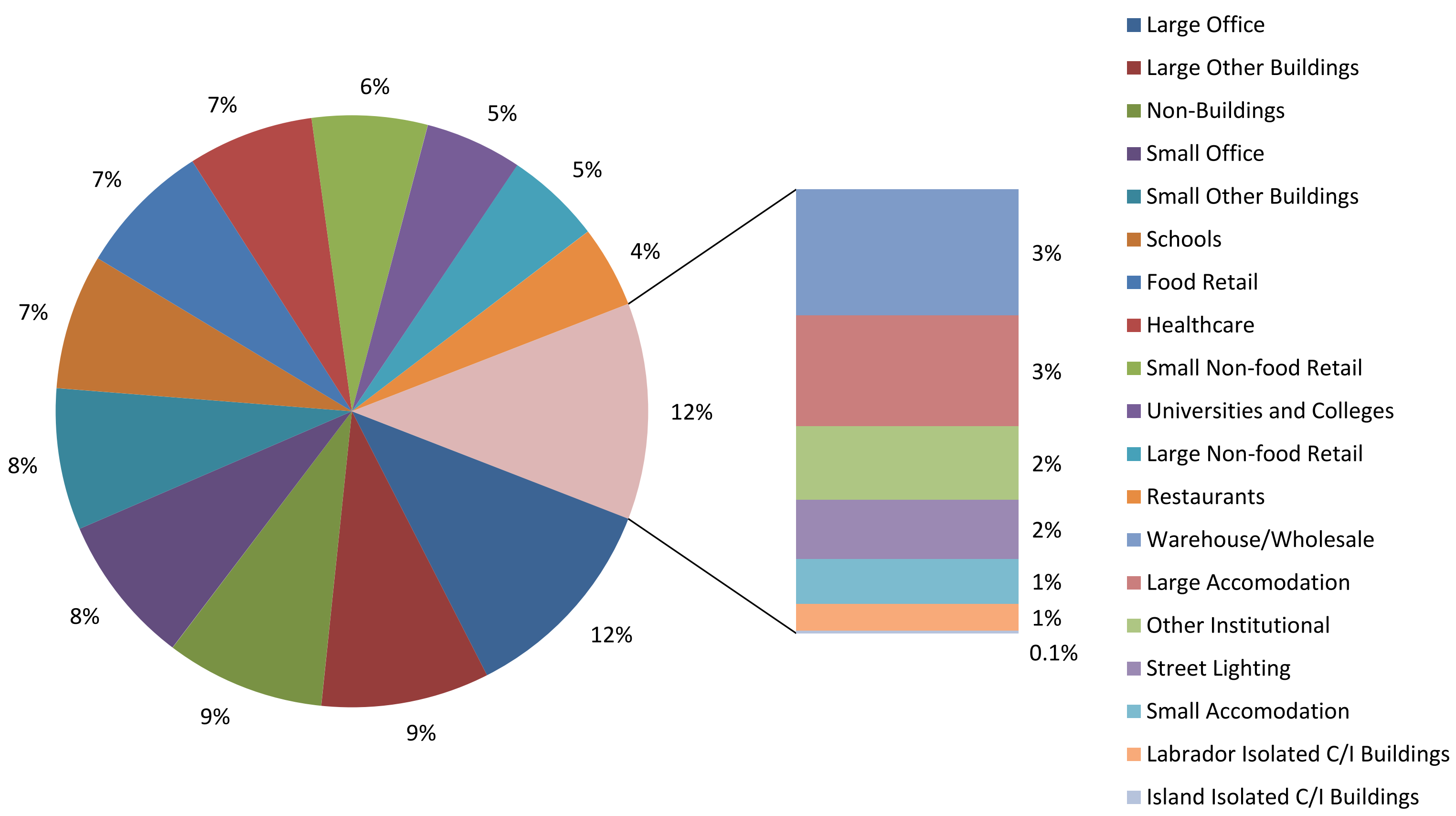
- The user can produce a pie chart of electricity consumption by end use for an individual sub sector of interest, such as large offices.
- The user can produce a column chart showing the electricity consumption for space heating and lighting in each of several sub sector types, with each sub sector type as a separate column and the different end use consumption values shown stacked on top of each other.
- The user can produce a line chart showing consumption for a particular sub sector type by year.

Data Manager has a user interface designed for someone with basic knowledge of Excel.

Exhibit 8 Base Year Annual Electricity Consumption by Sub sector and End Use, All of NL (MWh/yr.)

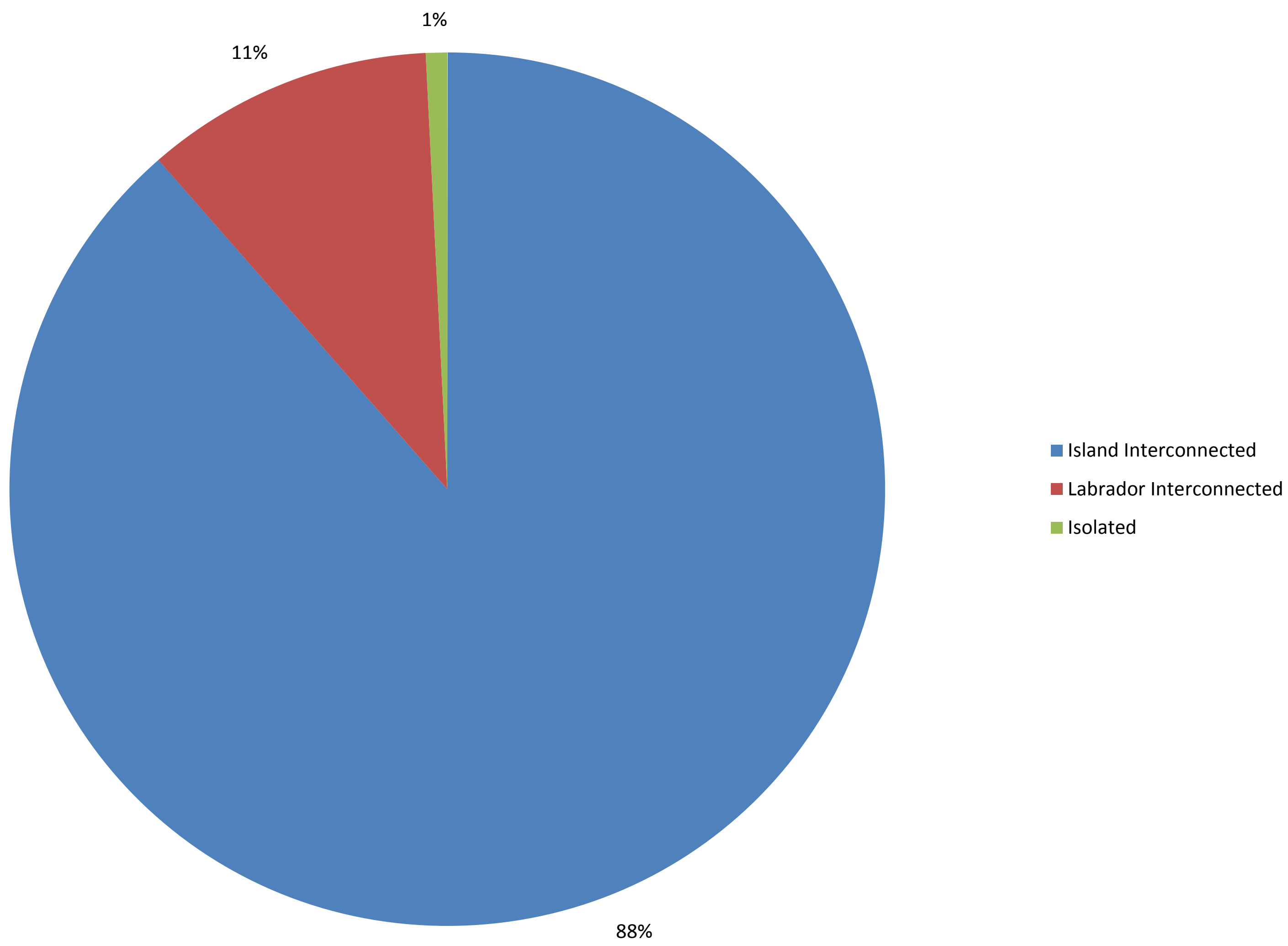
Sub Sector	Space Heating	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Refrigeration	Secondary Lighting	Domestic Hot Water	Computer Equipment	Food Service Equipment	Other Plug Loads	Outdoor Lighting	Space Cooling	Street Lighting	Computer Servers	Elevator	Block Heaters	Grand Total
Large Office	94,614	53,893	46,186	2,666	1,067	15,973	5,999	24,326	1,067	7,386	4,524	10,209	-	4,319	1,033	-	273,262
Small Office	76,520	40,527	20,053	2,192	868	6,020	5,263	20,197	-	6,132	3,756	7,928	-	3,586	-	22	193,065
Large Non-food Retail	30,090	36,209	28,344	1,021	6,135	3,845	1,819	2,021	4,090	2,632	3,583	3,224	-	467	-	35	123,515
Small Non-food Retail	45,979	45,510	29,767	1,496	-	5,322	2,835	2,993	-	3,896	5,305	4,984	-	691	-	68	148,847
Food Retail	23,490	20,697	11,522	749	91,544	3,236	3,484	2,323	9,237	2,502	2,612	1,610	-	327	-	21	173,352
Large Accomodation	20,548	7,426	5,946	661	2,073	7,856	16,327	1,194	3,392	1,321	1,172	1,210	-	254	244	30	69,655
Small Accomodation	9,922	3,788	1,435	304	462	2,102	7,230	537	770	589	523	411	-	113	-	4	28,191
Healthcare	57,863	5,258	30,746	1,116	1,784	24,911	10,048	4,163	9,516	8,004	4,036	2,446	-	963	864	222	161,941
Schools	83,105	45,131	9,356	1,082	1,074	10,063	5,700	7,777	1,481	1,567	6,281	279	-	1,363	-	29	174,289
Universities and Colleges	12,738	40,181	35,767	1,923	3,877	5,076	1,269	10,028	2,908	4,881	3,289	1,341	-	714	739	15	124,745
Warehouse/Wholesale	28,325	20,567	4,753	1,358	8,433	4,089	2,136	1,869	-	4,518	2,385	114	-	621	-	48	79,216
Restaurants	13,061	2,564	3,573	268	18,173	8,146	20,519	447	36,502	598	474	1,007	-	124	-	12	105,467
Labrador Isolated C/I Buildings	580	6,909	1,132	-	3,416	1,608	149	1,051	496	677	739	-	-	-	-	305	17,062
Island Isolated C/I Buildings	-	649	106	-	321	151	-	99	47	64	69	-	-	-	-	-	1,505
Large Other Buildings	65,447	36,027	27,825	1,564	22,200	14,680	13,133	8,017	12,662	5,660	4,741	2,936	-	1,388	406	358	217,045
Small Other Buildings	56,786	33,165	21,646	1,450	18,691	10,949	9,525	7,223	9,684	5,022	4,365	2,711	-	1,240	227	238	182,923
Other Institutional	10,017	12,713	8,247	412	1,763	4,559	2,407	1,212	537	2,075	1,406	219	-	-	-	412	45,979
Non-Buildings	-	-	-	204,856	-	-	-	-	-	-	-	-	-	-	-	-	204,856
Street Lighting	-	-	-	-	-	-	-	-	-	-	-	-	37,127	-	-	-	37,127
Grand Total	629,085	411,214	286,405	223,118	181,881	128,587	107,844	95,476	92,387	57,527	49,260	40,630	37,127	16,170	3,514	1,817	2,362,042

Exhibit 9 Distribution of Electricity Consumption by Sub sector in the Base Year (2014)



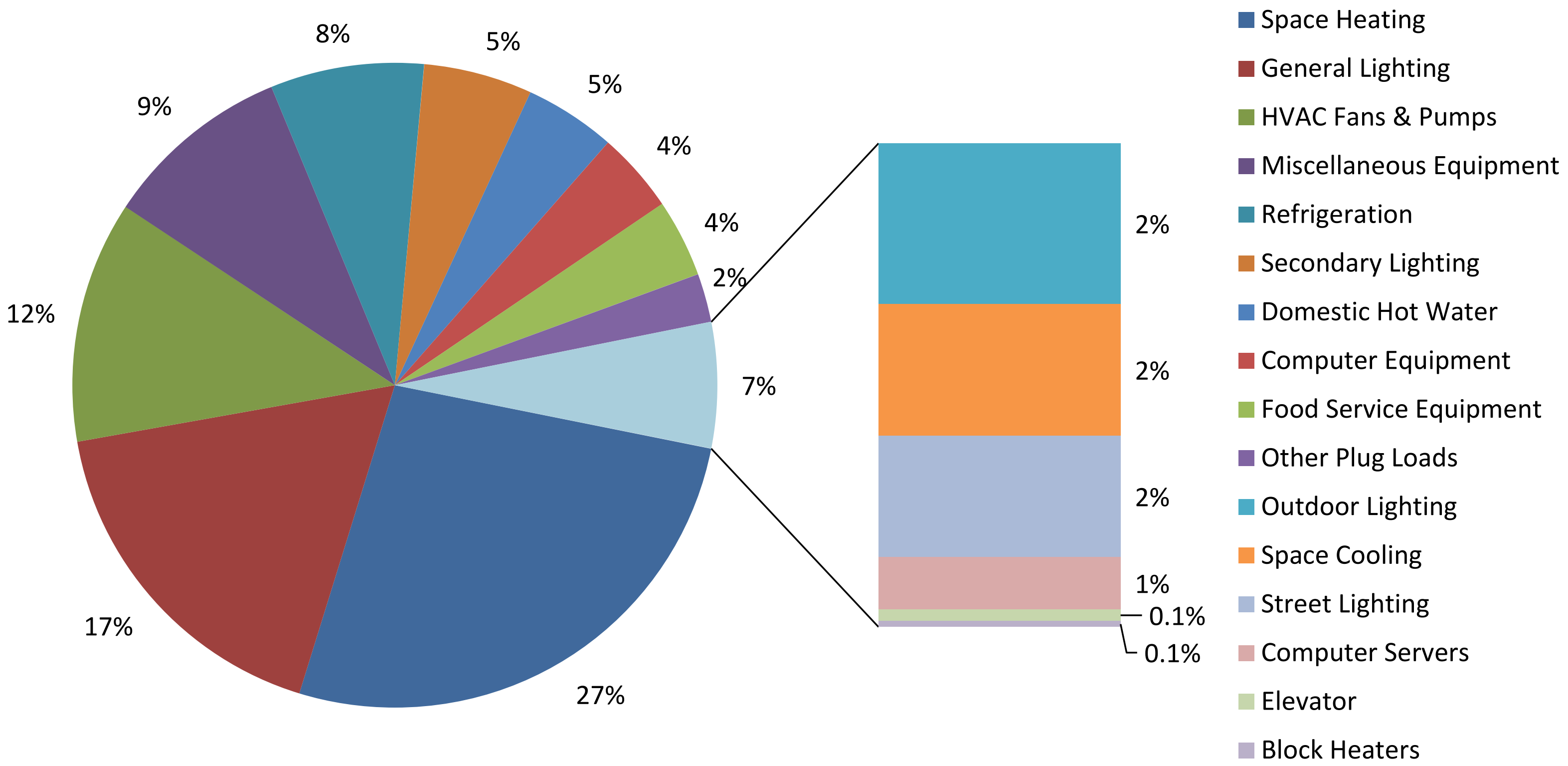
Totals may not add to 100% due to rounding.

Exhibit 10 Distribution of Electricity Consumption, by Region in the Base Year (2014)



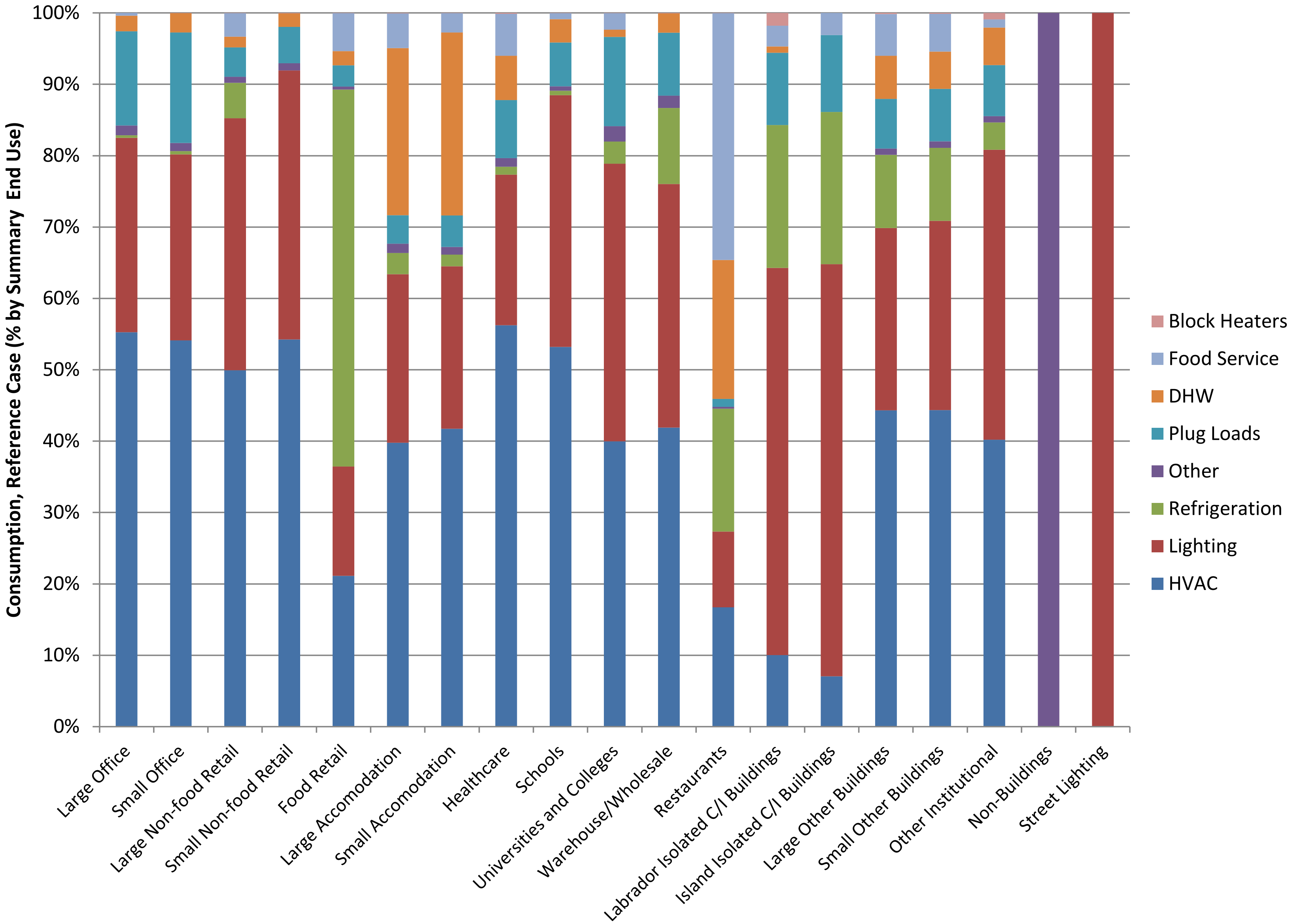
Totals may not add to 100% due to rounding.

Exhibit 11 Distribution of Electricity Consumption, by End Use in the Base Year (2014)



Totals may not add to 100% due to rounding.

Exhibit 12 Distribution of Electricity Consumption, by Sub Sector and End Use in the Base Year (2014)



4 Base Year (2014) Electric Peak Load

4.1 Introduction

This section provides a profile of the Base Year electric peak load for NL's Commercial sector. The discussion is organized into the following sub-sections:

- Peak period definitions
- Methodology
- Summary of results

Additional details are provided in Appendix B.

4.2 Peak Period Definitions

Based on discussions with utility personnel, the peak period of interest was the same as in the 2007-2008 study:

Peak Period – The morning period from 7 am to noon and the evening period from 4 pm to 8 pm on the four coldest days in the December to March period; this is a total of 36 hours per year.[13]

The system capacity constraints are very dependent on cold weather. The NL utilities are do not currently experience capacity constraints in the summer. In future, there may be financial advantages to reducing system demand in summer in order to market more power to summer-peaking utilities in the U.S. That possibility was not explored in this study.

4.3 Methodology

The electric peak load profile converts the annual electric energy use (MWh) presented in Section 3 to hourly demand (MW). Development of the electric peak load estimates employs four specific factors, which are described below and shown graphically in **Error! Not a valid bookmark self-reference.**.

- **Monthly Usage Allocation Factor:** This factor represents the percent of annual electric energy usage that is allocated to each month. This set of monthly fractions (percentages) reflects the seasonality of the load shape, whether a facility, process or end use, and is dictated by weather or other seasonal factors. In decreasing order of priority, this allocation factor can be obtained from either:
  - Monthly consumption statistics from end-use load studies
  - Monthly seasonal sales (preferably weather normalized) obtained by subtracting a "base" month from winter and summer heating and cooling months, or
  - Heating or cooling degree days applied to an appropriate base.

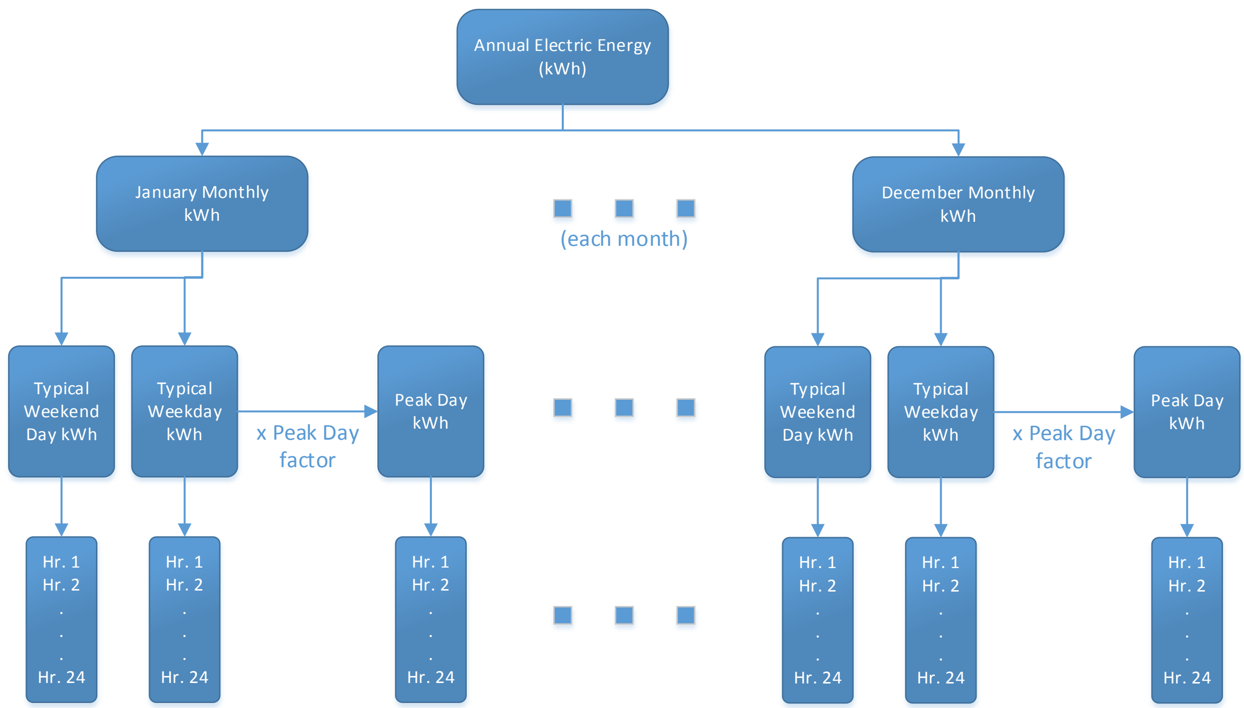
- **Weekend to Weekday Factor:** This factor is a ratio that describes the relationship between weekends and weekdays, reflecting the degree of weekend activity inherent in the facility or end

[13] Source: NL (Feb 2014) http://hydroblog.nalcorenergy.com/meeting-peak-demand/

use. This may vary by month or season. Based on this ratio, the average electric energy per day type can be computed from the corresponding monthly electric energy.

- **Peak Day Factor:** This factor reflects the degree of daily weather sensitivity associated with the load shape, particularly heating or cooling; it compares a peak (e.g., hottest or coldest) day to a typical weekday in that month.
- **Per Unit Hourly Factor:** This factor reflects the operating hours of the commercial electric equipment or end uses among different hours of the day for each day type (weekday, weekend day, peak day) and for each month. For example, for lighting, this would be affected by time of day and season (affected by daylight).

Exhibit 13 Overview of Peak Load Profile Methodology



4.4 Summary of Results

The factors defined above provided the basis for converting the annual commercial electricity use presented in Section 3 to aggregate peak loads in the peak period.

Exhibit 14 presents the results for the Commercial sector Base Year. The results are presented for each of the three regions in NL, by sub sector type. In each case, the results show the contribution of Commercial sector demand that is coincident with the total demand in the peak period.

Exhibit 14 Commercial Sector Base Year (2014) Aggregate Peak Demand by Region (MW)

Sub-Sector Type	Island Interconnected	Labrador Interconnected	Isolated	Grand Total
Large Office	62	-	-	62
Small Office	45	1	-	46
Large Non-food Retail	27	2	-	29
Small Non-food Retail	33	4	-	36
Food Retail	29	3	-	32
Large Accomodation	16	2	-	18
Small Accomodation	7	0	-	8
Healthcare	33	3	-	36
Schools	43	3	-	46
Universities and Colleges	22	1	-	23
Warehouse/Wholesale	16	2	-	17
Restaurants	28	2	-	30
Labrador Isolated C/I Buildings	-	-	3	3
Island Isolated C/I Buildings	-	-	0	0
Large Other Buildings	35	15	-	49
Small Other Buildings	32	10	-	41
Other Institutional	-	9	-	9
Non-Buildings	30	1	-	31
Street Lighting	5	0	0	5
Grand Total	**463**	**56**	**3**	**522**

Exhibit 15 shows the contribution, by end use, to the commercial component of the peak demand. Some key observations may be made:

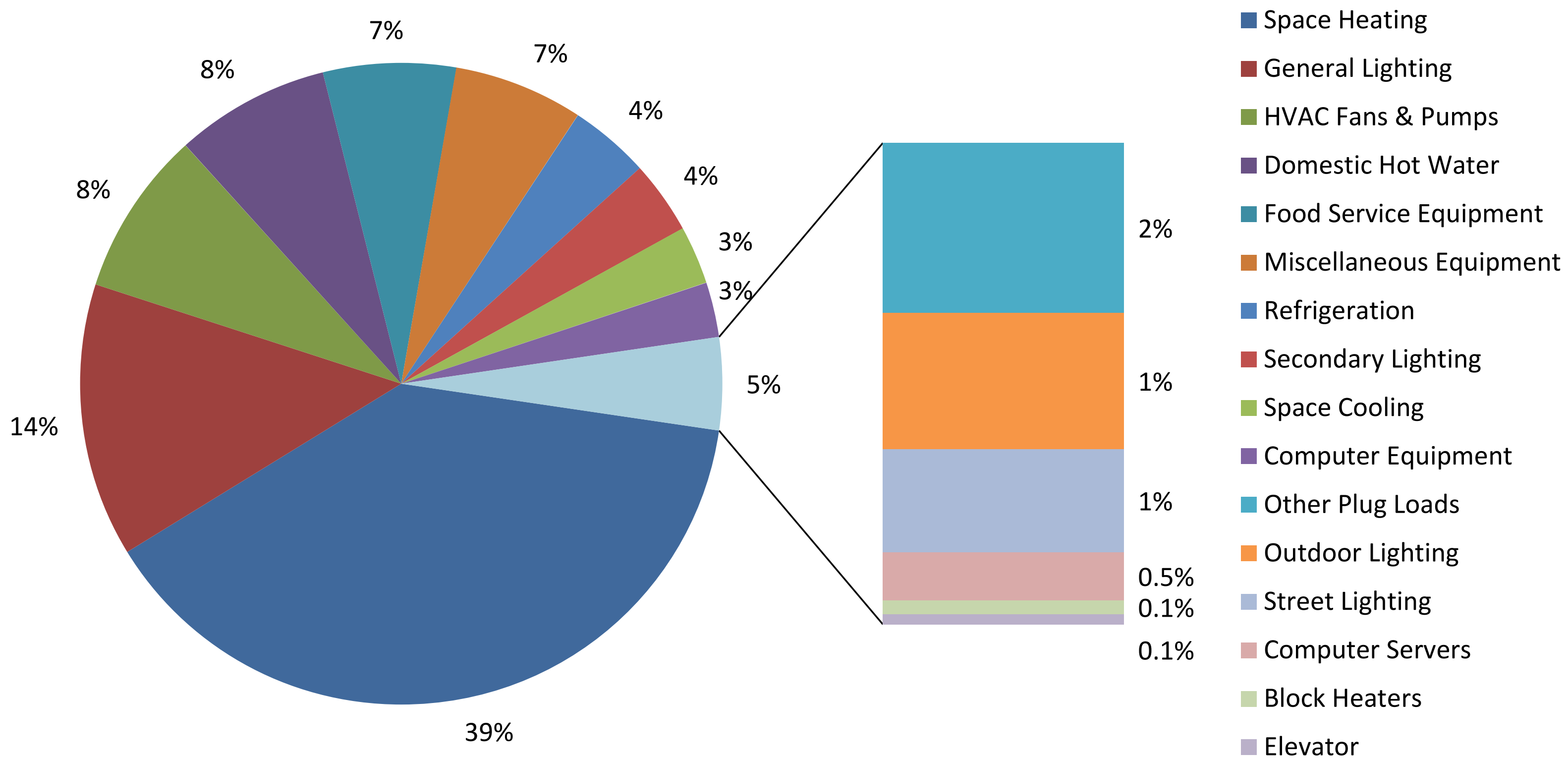
- Space heating is the largest commercial component of peak demand. As shown in the previous section, space heating is the largest end use in terms of annual electrical consumption. It also tends to be concentrated in the winter when the NL system peaks.

- General lighting is the second largest commercial component of peak demand. As shown in the previous section, lighting is a relatively large end use in terms of annual electrical consumption.

- HVAC Fans & Pumps are the third largest commercial contributor to peak demand. As shown in the previous section, HVAC Fans & Pumps are a relatively large end use in terms of annual electrical consumption.

- Domestic Hot Water is the fourth largest commercial contributor to peak demand. As shown in the previous section, domestic hot water is a relatively large end use in terms of electrical consumption.

Exhibit 15 Contribution by End Use to Commercial Aggregate Peak Demand (%)



Additional detail is provided in Appendix B.

5 Reference Case Electric Energy Forecast

5.1 Introduction

This section presents the Commercial sector Reference Case for the study period (2014 to 2029). The Reference Case estimates the expected level of electricity consumption that would occur over the study period in the absence of new utility-based CDM initiatives. As such, the Reference Case provides the point of comparison for the calculation of electricity saving opportunities associated with each of the scenarios that are assessed within this study.

The Reference Case discussion is presented within the following sub-sections:

- Methodology
- New Commercial Buildings
- "Natural Changes" to Electricity Use Intensity
- Commercial Floor Space
- Summary of Model Results
- Selected Highlights

5.2 Methodology

Development of the Reference Case involved the following three steps:

Step 1: Detailed building archetypes were developed for "New" buildings in each of the Commercial sub sectors. For the purposes of this study, any facility built after the Base Year is considered to be a "New" building. Each profile defines building specifications, mechanical equipment, lighting equipment and other electricity-using equipment.

Step 2: Expected "natural" changes in electricity consumption patterns over the study period were estimated. Special consideration was given to three factors:

- Naturally-occurring improvements in equipment efficiency through time.
- Expected stock penetration by more efficient equipment as older, inefficient equipment reaches the end of its service life.
- Changes in equipment density (e.g., computers and plug loads) or loads (e.g., required ventilation rates).

Step 3: The growth in floor space within each building sub sector over the study period was estimated. The growth rates were derived from the load forecast data provided by the Utilities.

5.3 New Commercial Buildings

The first task in building the Reference Case involved the development of detailed technical profiles that define building specifications, mechanical equipment, lighting equipment and electricity use for the new buildings in each of the commercial building sub sectors. In each case, the new building profiles were developed using CEEAM and the same approach as described previously in Section 3.5. Detailed profiles for each building sub sector are provided in Appendix C. Exhibit 16 highlights the resulting whole building electric EUIs for each new commercial building sub sector. For the purposes of comparison, it also shows whole-building electric EUIs for each of the existing building sub sectors.

Other trends include:

- Higher efficiency building envelopes, including improved window U-values and higher levels of wall and roof insulation.
- Improved lighting system efficiency, including higher efficacy lighting sources and lower light levels where appropriate.
- Increased saturation of space cooling in some sub sectors.
- 100% penetration of electric space heating and domestic hot water heating in new construction.

Certain sub sectors were not modelled with CEEAM. The methodology for determining the end use EUIs for these sub sectors is described in more detail below:

- **Large Other Buildings:** These buildings are assumed to be a composite of the Large Office, Large Non-Food Retail, Food Retail, Large Accommodation, Healthcare, Schools, Universities and Colleges, Warehouse/Wholesale, and Restaurants sub sectors. Their EUIs for each end use are estimated by taking a weighted average of the end use EUIs of each of the aforementioned building types.
- **Small Other Buildings:** These buildings are assumed to be a composite of the Small Office, Small Non-Food Retail, Food Retail, Small Accommodation, Healthcare, Schools, Universities and Colleges, Warehouse/Wholesale, and Restaurants sub sectors. Their EUIs for each end use are estimated by taking a weighted average of the end use EUIs of each of the aforementioned building types.
- **Other Institutional:** The military base at Goose Bay is assumed to be a composite of the Small Office, Food Retail, Small Non-Food Retail, Small Accommodation, Healthcare, Warehouse/Wholesale, and Restaurant sub sectors.
- **Isolated C/I Buildings:** The end use EUIs for these sub sectors, Island and Labrador, are based on energy audit data for buildings in these regions. The buildings in the isolated regions are not further broken down into sub sectors because of a lack of detailed information about specific sub sectors and because building types do not differ as much in the isolated regions as they do in larger urban areas.

Exhibit 16 Comparison of Whole Building Electric EUIs by Sub Sector, (kWh/ft^2/yr.)

Sub Sector	Island Interconnected		Labrador Interconnected		Comments
	Existing Buildings	New Buildings	Existing Buildings	New Buildings	
Large Office	28.3	25.7	28.6	35.7	New Office buildings have higher efficiency lighting and envelope systems. This is offset by a higher space cooling saturation and electric space heating share.
Small Office	23.8	22.2	22.8	26.9	
Large Non-food Retail	31.9	24.1	29.4	29.5	New Non-food retail buildings have higher efficiency lighting and envelope systems. This is offset by a higher space cooling saturation and electric space heating share.
Small Non-food Retail	26.0	23.6	27.9	25.6	
Food Retail	59.0	53.2	72.2	53.2	New Food Retail buildings are typically equipped w ith higher efficiency lighting, HVAC and envelope systems. This is offset by higher a space cooling saturation and electric space heating share.
Large Accommodation	27.3	23.4	30.3	28.6	New Hotels and Motels have higher efficiency lighting and envelope systems. This is offset by a higher electric space heating share and higher space cooling saturations due primarily to increased instance of in-room heating/cooling units.
Small Accommodation	25.4	22.2	30.3	30.1	
Healthcare	51.4	35.0	29.6	31.0	New healthcare buildings have higher efficiency lighting and envelope systems, and higher space cooling saturation. This is offset somew hat by higher ventilation rates, particularly in larger buildings and a higher electric space heating share.
School	14.9	13.3	18.5	15.3	New Schools have higher efficiency lighting and envelope systems. This is offset by a higher electric space heating share.
Universities and Colleges	24.1	19.6	26.3	24.8	New Universities and Colleges have higher efficiency lighting and envelope systems. This is offset by a higher electric space heating share.
Warehouse / Wholesale	16.2	14.0	21.1	16.8	New Warehouse/Wholesale buildings have higher efficiency lighting and envelope systems. This is offset by a higher electric space heating share.
Restaurant	100.9	102.9	97.0	92.9	New Restaurants have higher efficiency lighting, and envelope systems. This is offset by a higher electric space heating share.
Large Other	24.0	23.4	28.8	26.9	Changes to this sub sector are a consequence of changes to its constituent building types (see below).
Small Other	22.7	22.7	28.0	26.3	Changes to this sub sector are a consequence of changes to its constituent building types (see below).
Other Institutional	N/A	N/A	15.5	14.6	No major changes to construction practices are anticipated.
Island Isolated C/I	7.4	7.1	N/A	N/A	Natural changes to equipment efficiency are expected to drive EUI reduction.
Labrador Isolated C/I	N/A	N/A	7.8	7.5	Natural changes to equipment efficiency are expected to drive EUI reduction.

5.4 "Natural Changes" to Electricity Use Intensity

The next task involved estimating changes in electricity consumption patterns that would occur within the existing building stock over the study period in the absence of any CDM programming or influence. This included consideration of three major factors:

- Naturally-occurring improvements in equipment efficiency
- Expected stock penetration by more efficient equipment
- Changes in the saturation/intensity of end-use services (e.g., cooling, plug loads etc.)

These factors strongly influence future electric energy use within the Commercial sector. While the first two factors will have the effect of reducing electricity consumption, the last factor will result in increased electricity demand. Other considerations, such as operating hours and fuel share, may also affect future electricity demand. However, the values assumed in existing and new stock were assumed to remain constant over the study period.

Based on the assessment of current trends, the most significant natural changes are expected to involve the following end uses:

- Reduced lighting EUIs in existing buildings due to efficiency improvements at the time of natural stock turnover

- A trend toward more efficient space cooling equipment in existing buildings

- Increased computer equipment and plug load EUIs due to higher equipment densities

Detailed assumptions regarding natural change are presented in Appendix C.

5.5 Commercial Floor Space

The final task in the construction of the Reference Case involved calibration with NLH and NLP's load forecasts through time. This was accomplished using the following steps:

- Estimate and apply the expected impact of natural changes (see Section 5.4 above) within the existing building stock for each sub sector (i.e., an adjusted EUI that includes the effects of natural conservation at each milestone year)

- Add new buildings to the stock in order to match forecasted consumption in each combination of sub sector and milestone year.

A summary of the resulting floor space estimates in the Island Interconnected, Labrador Interconnected, and Isolated grids by sub sector and milestone year are provided in the following exhibits.

Exhibit 17 Commercial Sector Floor Space (ft^2), by Sub Sector and Milestone Year – Island Interconnected

Sub Sector	2014	2017	2020	2023	2026	2029
Large Office	10,328,000	10,615,000	11,014,000	11,559,000	11,950,000	12,399,000
Small Office	8,407,000	8,588,000	9,043,000	9,439,000	9,722,000	10,047,000
Large Non-food Retail	3,817,000	3,930,000	4,169,000	4,377,000	4,532,000	4,708,000
Small Non-food Retail	5,531,000	5,606,000	5,841,000	6,082,000	6,266,000	6,474,000
Food Retail	2,823,000	2,864,000	2,990,000	3,111,000	3,198,000	3,297,000
Large Accomodation	2,442,000	2,490,000	2,620,000	2,742,000	2,831,000	2,933,000
Small Accomodation	1,162,000	1,174,000	1,221,000	1,271,000	1,308,000	1,349,000
Healthcare	4,034,000	4,059,000	4,176,000	4,303,000	4,397,000	4,502,000
Schools	13,600,000	13,817,000	14,448,000	15,083,000	15,562,000	16,102,000
Universities and Colleges	7,391,000	7,475,000	7,617,000	7,744,000	7,847,000	7,961,000
Warehouse/Wholesale	5,075,000	5,187,000	5,435,000	5,654,000	5,816,000	6,001,000
Restaurants	994,000	1,011,000	1,061,000	1,106,000	1,138,000	1,174,000
Large Other Buildings	6,373,000	6,492,000	6,778,000	7,040,000	7,232,000	7,451,000
Small Other Buildings	6,214,000	6,184,000	6,328,000	6,543,000	6,705,000	6,885,000
Grand Total	78,193,000	79,492,000	82,741,000	86,053,000	88,504,000	91,284,000

Note: Any differences in totals are due to rounding.

Exhibit 18 Commercial Sector Floor Space (ft^2), by Sub Sector and Milestone Year – Labrador Interconnected

Sub Sector	2014	2017	2020	2023	2026	2029
Large Office	-	-	-	-	-	-
Small Office	168,000	168,000	172,000	176,000	180,000	184,000
Large Non-food Retail	273,000	275,000	277,000	279,000	281,000	283,000
Small Non-food Retail	525,000	528,000	545,000	560,000	575,000	590,000
Food Retail	159,000	159,000	160,000	161,000	162,000	163,000
Large Accomodation	234,000	235,000	236,000	237,000	238,000	239,000
Small Accomodation	31,000	31,000	32,000	33,000	33,000	34,000
Healthcare	573,000	442,000	444,000	446,000	449,000	451,000
Schools	741,000	744,000	752,000	760,000	768,000	776,000
Universities and Colleges	118,000	118,000	119,000	119,000	120,000	120,000
Warehouse/Wholesale	370,000	371,000	377,000	382,000	388,000	393,000
Restaurants	89,000	90,000	91,000	92,000	93,000	94,000
Large Other Buildings	2,228,000	2,236,000	2,245,000	2,254,000	2,263,000	2,271,000
Small Other Buildings	1,500,000	1,503,000	1,547,000	1,585,000	1,622,000	1,658,000
Other Institutional	2,960,000	2,983,000	3,005,000	3,028,000	3,051,000	3,075,000
Grand Total	9,969,000	9,882,000	10,003,000	10,113,000	10,222,000	10,331,000

Note: Any differences in totals are due to rounding.

Exhibit 19 Commercial Sector Floor Space (ft^2), by Sub Sector and Milestone Year – Isolated

Sub Sector	2014	2017	2020	2023	2026	2029
Labrador Isolated C/I Buildings	2,179,000	2,153,000	2,506,000	2,620,000	2,727,000	2,836,000
Island Isolated C/I Buildings	205,000	201,000	240,000	251,000	262,000	273,000
Grand Total	2,383,000	2,354,000	2,746,000	2,870,000	2,989,000	3,109,000

Note: Any differences in totals are due to rounding.

5.6 Summary of Results

This section presents the results of the model runs for the entire study period. The results are measured at the customer's point-of-use and do not include line losses. They are presented in four exhibits:

- Exhibit 20 presents the model results in tabular form, by sub sector type, end use and milestone year
- Exhibit 21 presents the model results for 2029 by subsector type
- Exhibit 22 presents the model results for 2029 by by region

Exhibit 23 presents the model results for 2029 by end use

- Exhibit 24 shows the evolving relative contribution of different summary end uses towards the total consumption in different sub sector types.

As illustrated, the combined Reference Case for all regions indicates that, in the absence of new utility-based CDM initiatives, total Commercial sector electricity consumption is expected to increase from approximately 2.36 million MWh/yr. in the Base Year to approximately 2.70 million MWh/yr. in 2029. This is an increase of approximately 14.1% over the study period.

Selected highlights are provided below.

By Sub Sector

Large and small office buildings contribute the largest portion of electricity consumption increases to the overall growth rate, about 25% of total load growth. The retail sector, including food retail and large and small non-food retail, also accounts for a significant portion of load growth (18%).

By Region

The division of electricity consumption by region is expected to remain stable over the study period, with the Island Interconnected region continuing to account for 88% of commercial electricity consumption, the Labrador Interconnected region accounting for 11%, and accounts connected to isolated diesel grids consuming the remaining 1%.

By End Use

Overall, electricity use grows a total of about 14% over the study period. This growth is driven in large part by increases in space heating electricity consumption, which grows by 21% between 2014 and 2029, due to a large number of new electrically heated buildings being introduced in to the building stock. A knock-on effect of the move toward electric space heating in new buildings is that electricity consumption for water heating also increases dramatically (17% growth), as electrically heated buildings rarely invest in fossil fuel infrastructure for water heating only.

Three additional end uses also experience significant growth from 2014 to 2029: space cooling (19%), HVAC fans and pumps (17%), and computer equipment (26%), servers (27%), and plug loads (24%).

Between 2014 and 2029 space cooling (19%) and HVAC fans and pumps (17%) increase as a consequence of a trend towards higher space cooling saturations. Computer equipment (26%), servers (27%), and plug loads (24%) increase between 2014 and 2029, reflecting increased densities of computer equipment and plug loads which offset efficiency gains in equipment over the period.

End uses which grow at a significantly slower rate than average include general lighting (4%) and secondary lighting, which decreases by 1.2%. Lighting end uses show a slight decline in importance as more efficient new buildings are introduced into the building stock through time, and as a result of naturally occurring lighting retrofits in existing buildings.

In terms of absolute contribution, space heating accounts for the largest portion of overall load growth (133,000 MWh or about 40% of total load growth). This is followed by HVAC fans & pumps (15%), miscellaneous equipment (9%), refrigeration (8%) and computer equipment (8%).

By Sub sector and End Use

The last exhibit in this section shows the trends in consumption by sub sector and end-use groupings. The following key observations can be made:

- Consumption in the HVAC end uses is expected to modestly increase in most commercial sub sectors between now and 2029
- Lighting is expected to account for a slightly diminishing share of commercial electricity consumption between now and 2029, even without new CDM intervention, largely as a result of naturally occurring lighting retrofits in existing buildings.
- The exhibit also permits comparisons of end-use consumption proportions from one sub sector type to another. These patterns are expected to remain relatively consistent through the study period.

Exhibit 20 Reference Case Electricity Consumption, Modelled by End Use, Sub sector and Milestone Year (MWh/yr.)

Sub-Sector	Year	Space Heating	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Refrigeration	Secondary Lighting	Domestic Hot Water	Computer Equipment	Food Service Equipment	Other Plug Loads	Outdoor Lighting	Space Cooling	Street Lighting	Computer Servers	Elevator	Block Heaters	Grand Total
Large Office	2014	94,614	53,893	46,186	2,666	1,067	15,973	5,999	24,326	1,067	7,386	4,524	10,209	0	4,319	1,033	0	273,262
	2017	96,854	54,127	47,938	2,740	1,096	15,870	6,179	25,489	1,096	7,739	4,469	10,463	0	4,526	1,062	0	279,648
	2020	99,960	54,868	50,370	2,843	1,137	15,850	6,427	26,914	1,137	8,172	4,462	10,855	0	4,779	1,101	0	288,877
	2023	104,216	56,281	53,700	2,984	1,194	15,942	6,768	28,686	1,194	8,710	4,520	11,430	0	5,093	1,156	0	301,873
	2026	107,265	56,989	56,085	3,085	1,234	15,916	7,013	30,093	1,234	9,137	4,510	11,813	0	5,343	1,195	0	310,912
	2029	110,768	57,962	58,826	3,201	1,280	15,935	7,293	31,637	1,280	9,606	4,526	12,268	0	5,617	1,240	0	321,441
Small Office	2014	76,520	40,527	20,053	2,192	868	6,020	5,263	20,197	0	6,132	3,756	7,928	0	3,586	0	22	193,065
	2017	77,805	40,464	20,877	2,239	868	5,953	5,376	21,027	0	6,384	3,685	8,062	0	3,733	0	22	196,495
	2020	81,110	41,554	22,953	2,357	868	5,967	5,663	22,513	0	6,836	3,736	8,520	0	3,997	0	22	206,097
	2023	83,988	42,399	24,762	2,460	868	5,964	5,913	23,860	0	7,244	3,761	8,910	0	4,236	0	23	214,387
	2026	86,061	42,775	26,056	2,533	868	5,927	6,092	24,940	0	7,572	3,736	9,166	0	4,428	0	23	220,180
	2029	88,432	43,325	27,540	2,618	868	5,903	6,298	26,118	0	7,930	3,730	9,472	0	4,637	0	24	226,895
Large Non-food Retail	2014	30,090	36,209	28,344	1,021	6,135	3,845	1,819	2,021	4,090	2,632	3,583	3,224	0	467	0	35	123,515
	2017	30,629	36,278	29,006	1,050	6,308	3,823	1,875	2,118	4,205	2,758	3,540	3,293	0	489	0	36	125,409
	2020	31,748	37,212	30,389	1,112	6,669	3,862	1,993	2,278	4,446	2,966	3,608	3,472	0	526	0	36	130,316
	2023	32,725	37,934	31,596	1,166	6,983	3,886	2,096	2,422	4,656	3,153	3,648	3,624	0	559	0	36	134,485
	2026	33,458	38,292	32,499	1,206	7,219	3,884	2,173	2,540	4,813	3,307	3,642	3,730	0	586	0	36	137,386
	2029	34,291	38,800	33,526	1,252	7,487	3,893	2,261	2,668	4,991	3,474	3,656	3,854	0	616	0	37	140,806
Small Non-food Retail	2014	45,979	45,510	29,767	1,496	0	5,322	2,835	2,993	0	3,896	5,305	4,984	0	691	0	68	148,847
	2017	46,550	45,134	30,163	1,515	0	5,252	2,873	3,091	0	4,025	5,161	5,012	0	713	0	68	149,557
	2020	48,422	45,949	31,431	1,578	0	5,262	2,997	3,275	0	4,265	5,170	5,208	0	756	0	70	154,382
	2023	50,318	46,793	32,723	1,642	0	5,274	3,122	3,461	0	4,507	5,182	5,409	0	799	0	72	159,301
	2026	51,805	47,249	33,725	1,692	0	5,259	3,220	3,620	0	4,713	5,144	5,553	0	836	0	74	162,891
	2029	53,457	47,862	34,845	1,747	0	5,255	3,329	3,790	0	4,934	5,127	5,720	0	875	0	76	167,017
Food Retail	2014	23,490	20,697	11,522	749	91,544	3,236	3,484	2,323	9,237	2,502	2,612	1,610	0	327	0	21	173,352
	2017	23,684	20,545	11,683	760	92,742	3,205	3,538	2,401	9,364	2,587	2,561	1,619	0	338	0	21	175,048
	2020	24,284	20,942	12,182	793	96,442	3,244	3,702	2,544	9,759	2,744	2,622	1,683	0	359	0	21	181,322
	2023	24,858	21,302	12,659	824	99,978	3,279	3,859	2,684	10,137	2,896	2,676	1,743	0	380	0	21	187,295
	2026	25,273	21,447	13,003	847	102,532	3,286	3,973	2,798	10,410	3,020	2,686	1,781	0	396	0	21	191,473
	2029	25,745	21,671	13,396	872	105,442	3,304	4,103	2,921	10,720	3,154	2,712	1,828	0	414	0	21	196,304
Large Accomodation	2014	20,548	7,426	5,946	661	2,073	7,856	16,327	1,194	3,392	1,321	1,172	1,210	0	254	244	30	69,655
	2017	20,894	7,362	6,051	673	2,092	7,807	16,653	1,238	3,423	1,371	1,147	1,226	0	264	249	30	70,481
	2020	21,816	7,440	6,330	707	2,143	7,938	17,530	1,316	3,506	1,462	1,157	1,291	0	282	262	30	73,210
	2023	22,685	7,505	6,593	738	2,190	8,053	18,355	1,391	3,585	1,549	1,164	1,350	0	298	274	31	75,762
	2026	23,322	7,512	6,786	762	2,225	8,095	18,959	1,452	3,642	1,620	1,157	1,391	0	312	283	31	77,550
	2029	24,046	7,542	7,006	788	2,265	8,165	19,647	1,519	3,708	1,697	1,155	1,439	0	327	293	31	79,627
Small Accomodation	2014	9,922	3,788	1,435	304	462	2,102	7,230	537	770	589	523	411	0	113	0	4	28,191
	2017	10,008	3,730	1,450	307	466	2,076	7,305	553	777	606	507	413	0	117	0	4	28,319
	2020	10,385	3,728	1,514	319	485	2,107	7,630	584	809	642	507	437	0	124	0	4	29,276
	2023	10,777	3,731	1,581	332	505	2,141	7,971	615	841	679	508	462	0	131	0	4	30,280
	2026	11,069	3,713	1,631	342	519	2,156	8,222	642	866	709	504	480	0	137	0	4	30,992
	2029	11,397	3,702	1,687	353	536	2,177	8,506	670	893	742	501	500	0	143	0	4	31,812

Exhibit 20 Reference Case Electricity Consumption, Modelled by End Use, Sub sector and Milestone Year (MWh/yr.) (cont'd…)

Sub-Sector	Year	Space Heating	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Refrigeration	Secondary Lighting	Domestic Hot Water	Computer Equipment	Food Service Equipment	Other Plug Loads	Outdoor Lighting	Space Cooling	Street Lighting	Computer Servers	Elevator	Block Heaters	Grand Total
Healthcare	2014	57,863	5,258	30,746	1,116	1,784	24,911	10,048	4,163	9,516	8,004	4,036	2,446	0	963	864	222	161,941
	2017	57,443	5,038	30,085	1,105	1,743	23,821	9,690	4,148	9,296	7,975	3,787	2,414	0	960	856	171	158,532
	2020	58,774	5,092	30,958	1,135	1,789	23,841	10,089	4,336	9,542	8,337	3,737	2,472	0	1,003	880	171	162,156
	2023	60,227	5,160	31,908	1,169	1,839	23,905	10,524	4,534	9,809	8,717	3,697	2,537	0	1,049	905	172	166,153
	2026	61,299	5,184	32,612	1,193	1,876	23,828	10,846	4,702	10,007	9,039	3,626	2,579	0	1,088	924	172	168,975
	2029	62,507	5,224	33,404	1,221	1,918	23,801	11,208	4,880	10,230	9,382	3,566	2,629	0	1,129	946	172	172,217
Schools	2014	83,105	45,131	9,356	1,082	1,074	10,063	5,700	7,777	1,481	1,567	6,281	279	0	1,363	0	29	174,289
	2017	84,471	44,837	9,534	1,099	1,091	9,983	5,808	8,052	1,504	1,623	6,126	300	0	1,411	0	29	175,868
	2020	88,451	45,707	10,053	1,148	1,141	10,136	6,122	8,555	1,570	1,724	6,155	365	0	1,499	0	29	182,656
	2023	92,446	46,585	10,575	1,198	1,191	10,290	6,437	9,059	1,636	1,826	6,186	430	0	1,588	0	29	189,475
	2026	95,470	47,029	10,970	1,235	1,228	10,358	6,676	9,478	1,686	1,910	6,148	479	0	1,661	0	30	194,358
	2029	98,878	47,644	11,415	1,277	1,271	10,460	6,945	9,931	1,743	2,001	6,136	535	0	1,740	0	30	200,006
Universities and Colleges	2014	12,738	40,181	35,767	1,923	3,877	5,076	1,269	10,028	2,908	4,881	3,289	1,341	0	714	739	15	124,745
	2017	13,160	39,760	36,075	1,945	3,921	5,017	1,323	10,341	2,940	5,033	3,194	1,419	0	736	748	15	125,627
	2020	13,867	39,599	36,592	1,982	3,994	4,987	1,415	10,731	2,995	5,223	3,125	1,557	0	764	762	15	127,609
	2023	14,504	39,375	37,058	2,015	4,060	4,950	1,497	11,102	3,045	5,404	3,049	1,681	0	790	774	15	129,321
	2026	15,022	39,042	37,437	2,041	4,114	4,901	1,564	11,442	3,085	5,569	2,963	1,779	0	814	785	15	130,574
	2029	15,589	38,754	37,852	2,071	4,172	4,857	1,638	11,794	3,129	5,741	2,882	1,887	0	839	796	16	132,017
Warehouse/Wholesale	2014	28,325	20,567	4,753	1,358	8,433	4,089	2,136	1,869	0	4,518	2,385	114	0	621	0	48	79,216
	2017	28,899	20,571	4,825	1,387	8,608	4,028	2,195	1,945	0	4,703	2,339	118	0	646	0	48	80,312
	2020	30,202	21,092	4,988	1,452	9,003	3,992	2,326	2,070	0	5,004	2,355	128	0	688	0	49	83,349
	2023	31,347	21,500	5,131	1,509	9,349	3,951	2,442	2,184	0	5,280	2,358	137	0	726	0	49	85,963
	2026	32,210	21,703	5,239	1,551	9,609	3,899	2,528	2,279	0	5,510	2,336	144	0	757	0	50	87,817
	2029	33,185	21,988	5,361	1,600	9,903	3,852	2,626	2,382	0	5,758	2,323	152	0	791	0	51	89,972
Restaurants	2014	13,061	2,564	3,573	268	18,173	8,146	20,519	447	36,502	598	474	1,007	0	124	0	12	105,467
	2017	13,396	2,552	3,624	273	18,467	8,065	20,868	463	37,092	620	463	1,016	0	128	0	12	107,038
	2020	14,360	2,617	3,769	286	19,321	8,140	21,878	493	38,804	660	466	1,061	0	136	0	12	112,003
	2023	15,233	2,671	3,900	297	20,093	8,192	22,793	521	40,355	697	468	1,101	0	144	0	12	116,476
	2026	15,856	2,694	3,994	306	20,646	8,183	23,447	544	41,465	727	463	1,126	0	150	0	12	119,614
	2029	16,569	2,729	4,101	315	21,278	8,196	24,195	568	42,733	760	461	1,157	0	157	0	12	123,231
Labrador Isolated C/I Buildings	2014	580	6,909	1,132	0	3,416	1,608	149	1,051	496	677	739	0	0	0	0	305	17,062
	2017	573	6,689	1,118	0	3,375	1,557	148	1,059	490	682	701	0	0	0	0	301	16,693
	2020	650	7,498	1,409	0	3,931	1,724	172	1,258	573	810	813	0	0	0	0	351	19,187
	2023	674	7,663	1,501	0	4,109	1,756	180	1,335	599	860	830	0	0	0	0	367	19,874
	2026	698	7,815	1,590	0	4,279	1,785	187	1,410	624	908	844	0	0	0	0	382	20,521
	2029	721	7,968	1,679	0	4,449	1,814	194	1,486	650	956	858	0	0	0	0	397	21,173
Island Isolated C/I Buildings	2014	0	649	106	0	321	151	0	99	47	64	69	0	0	0	0	0	1,505
	2017	0	626	105	0	316	146	0	99	46	64	66	0	0	0	0	0	1,466
	2020	0	716	136	0	377	164	0	120	55	78	78	0	0	0	0	0	1,725
	2023	0	732	145	0	393	168	0	128	57	82	80	0	0	0	0	0	1,786
	2026	0	748	154	0	411	171	0	135	60	87	82	0	0	0	0	0	1,847
	2029	0	765	163	0	428	174	0	143	62	92	83	0	0	0	0	0	1,910

Exhibit 20 Reference Case Electricity Consumption, Modelled by End Use, Sub sector and Milestone Year (MWh/yr.) (cont'd…)

Sub-Sector	Year	Space Heating	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Refrigeration	Secondary Lighting	Domestic Hot Water	Computer Equipment	Food Service Equipment	Other Plug Loads	Outdoor Lighting	Space Cooling	Street Lighting	Computer Servers	Elevator	Block Heaters	Grand Total
Large Other Buildings	2014	65,447	36,027	27,825	1,564	22,200	14,680	13,133	8,017	12,662	5,660	4,741	2,936	0	1,388	406	358	217,045
	2017	66,313	35,786	28,269	1,590	22,506	14,521	13,332	8,306	12,823	5,854	4,623	2,986	0	1,437	413	359	219,118
	2020	68,311	36,189	29,295	1,651	23,216	14,534	13,783	8,769	13,190	6,152	4,598	3,146	0	1,516	429	360	225,139
	2023	70,141	36,495	30,234	1,707	23,865	14,520	14,196	9,206	13,525	6,435	4,560	3,290	0	1,591	444	361	230,570
	2026	71,504	36,537	30,933	1,748	24,348	14,437	14,505	9,572	13,777	6,675	4,482	3,389	0	1,653	455	362	234,377
	2029	73,045	36,680	31,724	1,795	24,895	14,380	14,855	9,964	14,061	6,931	4,420	3,504	0	1,720	467	363	238,804
Small Other Buildings	2014	56,786	33,165	21,646	1,450	18,691	10,949	9,525	7,223	9,684	5,022	4,365	2,711	0	1,240	227	238	182,923
	2017	56,611	32,383	21,570	1,444	18,624	10,696	9,497	7,339	9,654	5,106	4,176	2,673	0	1,260	226	238	181,497
	2020	57,970	32,437	22,175	1,479	19,060	10,671	9,774	7,656	9,895	5,329	4,114	2,754	0	1,315	232	242	185,103
	2023	59,756	32,744	22,979	1,527	19,645	10,698	10,135	8,039	10,204	5,592	4,089	2,879	0	1,381	239	246	190,153
	2026	61,179	32,844	23,617	1,565	20,107	10,679	10,424	8,369	10,453	5,821	4,033	2,969	0	1,438	245	250	193,994
	2029	62,724	33,015	24,311	1,606	20,611	10,675	10,738	8,717	10,722	6,062	3,987	3,071	0	1,498	251	254	198,243
Other Institutional	2014	10,017	12,713	8,247	412	1,763	4,559	2,407	1,212	537	2,075	1,406	219	0	0	0	412	45,979
	2017	33,698	12,550	8,319	415	1,775	4,494	2,423	1,246	542	2,133	1,362	218	0	0	0	415	69,591
	2020	50,460	12,387	8,392	418	1,788	4,428	2,438	1,280	547	2,191	1,318	218	0	0	0	418	86,285
	2023	50,522	12,225	8,466	421	1,801	4,362	2,454	1,314	552	2,250	1,274	218	0	0	0	421	86,281
	2026	50,585	12,063	8,540	425	1,814	4,297	2,470	1,348	558	2,308	1,231	217	0	0	0	425	86,280
	2029	50,648	11,902	8,615	428	1,827	4,232	2,486	1,382	563	2,366	1,187	217	0	0	0	428	86,282
Non-Buildings	2014	0	0	0	204,856	0	0	0	0	0	0	0	0	0	0	0	0	204,856
	2017	0	0	0	207,490	0	0	0	0	0	0	0	0	0	0	0	0	207,490
	2020	0	0	0	214,805	0	0	0	0	0	0	0	0	0	0	0	0	214,805
	2023	0	0	0	221,041	0	0	0	0	0	0	0	0	0	0	0	0	221,041
	2026	0	0	0	225,350	0	0	0	0	0	0	0	0	0	0	0	0	225,350
	2029	0	0	0	230,330	0	0	0	0	0	0	0	0	0	0	0	0	230,330
Street Lighting	2014	0	0	0	0	0	0	0	0	0	0	0	0	37,127	0	0	0	37,127
	2017	0	0	0	0	0	0	0	0	0	0	0	0	36,851	0	0	0	36,851
	2020	0	0	0	0	0	0	0	0	0	0	0	0	36,931	0	0	0	36,931
	2023	0	0	0	0	0	0	0	0	0	0	0	0	36,999	0	0	0	36,999
	2026	0	0	0	0	0	0	0	0	0	0	0	0	37,043	0	0	0	37,043
	2029	0	0	0	0	0	0	0	0	0	0	0	0	37,086	0	0	0	37,086
Grand Total	2014	629,085	411,214	286,405	223,118	181,881	128,587	107,844	95,476	92,387	57,527	49,260	40,630	37,127	16,170	3,514	1,817	2,362,042
	2017	660,988	408,432	290,691	226,032	183,999	126,314	109,081	98,914	93,254	59,263	47,906	41,233	36,851	16,760	3,553	1,768	2,405,038
	2020	700,771	415,029	302,937	234,065	191,362	126,848	113,939	104,692	96,828	62,594	48,023	43,168	36,931	17,744	3,665	1,831	2,500,428
	2023	724,416	421,095	315,512	241,030	198,063	127,332	118,743	110,542	100,196	65,882	48,049	45,201	36,999	18,765	3,793	1,860	2,577,476
	2026	742,075	423,639	324,872	245,880	203,029	127,062	122,301	115,362	102,679	68,634	47,587	46,596	37,043	19,600	3,887	1,887	2,632,135
	2029	762,002	427,532	335,451	251,473	208,630	127,074	126,322	120,570	105,485	71,588	47,311	48,233	37,086	20,505	3,994	1,915	2,695,172

Exhibit 21 Distribution of Electricity Consumption in 2029 by Sub Sector

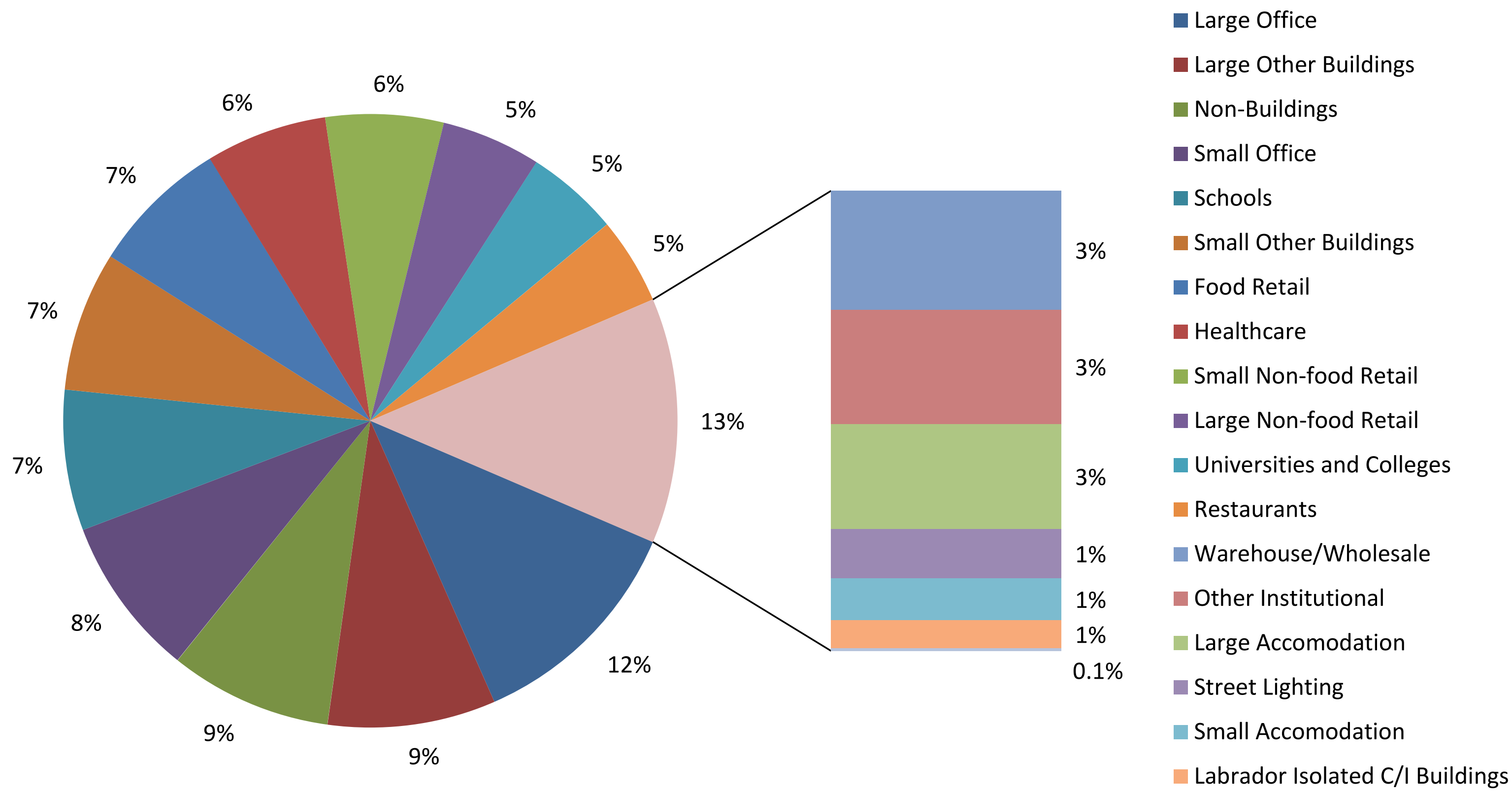


Exhibit 22 Distribution of Electricity Consumption in 2029 by Region

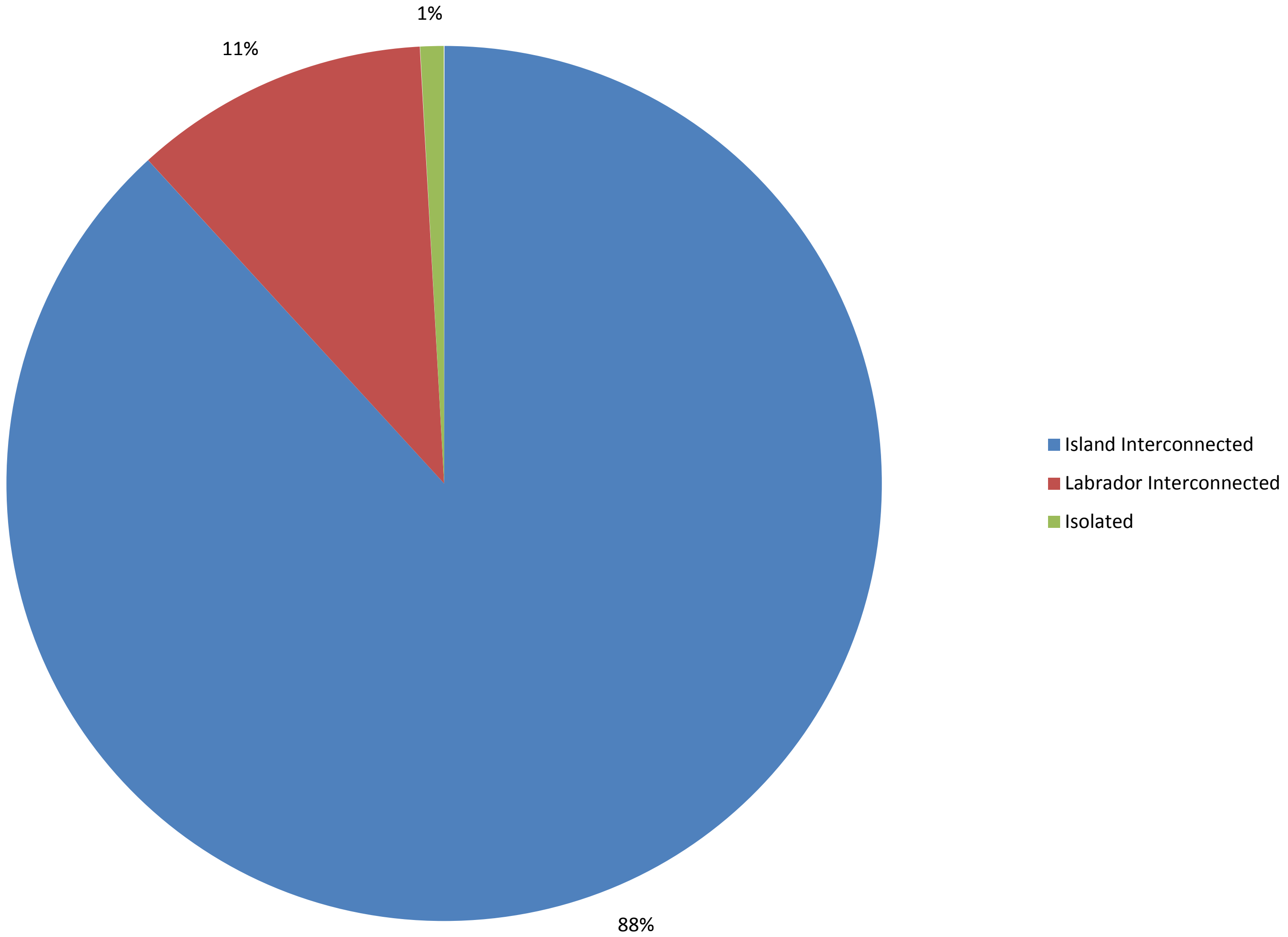


Exhibit 23 Distribution of Electricity Consumption in 2029 by End Use

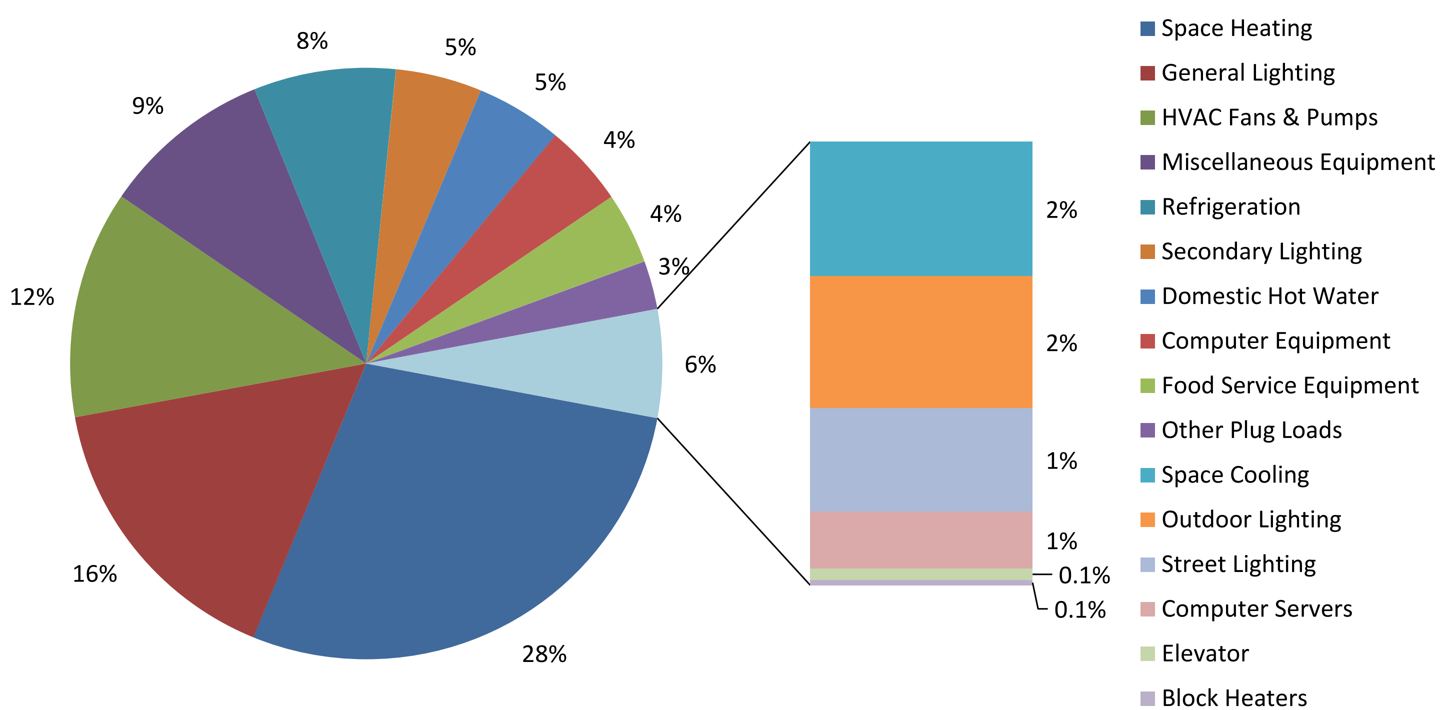


Exhibit 24 Distribution of Electricity Consumption, by Sub sector and End Use, Trends to 2029

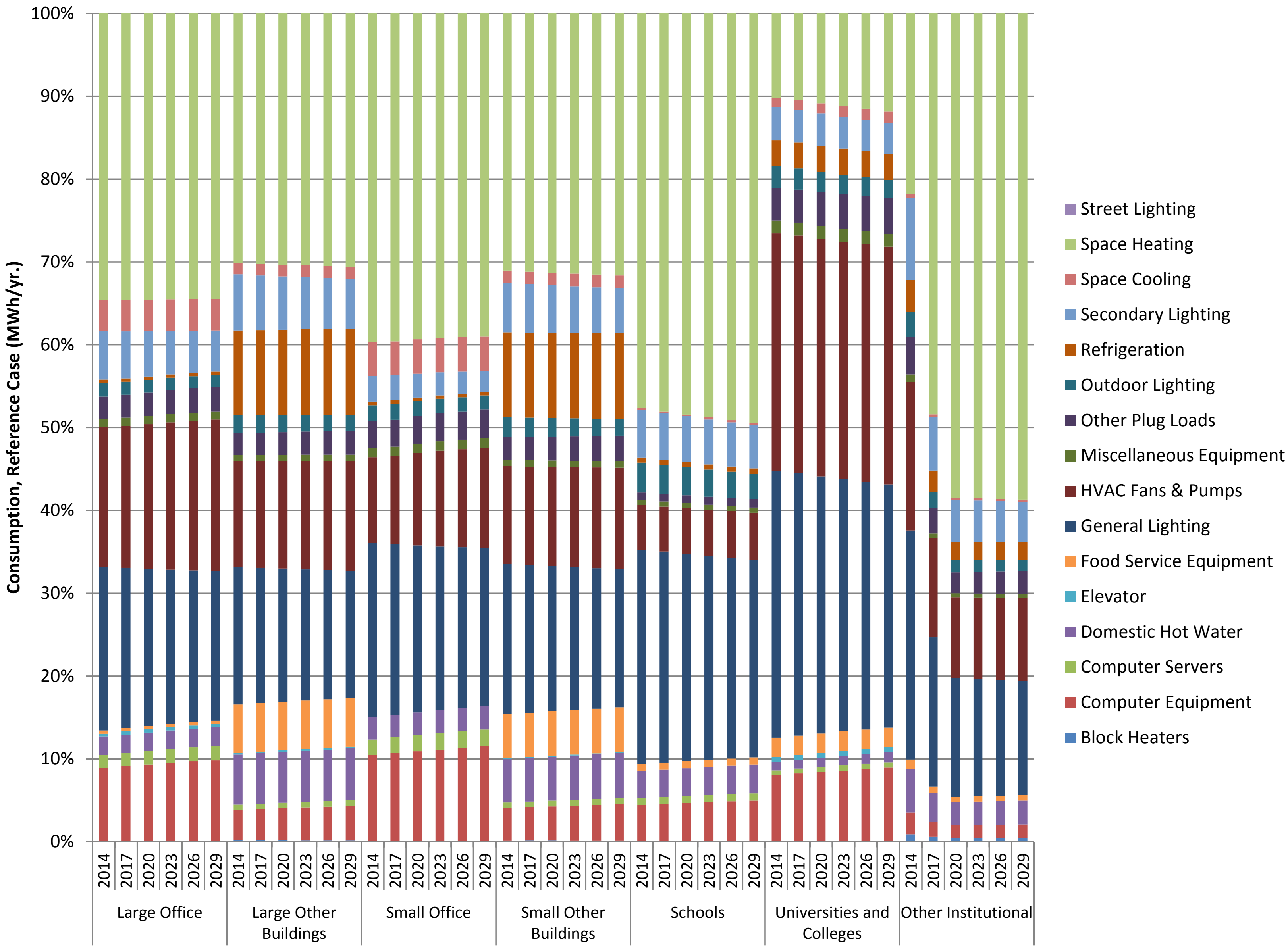


Exhibit 24 Distribution of Electricity Consumption, by Sub sector and End Use, Trends to 2029 (cont'd…)

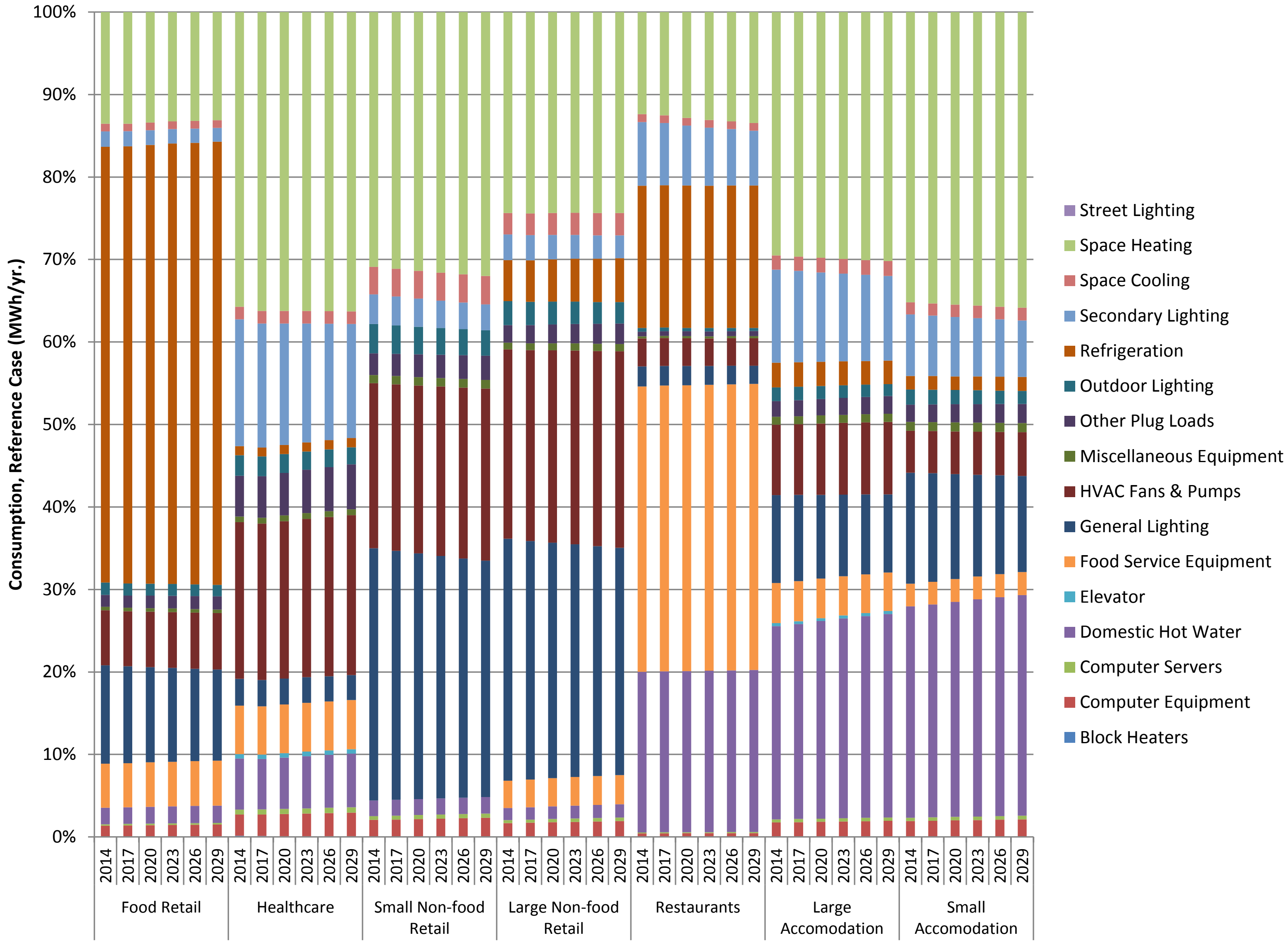
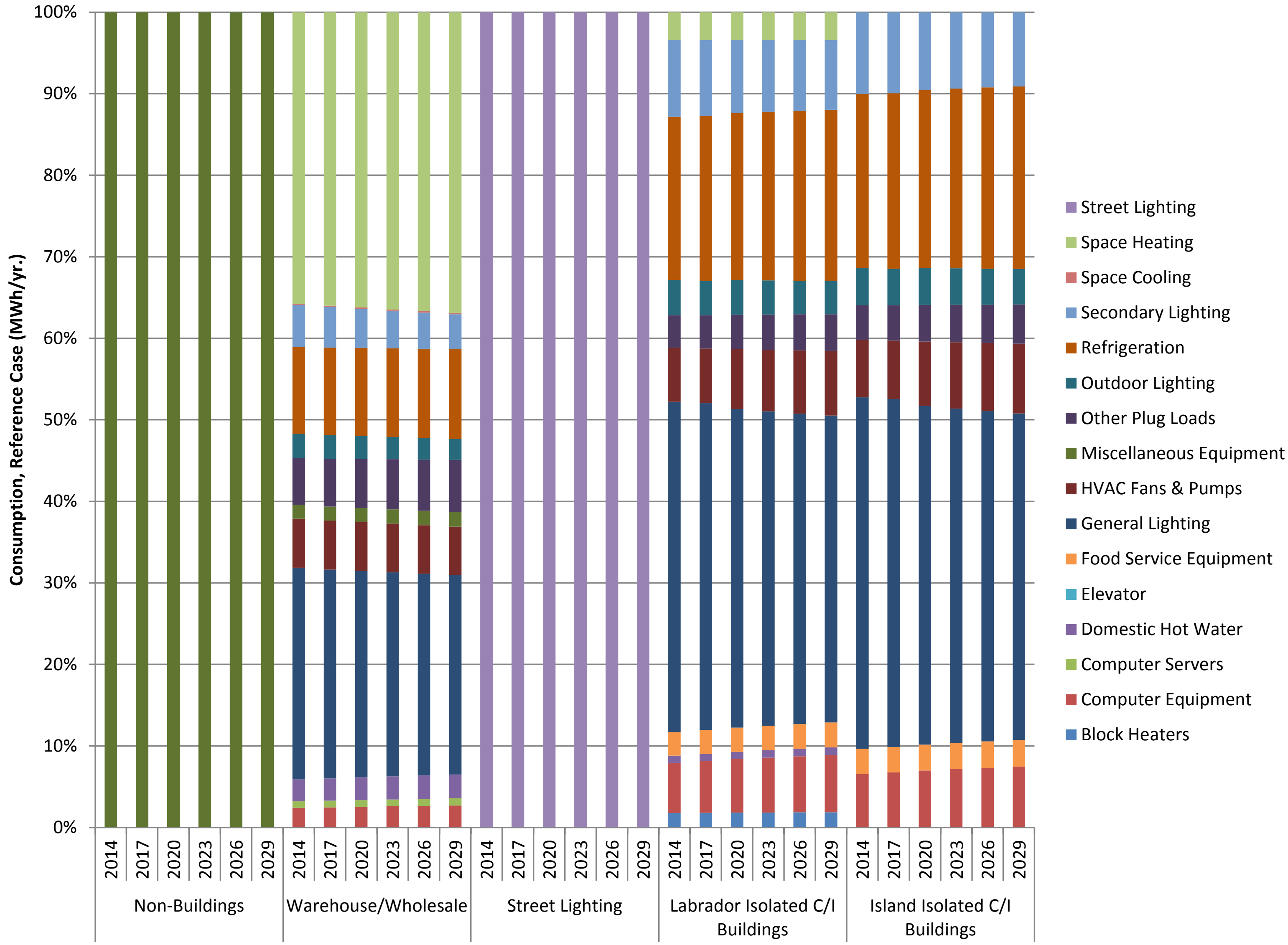


Exhibit 24 Distribution of Electricity Consumption, by Sub sector and End Use, Trends to 2029 (cont'd…)



6 Reference Case Electric Peak Load Forecast

6.1 Introduction

This section provides a profile of the electric peak load for Newfoundland and Labrador's Commercial sector over the Reference Case period of 2014 to 2029. The Reference Case peak load profile estimates the expected level of demand in the peak period that would occur over the study period in the absence of new CDM initiatives or rate changes. As such, the Reference Case provides the point of comparison for the calculation of peak load savings associated with each of the subsequent scenarios that are assessed within this study.

The discussion is organized into the following sub-sections:

- Methodology
- Summary of results

6.2 Methodology

The electric peak loads for each combination of end use, sub sector and milestone year were calculated in exactly the same manner as shown in Section 4, which presented the Base Year peak load profiles.

For this Reference Case, the electric energy consumption (from Section 5) is converted to a demand value for the peak period definition by dividing the applicable electric energy value for each sub sector and end use by the corresponding Commercial sector load shape hours-use factors, as presented in Appendix B.

6.3 Summary of Results

A summary of the Reference Case peak load profiles is presented in Exhibit 25.

Exhibit 25 Electric Peak Loads, by Milestone Year, Sub sector & Region (MW)

Sub-Sector	Year	Island Interconnected	Isolated	Labrador Interconnected	Grand Total
Large Office	2014	62	-	-	62
	2017	64	-	-	64
	2020	66	-	-	66
	2023	69	-	-	69
	2026	71	-	-	71
	2029	73	-	-	73
Small Office	2014	45	-	1	46
	2017	46	-	1	47
	2020	48	-	1	49
	2023	50	-	1	51
	2026	51	-	1	52
	2029	53	-	1	54
Large Non-food Retail	2014	27	-	2	29
	2017	27	-	2	29
	2020	28	-	2	30
	2023	29	-	2	31
	2026	30	-	2	32
	2029	31	-	2	33
Small Non-food Retail	2014	33	-	4	36
	2017	33	-	4	37
	2020	34	-	4	38
	2023	35	-	4	39
	2026	36	-	4	40
	2029	37	-	4	41
Food Retail	2014	29	-	3	32
	2017	29	-	3	32
	2020	30	-	3	33
	2023	31	-	3	34
	2026	32	-	3	35
	2029	33	-	3	36
Large Accomodation	2014	16	-	2	18
	2017	17	-	2	18
	2020	17	-	2	19
	2023	18	-	2	20
	2026	19	-	2	20
	2029	19	-	2	21
Small Accomodation	2014	7	-	0	8
	2017	7	-	0	8
	2020	8	-	0	8
	2023	8	-	0	8
	2026	8	-	0	8
	2029	8	-	0	9
Healthcare	2014	33	-	3	36
	2017	33	-	3	36
	2020	34	-	3	37
	2023	35	-	3	37
	2026	36	-	3	38
	2029	36	-	3	39

Exhibit 25 Electric Peak Loads, by Milestone Year, Sub sector & Region (MW) (cont'd…)

Sub-Sector	Year	Island Interconnected	Isolated	Labrador Interconnected	Grand Total
Schools	2014	43	-	3	46
	2017	44	-	3	46
	2020	45	-	3	48
	2023	47	-	3	50
	2026	49	-	3	52
	2029	50	-	3	53
Universities and Colleges	2014	22	-	1	23
	2017	22	-	1	23
	2020	23	-	1	23
	2023	23	-	1	24
	2026	23	-	1	24
	2029	24	-	1	25
Warehouse/Wholesale	2014	16	-	2	17
	2017	16	-	2	18
	2020	17	-	2	18
	2023	17	-	2	19
	2026	18	-	2	19
	2029	18	-	2	20
Restaurants	2014	28	-	2	30
	2017	28	-	2	31
	2020	30	-	3	32
	2023	31	-	3	34
	2026	32	-	3	35
	2029	33	-	3	36
Labrador Isolated C/I Buildings	2014	-	3	-	3
	2017	-	3	-	3
	2020	-	3	-	3
	2023	-	3	-	3
	2026	-	4	-	4
	2029	-	4	-	4
Island Isolated C/I Buildings	2014	-	0	-	0
	2017	-	0	-	0
	2020	-	0	-	0
	2023	-	0	-	0
	2026	-	0	-	0
	2029	-	0	-	0
Large Other Buildings	2014	35	-	15	49
	2017	35	-	15	50
	2020	36	-	15	51
	2023	38	-	15	53
	2026	39	-	15	54
	2029	40	-	15	55
Small Other Buildings	2014	32	-	10	41
	2017	32	-	10	41
	2020	32	-	10	42
	2023	33	-	10	43
	2026	34	-	10	44
	2029	35	-	10	45

Exhibit 25 Electric Peak Loads, by Milestone Year, Sub sector & Region (MW) (cont'd…)

Sub-Sector	Year	Island Interconnected	Isolated	Labrador Interconnected	Grand Total
Other Institutional	2014	-	-	9	9
	2017	-	-	15	15
	2020	-	-	20	20
	2023	-	-	20	20
	2026	-	-	20	20
	2029	-	-	20	20
Non-Buildings	2014	30	-	1	31
	2017	31	-	1	32
	2020	32	-	1	33
	2023	33	-	1	34
	2026	34	-	1	34
	2029	34	-	1	35
Street Lighting	2014	5	0	0	5
	2017	5	0	0	5
	2020	5	0	0	5
	2023	5	0	0	5
	2026	5	0	0	5
	2029	5	0	0	5
Grand Total	2014	463	3	56	522
	2017	469	3	62	534
	2020	486	4	67	557
	2023	503	4	67	575
	2026	516	4	68	588
	2029	530	4	68	603

Selected highlights include:

- Since the hours-use factors applied are not assumed to change during the study period, trends in peak demand contributions for specific sub sectors are expected to follow the electricity consumption trends for those sub sectors. Large and small offices, for example, will continue to make the largest commercial contribution to the peak demand throughout the study period.

- Similarly, peak demand contributions for specific end uses are expected to follow the electricity consumption trends for those end uses. Space heating becomes an increasingly important contributor to peak demand through time, while indoor lighting, because of natural gains in efficiency, will make a gradually declining contribution towards the peak demand.

7 Technology Assessment: All Measures

7.1 Introduction

This section identifies and assesses the economic attractiveness of the selected energy efficiency measures for the Commercial sector. It also identifies and assesses the economic attractiveness of selected Commercial sector electric capacity-only peak load reduction measures, which in this study are defined as those measures that affect electric peak but have minimal or no impact on electric energy use. The discussion is organized and presented as follows:

- Methodology
- Energy efficiency technologies
- Electric peak load reduction measures
- Summary of unbundled results
- Energy efficiency supply curves
- Demand reduction supply curves.

7.2 Methodology

The following steps were employed to assess the measures:

- Select candidate measures
- Establish technical performance for each option
- Establish the capital, installation and operating costs for each option
- Calculate the cost of conserved energy (CCE) for each energy efficiency technology and O&M measure
- Calculate the cost of electric peak load reduction (CEPR) for each option.

A brief description of each step is provided below.

Step 1 Select Candidate Measures

The candidate measures were selected in close collaboration with client personnel based on a combination of a literature review and previous study team experience. The selected measures are all considered to be technically proven and commercially available, even if only at an early stage of market entry. Technology costs, which will be addressed in this section, were not a factor in the initial selection of candidate technologies.

Step 2 Establish Technical Performance

Information on the performance improvements provided by each measure was compiled from available secondary sources, including the experience and on-going research work of study team members. In the case of some of the peak load reduction measures, comfort may be affected and the trade-off between benefits (e.g., cost savings) and costs (including reduction in comfort) were judged based on past experience with similar technologies and customer acceptance.

Step 3 Establish Capital, Installation and Operating Costs for Each Measure

Information on the cost of implementing each measure was also compiled from secondary sources, including the experience and on-going research work of study team members.

In the case of energy efficiency measures, the incremental cost is applicable when a measure is installed in a new facility, or at the end of its useful life in an existing facility; in this case, incremental cost is defined as the cost difference for the energy efficiency measure relative to the baseline technology. The full cost is applicable when an operating piece of equipment is replaced with a more efficient model prior to the end of its useful life.[14]

Unlike energy efficiency measures, in which major equipment, such as heating and water heating systems are typically replaced, or thermal envelope measures such as insulation upgrades affect systems directly, capacity-only measures are typically implemented via add-on control equipment, although some built-in control equipment exists. The incremental cost is thus defined as the control equipment itself or incremental cost for a controllable appliance or device relative to the baseline appliance cost (e.g., remote accessible thermostat vs. standard thermostat), plus any required infrastructure (e.g., automatic meter reading or communications gateways). In cases where a more efficient appliance with peak control functions replaces a standard appliance, both electric energy and electric peak reduction are achieved, with some splitting of incremental costs attributable to each function. Where a new or replacement end use is installed that operates off peak, thus achieving electric peak reduction without significant energy impacts, incremental costs for the electric peak reduction device will be compared with standard equipment without assuming any early replacement and, thus, salvage value.

In all cases the costs and savings are annualized, based on the number of years of equipment life and the discount rate, and the costs incorporate applicable changes in annual O&M costs. All costs are expressed in constant 2014 dollars.

Step 4 Calculate CCE for Each Energy Efficiency Measure

One of the important sets of information provided in this section is the CCE associated with each energy efficiency measure. The CCE for an energy efficiency measure is defined as the annualized incremental cost of the upgrade measure divided by the annual energy savings achieved, excluding any administrative or program costs required to achieve full use of the technology or measure. All cost information presented in this section and in the accompanying TRM Workbook is expressed in constant 2014 dollars.

The CCE provides a basis for the subsequent selection of measures to be included in the Economic Potential Forecast (see Section 8). The CCE is calculated according to the following formula:

$$\frac{C_A + M}{S}$$

[14] With some exceptions, many measures could conceivably be applied as either a full-cost measure (applicable immediately) or as an incremental cost measure (upon end of service life), depending on how financially attractive it is. Therefore, for all but a few measures, the TRM Workbook is configured to evaluate the measure at full cost and include it on that basis if it passes the screen, then roll to evaluating it on an incremental basis, and only fail it completely if it fails both tests. Where a measure is always full cost (such as the block heater timer, where the baseline technology is the “do nothing” option), the incremental cost option is excluded. Where a measure is always incremental cost (such as high-performance homes, where the baseline technology has to be a standard construction home, not no home at all), the full cost option is excluded.

It is recognized that some measures can be implemented prior to the end of their useful life, that is, early retirement. This intermediate option between full and incremental cost could increase the rate of adoption for some of the incremental measures, raising the Economic Potential savings modestly. However, in this study early retirement is treated as a program option.

Where:

C_A is the annualized installed cost
M is the incremental annual cost of operation and maintenance (O&M)
S is the annual kWh electricity savings

And *A* is the annualization factor

$$A = \frac{i(1+i)^n}{(1+i)^n - 1}$$

Where:

i is the discount rate
n is the life of the measure

The detailed CCE tables (see TRM Workbook) show both incremental and full installed costs for the energy efficiency measures, as applicable. If the measure or technology is installed in a new facility or at the point of natural replacement in an existing facility, then the incremental cost of the measure versus the cost of the baseline technology is used. If, prior to the end of its life, an operating piece of equipment is replaced with a more efficient model, then the full cost of the efficient measure is used.

The annual saving associated with the efficiency measure is the difference in annual electricity consumption with and without the measure.

The CCE calculation is sensitive to the chosen discount rate. In the CCE calculations that accompany this document, a discount rate of 7% (real) is used.

Step 5 Calculate CEPR for Each Peak Load Measure

The CEPR for a peak load reduction measure is defined as the annualized incremental cost of the measure divided by the annual peak reduction achieved, excluding any administrative or program costs required to achieve full use of the technology or measure. All cost information presented in this section and in the TRM Workbook is in constant (2014) dollars.

The CEPR provides a basis for the subsequent selection of measures to be included in the Economic Potential Forecast (see Section 8). The CEPR is calculated according to the following formula:

$$\frac{C_A + M}{S_p}$$

Where:

C_A is the annualized installed cost
M is the incremental annual cost of operation and maintenance (O & M)
S_p is the annual kW load reduction associated with peak definition p.

And A is the annualization factor.

$$A = \frac{i(1+i)^n}{(1+i)^n - 1}$$

Where:

i is the discount rate;
n is the life of the measure.

Note that the annual O&M cost will include, in some cases, amortized costs associated with infrastructure considered a prerequisite for implementation of the measure. This could include automated metering infrastructure (AMI), such as advanced metering, communications gateways and other related system investments. These costs would typically support multiple applications (e.g., communications gateways could enable control of heating, air conditioning, water heating, and HVAC fans and pumps), as well as facilitate time-differentiated rates that would be required for a feasible and cost-effective program implementation (e.g., thermal energy storage). It should also be noted that the measure lifetime is for the control device, function or feature, rather than that of the unit it is controlling. The study does not presume any specific technology or infrastructure, but does assume that a marketplace will develop for such systems, whether or not NL utilities adopt them, or develops access directly or indirectly to customer control equipment.

The CEPR can be compared to benefits, which include the value of reduced peak for the utility (avoided capacity and transmission and distribution (T&D) investment or purchase costs), the customer (e.g., bill savings) and society (e.g., value of environmental benefits) to determine its cost effectiveness from various perspectives (societal, utility, participant and non-participant).

As with the CCE for energy savings, the CEPR calculation is sensitive to the chosen discount rate, which, as for the CCE, used a 7% (real) discount rate. Higher discount rates will tend to reduce savings and decrease cost effectiveness where costs are incurred upfront and benefits accrue over many years.

Step 6 Estimate Approximate Unbundled Electric Energy Savings Potential for Each Energy Efficiency Measure and Demand Reduction for Each Peak Load Measure

The next step in the assessment was to prepare an approximate estimate of the potential unbundled electric energy savings that could theoretically be provided by each energy efficiency measure over the study period, and similarly to prepare an estimate of demand reductions that could be provided by each peak load measure. The term “unbundled” means that the savings for each measure are calculated in isolation from other important factors that ultimately determine the potential for real life savings.

The strength of this approach is that it provides insight into the relative size of the potential electric energy savings or demand reductions associated with individual measures; this perspective is often of particular value to utility CDM program design personnel who may need to consider combinations of measures that differ from those selected for the CDM potential assessment.

However, it should be noted that the savings from individual measures cannot be used directly to calculate total savings potential or demand reduction. This is due primarily to two factors:

- **More than one upgrade may affect a given end use:** For example, improved insulation reduces space heating electricity use, as does the installation of a heat pump. On its own, each measure will reduce overall space heating electricity use. However, the two savings are not additive. The order in which some upgrades are introduced is also important. In this study, the approach has been to select and model the impact of bundles of measures that reduce the load for a given end use (e.g., wall insulation and window upgrades that reduce the space heating load) and then to introduce measures that meet the remaining load more efficiently (e.g., a heat pump heating system). Similarly, more than one peak load measure may affect a given end use, or peak load measures may be applied to the same end use that one or more energy efficiency measures may also affect.

- **There are interactive effects among end uses:** For example, the electricity savings from more efficient lighting result in reduced waste heat. During the space heating season, lighting waste heat contributes to a facility’s internal heat gains, which lower the amount of heat that must be provided by the space heating system. The magnitude of the interactive effects can be significant, both on energy consumption and peak demand. However, it is important to note that assessing the impact of interactive effects in commercial facilities is more complex since heat may be generated in spaces that heat the conditioned space much less effectively (e.g. high bay fixtures or equipment in mechanical rooms). Interactive effects were captured on a measure by measure basis for measures that were more likely to have an impact on space heating requirements and a 30% heating penalty was assumed for this subset of measures. For example, it was assumed that about 30% of the savings from the LED lamps measure would be lost due to increased space heating requirements. Rather than reducing the savings from these measures directly, interactive effects have been taken into consideration with the measure "HVAC Impact from Other Savings".

The above factors are incorporated in later stages of the analysis.

Step 7 Prepare Energy Efficiency and Demand Reduction Supply Curves

The final step in the assessment of the selected energy efficiency measures was the generation of an energy efficiency supply curve and a demand reduction supply curve. Energy efficiency supply curves are built up based on the conserved electricity and the CCE for each measure. Similarly, demand reduction supply curves are built up based on the demand reduction and the CEPR for each measure. The CSEEM model was used to model the application of all technically feasible measures, accumulating the electricity savings or demand reduction and associated implementation costs for each sub sector type.

Measures were applied sequentially to account, at least approximately, for interaction between measures. The impact of building shell measures was modelled using ICF's Commercial/Institutional Building Energy-use Simulation Model (CEEAM), but only individually. The full package of measures was not modelled together, nor was the impact of internal gains on space heating and cooling included. These effects are modelled more thoroughly for the Economic Potential calculation, when all the measures that pass the economic screen are modelled together. Similarly, the demand measures were also applied sequentially, but began with the demand reference case, not the demand that would remain after all the efficiency measures were applied. Thus the interaction between energy efficiency and demand reduction is neglected for this supply curve.

The accumulated savings and costs for each measure were added together to present the overall energy efficiency supply curve for the province. They were sorted in order from lowest cost per kWh saved to highest cost, and presented on a graph showing CCE versus electricity savings.

The accumulated demand reduction and costs for each measure were added together to present the overall demand reduction supply curve for the province. They were sorted in order from lowest cost per kW reduction to highest cost, and presented on a graph showing CEPR versus demand reduction.

7.3 Energy Efficiency Technology Assessment

Exhibit 26 shows the energy efficiency technologies and measures that are included in this study. A description and detailed financial and economic assessment of each measure is provided in the TRM Workbook that accompanies this report.

Exhibit 26 Energy Efficiency Technologies Included in this Study

Block Heaters ▪ Block Heater Controls **Computer Equipment (ENERGY STAR ®)** ▪ ENERGY STAR® Computers ▪ ENERGY STAR® Office Equipment ▪ Energy-Efficient Server Technologies ▪ Activate PC Power Management* **Domestic Hot Water** ▪ On-Demand Water Heaters ▪ Heat Pump Water Heaters ▪ Low-Flow Pre-Rinse Spray Valves ▪ Low-Flow Faucet Aerators ▪ Low-Flow Showerheads ▪ Drainwater Heat Recovery ▪ ENERGY STAR® Dishwashers **Food Service Equipment** ▪ High-Efficiency Cooking Equipment **Lighting** ▪ LED Screw-In Lamps** ▪ LED High Bay fixtures** ▪ LED Tubular Lamps** ▪ LED Troffers** ▪ LED Outdoor Fixtures ▪ LED Exit Signs ▪ LED Refrigerated Display Case Lighting ▪ High Performance T8 Fixtures** ▪ T5HO Fixtures** ▪ Occupancy Sensors (Lighting) ▪ Dimming Control (Daylighting) ▪ Lighting Controls (Outdoor) ▪ Make Use of Daylighting* ▪ Use Task Light Instead of Ambient* **Building Envelope** ▪ Roof Insulation ▪ Wall Insulation ▪ High Performance Glazing Systems ▪ Air Curtains	**Refrigeration** ▪ Cooler Night Covers ▪ Refrigerated Cases with Doors ▪ ECM Motors and Evaporator Fan Motor Controllers ▪ Freezer Defrost Controllers ▪ High Efficiency Compressors ▪ Automatic Door Closers (Walk-in Coolers) ▪ Refrigeration Heat Recovery ▪ Refrigeration Controls ▪ CEE-Rated Refrigerators and Freezers **HVAC** ▪ High-Efficiency Air Source Heat Pumps ▪ Ground Source Heat Pumps ▪ Ductless Mini-Split Heat Pumps ▪ HVAC Occupancy Sensors ▪ Demand Control Ventilation (DCV) ▪ VFDs on HVAC Motors ▪ Ventilation Heat Recovery ▪ Radiant Infrared Heaters ▪ High Efficiency Chillers ▪ High Efficiency Rooftop Units (RTUs) ▪ Premium Efficiency Motors ▪ Advanced Building Automation Systems ▪ Building Recommissioning ▪ Programmable Thermostats ▪ Demand Control Kitchen Ventilation (DCKV) ▪ Use Natural Ventilation (Summer)* ▪ Use Shades/Blinds (Summer)* ▪ Use Shades/Blinds (Winter)* ▪ Keep Doors Closed (Summer)* ▪ Keep Doors Closed (Winter)* **Other Plug Loads** ▪ Refrigerated Vending Machine Controllers ▪ Reduce Number of Fridges* **New Construction** ▪ New Construction (25% more efficient) ▪ New Construction (40% more efficient) **Street Lighting** ▪ LED Street Lighting

* Denotes behavioural measure

** Measures assessed separately for primary (e.g. classrooms in a school) and secondary lighting (e.g. hallways in a school), since hours of operation differ for these scenarios. As such, many of the following exhibits include two line items with the same measure name.

7.3.1 Technology Screening Results

A summary of the results is provided in Exhibit 27. For each of the measures reviewed, the exhibit shows:

- The name of the measure
- The cost basis[15] for the CCE that is shown (e.g. full versus incremental)
- The measure's average CCE for each region[16] Average CCE refers to a weighted average of the CCE values for the measure in different sub sectors.[17]

Measures analyzed on the basis of full cost have been placed towards the top of Exhibit 27 because they are qualitatively different from the measures that pass only on an incremental basis. A measure that passes on a full-cost basis can be applied immediately, even if the piece of equipment it replaces or improves is currently working properly. That means the rate at which the measure can be implemented as a utility CDM measure is limited only by market and program constraints. A measure that passes only on an incremental basis, on the other hand, is limited by the rate of natural replacement (due to failure or obsolescence) or purchase of the piece of equipment it replaces. A measure that passes on a full-cost basis in some sub sector types and on an incremental cost basis in others is shown as "Full/Incr". The exhibit does not include behavior measures as there are no measure-level costs associated with implementing these measures (i.e. CCE of 0 ¢/kWh).

Exhibit 27 Commercial Sector Energy Efficiency Technology Measures, Screening Results[18]

Measure Name	Basis	Average CCE (¢/kWh)		
		Island	Labrador	Isolated
Activate PC Power Management	Full	0.0	0.0	0.0
Make Use of Daylighting	Full	0.0	0.0	0.0
Use Task Light Instead of Ambient	Full	0.0	0.0	0.0
Reduce Number of Fridges	Full	0.0	0.0	0.0
Use Shades/Blinds (Winter)	Full	0.0	0.0	0.0
Keep Doors Closed (Winter)	Full	0.0	0.0	0.0
Use Shades/Blinds (Summer)	Full	0.0	0.0	0.0
Use Natural Ventilation (Summer)	Full	0.0	0.0	0.0
Keep Doors Closed (Summer)	Full	0.0	0.0	0.0
Low-Flow Showerheads	Full	0.1	0.1	0.1
Low-Flow Showerheads	Full	0.1	0.1	0.1
Low-Flow Faucet Aerators	Full	0.1	0.1	0.1
Lighting Controls (Outdoor)	Full	0.4	0.4	0.7
Cooler Night Covers	Full	0.7	0.7	0.7
Low-Flow Pre-Rinse Spray Valves	Full	0.7	0.9	1.1
Automatic Door Closers (Walk-In Coolers & Freezers)	Full	1.2	1.2	N/A
LED Screw-In Lamps (Secondary)	Full	1.7	1.4	1.6
Programmable Thermostats	Full	1.8	2.0	1.4
LED Screw-In Lamps	Full	2.2	1.8	2.1

[15] See Step 4 in Section 7.2 for a fuller description.
[16] The thresholds that were employed for the economic screening of the measures are summarized in Section 8.2
[17] In the subsequent modeling described in Section 8, measure pass or fail the economic screen on the basis of their CCE in the individual sub sector and region, not on the basis of this weighted average value.
[18] Average CCE does not include program costs.

Exhibit 27 Commercial Sector Energy Efficiency Technology Measures, Screening Results (cont'd…)

Measure Name	Basis	Average CCE (¢/kWh)		
		Island	Labrador	Isolated
Refrigerated Vending Machine Controllers	Full	2.6	2.6	2.6
High Efficiency Compressors (Refrigeration)	Full	2.7	2.7	N/A
High Performance T8 Fixtures (Secondary)	Full	3.7	2.7	3.3
VFDs on HVAC Motors	Full	3.5	3.2	3.1
Building Recommissioning	Full	3.4	3.6	2.9
Hotel Occupancy Sensors	Full	3.8	2.8	N/A
ENERGY STAR Dishwashers	Full	5.0	5.0	0.0
T5HO Fixtures (Secondary)	Full	3.9	2.9	3.6
LED High Bay Fixtures (Secondary)	Full	4.0	3.2	3.8
LED Exit Signs	Full	3.8	3.8	3.8
High Performance T8 Fixtures	Full	4.7	3.5	4.2
Demand Control Kitchen Ventilation (DCKV)	Full	4.2	4.2	N/A
T5HO Fixtures	Full	4.7	3.7	4.5
Refrigeration Controls	Full	4.5	4.5	N/A
LED High Bay Fixtures	Full	5.0	4.0	4.8
Ventilation Heat Recovery	Full	5.2	4.7	4.1
ECM Motors and Evaporator Fan Motor Controllers	Full	4.7	4.7	4.7
Occupancy Sensors (Lighting)	Full	4.7	4.9	5.3
LED Street Lighting	Full	7.8	7.8	0.0
Radiant Infrared Heaters	Full	5.9	6.1	N/A
LED Tubular Lamps (Secondary)	Full	7.1	5.3	6.8
Ductless Mini-Split Heat Pump	Full	9.0	4.4	6.2
Demand Control Ventilation (DCV)	Full	8.1	5.9	N/A
Refrigeration Heat Recovery	Full	8.2	8.2	N/A
Block Heater Controls	Full	N/A	10.0	10.0
Advanced Building Automation Systems	Full	9.9	11.2	N/A
Refrigerated Cases with Doors	Full	10.9	10.9	N/A
Dimming Control (Daylighting)	Full	18.5	14.2	18.6
Air Curtains	Full	18.8	18.8	N/A
Freezer Defrost Controllers	Full	27.9	27.9	27.9
High-Efficiency Air Source Heat Pumps	Full/Incr.	4.6	0.9	9.4
Heat Pump Water Heaters	Full/Incr.	4.8	3.4	12.2
LED Tubular Lamps	Full/Incr.	8.9	5.3	8.7
Ground Source Heat Pumps	Full/Incr.	12.3	10.0	12.5
Energy-Efficient Server Technologies	Incr.	0.0	0.0	0.0
ENERGY STAR Computers	Incr.	0.0	0.0	0.0
ENERGY STAR Office Equipment	Incr.	0.0	0.0	0.0
New Construction (25% More Efficient)	Incr.	3.3	3.1	3.8
Drainwater Heat Recovery	Incr.	4.5	4.5	4.5

Exhibit 27 Commercial Sector Energy Efficiency Technology Measures, Screening Results (cont'd…)

Measure Name	Basis	Average CCE (¢/kWh)		
		Island	Labrador	Isolated
Premium Efficiency Motors	Incr.	4.9	4.5	4.3
High Performance Glazing Systems	Incr.	5.6	6.1	3.2
LED Outdoor Fixtures	Incr.	3.0	3.0	11.3
New Construction (40% More Efficient)	Incr.	6.1	5.8	7.2
CEE-Rated Refrigerators and Freezers	Incr.	8.4	8.4	8.4
Wall Insulation	Incr.	14.1	13.8	5.8
Roof Insulation	Incr.	15.8	16.4	5.0
LED Refrigerated Display Case Lighting	Incr.	11.5	11.5	16.0
On-Demand Water Heaters	Incr.	13.2	13.2	N/A
LED Troffers (Secondary)	Incr.	15.9	12.7	26.2
High Efficiency Chillers	Incr.	14.9	21.7	N/A
LED Troffers	Incr.	20.1	16.3	19.3
High Efficiency RTUs	Incr.	24.6	34.7	32.1

7.4 Demand Reduction Technology Assessment

Exhibit 28 shows the demand reduction technologies and measures that are included in this study. A description and detailed financial and economic assessment of each measure is provided in the TRM Workbook that accompanies this report.

Exhibit 28 Demand Reduction Technologies Included in this Study[19]

Space Heating ▪ Thermal Storage ▪ Heating Controls HVAC Fans and Pumps ▪ HVAC Demand Controls Lighting ▪ Lighting Demand Controls	Domestic Hot Water ▪ DHW Controls Refrigeration ▪ Refrigeration Demand Controls

7.4.1 Technology Screening Results

A summary of the results is provided in Exhibit 29. For each of the measures reviewed, the exhibit shows:

- The name of the measure
- The cost basis[20] for the CEPR that is shown (e.g. full versus incremental)
- The measure's average CEPR for each region[21]

[19] Please note that all demand curtailment is accounted for in the Industrial sector analysis and reporting
[20] See Step 4 in Section 7.2 for a fuller description.
[21] The thresholds that were employed for the economic screening of the measures are summarized in Section 8.2

Measures analyzed on the basis of full cost have been placed towards the top of Exhibit 29 because they are qualitatively different from the measures that pass only on an incremental basis. A measure that passes on a full-cost basis can be applied immediately, even if the piece of equipment it replaces or improves is currently working properly. That means the rate at which the measure can be implemented as a utility CDM measure is limited only by market and program constraints. A measure that passes only on an incremental basis, on the other hand, is limited by the rate of natural replacement (due to failure or obsolescence) or purchase of the piece of equipment it replaces. A measure that passes on a full-cost basis in some sub sector types and on an incremental cost basis in others is shown as “Full/Incr.”

Exhibit 29 Commercial Sector Demand Reduction Technology Measures, Screening Results[22]

Measure Name	Basis	Average CEPR ($/kW)		
		Island	Labrador	Isolated
Lighting Demand Controls	Full	37.7	37.7	37.7
Refrigeration Demand Controls	Full	69.2	69.2	N/A
HVAC Demand Controls	Full	72.4	72.4	72.4
Heating Controls	Full	87.1	87.1	87.1
DHW Controls	Full	103.7	92.9	82.7
Thermal Storage	Full	241.0	241.0	241.0

7.5 Energy Efficiency Supply Curve

This sub-section includes energy efficiency supply curves for each of the three regions studied. It is important to present the supply curves for each region separately, because the avoided costs are different. The supply curves presented are for the year 2029, but the Data Manager can be used to generate supply curves for the other years. Each supply curve shows the avoided cost for that region as a horizontal line, with dashed lines showing the upper and lower edge of the range of reasonableness.

The supply curves were constructed based on the approximate Technical Potential savings associated with the measures listed in Exhibit 23. The following approach was used:

- Measures were introduced in sequence
- Where more than one measure affected the same end use, the savings shown for the second measure are incremental to those already shown for the first
- Sequence was determined by listing first the items that reduce the electrical load, then those that meet residual load with the most efficient technology. It included consideration of CCE results from the preceding exhibit, but not for the purposes of economic screening.
- Items appear in order, starting with the lowest average CCE, but do not stop at the avoided cost threshold. Hence, the supply curve presents a type of Technical Potential scenario.

The results are presented in six exhibits:

- Exhibit 30 presents the potential by measure for the Island Interconnected region. The columns provide the savings for the measure, cumulative savings, and CCE, with measures sorted and numbered in order of increasing CCE.
- Exhibit 31 presents the supply curve for the Island Interconnected region. A few of the larger measures are numbered as landmarks. The numbers match those in Exhibit 30.

[22] Average CEPR does not include program costs.

- Exhibit 32 presents the potential by measure for the Labrador Interconnected region. The columns provide the savings for the measure, cumulative savings, and CCE, with measures sorted and numbered in order of increasing CCE.
- Exhibit 33 presents the supply curve for the Island Interconnected region. A few of the larger measures are numbered as landmarks. The numbers match those in Exhibit 32.
- Exhibit 34 presents the potential by measure for the Labrador Interconnected region. The columns provide the savings for the measure, cumulative savings, and CCE, with measures sorted and numbered in order of increasing CCE.
- Exhibit 35 presents the supply curve for the Island Interconnected region. A few of the larger measures are numbered as landmarks. The numbers match those in Exhibit 34.

Exhibit 30 Island Interconnected Measure Potential and CCE

Ref #	Measure Name	Savings (MWh/yr.)	Cumulative Savings (MWh/yr.)	CCE ($/kWh)
1	ENERGY STAR Computers	26,019	26,019	$0.00
2	Activate PC Power Management	8,476	34,495	$0.00
3	Energy-Efficient Server Technologies	2,510	37,005	$0.00
4	ENERGY STAR Office Equipment	1,834	38,839	$0.00
5	Make Use of Daylighting	1,055	39,894	$0.00
6	Reduce Number of Fridges	587	40,481	$0.00
7	Use Task Light Instead of Ambient	456	40,938	$0.00
8	Use Shades/Blinds (Winter)	239	41,177	$0.00
9	Keep Doors Closed (Winter)	114	41,291	$0.00
10	Use Shades/Blinds (Summer)	41	41,332	$0.00
11	Use Natural Ventilation (Summer)	20	41,351	$0.00
12	Keep Doors Closed (Summer)	11	41,362	$0.00
13	Low-Flow Showerheads	4,628	45,990	$0.00
14	Low-Flow Faucet Aerators	15,350	61,340	$0.00
15	Lighting Controls (Outdoor)	3,873	65,213	$0.00
16	Low-Flow Pre-Rinse Spray Valves	1,004	66,217	$0.00
17	Cooler Night Covers	3,660	69,877	$0.01
18	Automatic Door Closers (Walk-In Coolers & Freezers)	561	70,438	$0.01
19	LED Screw-In Lamps	14,213	84,652	$0.02
20	Programmable Thermostats	31,416	116,068	$0.02
21	High-Efficiency Air Source Heat Pumps	109,737	225,804	$0.02
22	LED Screw-In Lamps	10,497	236,301	$0.02
23	Refrigerated Vending Machine Controllers	6,819	243,121	$0.03
24	High Efficiency Compressors (Refrigeration)	8,537	251,658	$0.03
25	High Performance T8 Fixtures	2,832	254,490	$0.03
26	LED Outdoor Fixtures	21,223	275,714	$0.03
27	New Construction (25% More Efficient)	45,360	321,074	$0.03
28	VFDs on HVAC Motors	22,300	343,374	$0.03
29	Building Recommissioning	96,103	439,477	$0.03
30	Heat Pump Water Heaters	6,015	445,492	$0.03
31	Advanced Building Automation Systems	49,883	495,376	$0.04
32	Hotel Occupancy Sensors	2,434	497,810	$0.04
33	LED Exit Signs	169	497,979	$0.04

Exhibit 30 Island Interconnected Measure Potential and CCE (cont'd…)

Ref #	Measure Name	Savings (MWh/yr.)	Cumulative Savings (MWh/yr.)	CCE ($/kWh)
34	Demand Control Kitchen Ventilation (DCKV)	1,569	499,548	$0.04
35	Premium Efficiency Motors	3,516	503,064	$0.04
36	High Performance Glazing Systems	27,639	530,703	$0.04
37	Occupancy Sensors (Lighting)	33,225	563,928	$0.04
38	T5HO Fixtures	3,345	567,273	$0.04
39	Refrigeration Controls	3,318	570,591	$0.04
40	Drainwater Heat Recovery	4,108	574,699	$0.05
41	ECM Motors and Evaporator Fan Motor Controllers	5,901	580,600	$0.05
42	LED High Bay Fixtures	4,486	585,086	$0.05
43	High Performance T8 Fixtures	19,273	604,359	$0.05
44	T5HO Fixtures	804	605,162	$0.05
45	ENERGY STAR Dishwashers	2,856	608,018	$0.05
46	Ventilation Heat Recovery	19,399	627,417	$0.05
47	LED High Bay Fixtures	1,095	628,512	$0.05
48	New Construction (40% More Efficient)	26,877	655,388	$0.06
49	Radiant Infrared Heaters	3,270	658,658	$0.06
50	LED Tubular Lamps	4,989	663,648	$0.06
51	High-Efficiency Cooking Equipment	3,658	667,306	$0.06
52	LED Tubular Lamps	33,184	700,490	$0.07
53	LED Street Lighting	14,638	715,127	$0.08
54	Refrigeration Heat Recovery	896	716,023	$0.08
55	CEE-Rated Refrigerators and Freezers	5,714	721,738	$0.08
56	Ductless Mini-Split Heat Pump	62,016	783,754	$0.09
57	Demand Control Ventilation (DCV)	23,996	807,750	$0.09
58	Ground Source Heat Pumps	24,316	832,067	$0.11
59	Refrigerated Cases with Doors	13,416	845,482	$0.11
60	LED Refrigerated Display Case Lighting	3,310	848,793	$0.11
61	Wall Insulation	29,480	878,272	$0.13
62	On-Demand Water Heaters	843	879,115	$0.13
63	LED Troffers	915	880,030	$0.14
64	Roof Insulation	20,435	900,466	$0.14
65	High Efficiency Chillers	1,193	901,659	$0.15
66	Air Curtains	299	901,957	$0.19
67	Dimming Control (Daylighting)	9,011	910,968	$0.19
68	LED Troffers	5,826	916,794	$0.19
69	High Efficiency RTUs	5,442	922,236	$0.26
70	Freezer Defrost Controllers	291	922,527	$0.28

Exhibit 31 Island Interconnected Energy Efficiency Supply Curve

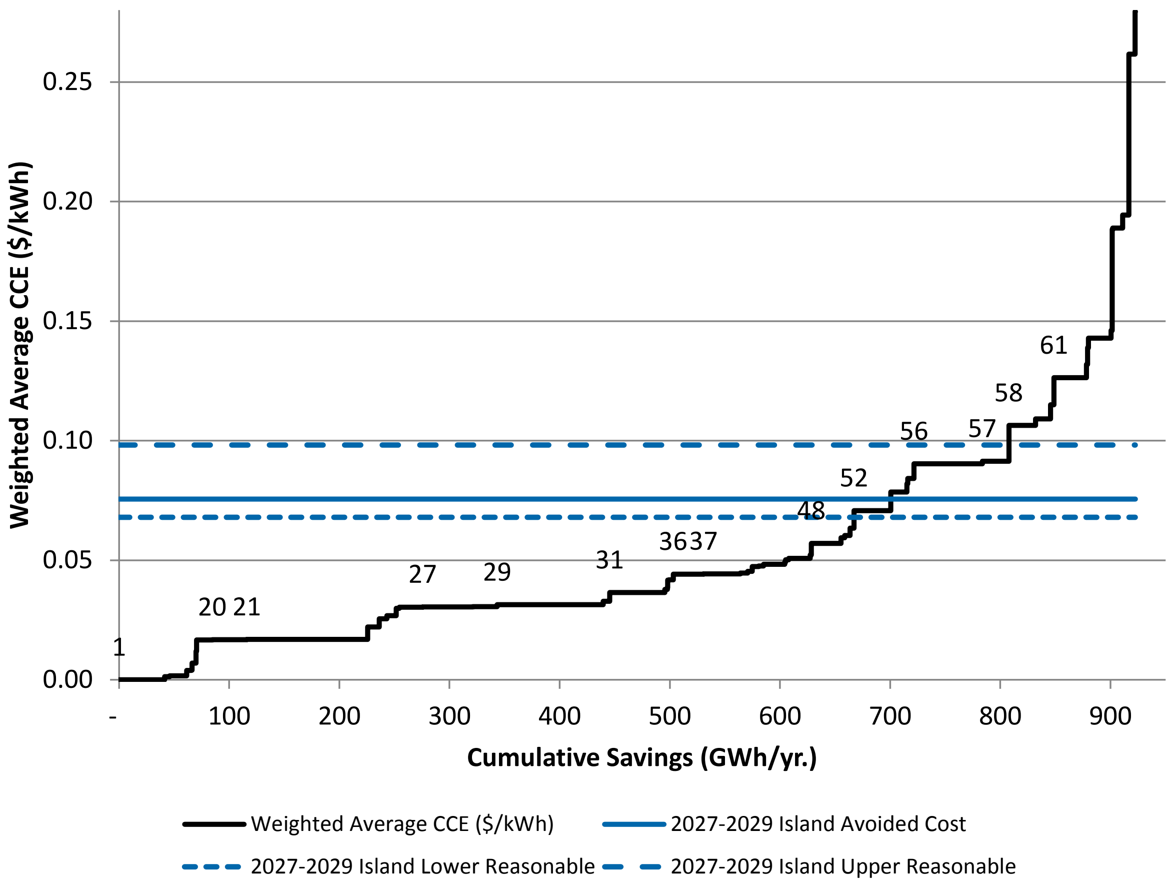


Exhibit 32 Labrador Interconnected Measure Potential and CCE

Ref #	Measure Name	Savings (MWh/yr.)	Cumulative Savings (MWh/yr.)	CCE ($/kWh)
1	ENERGY STAR Computers	1,784	1,784	$0.00
2	Activate PC Power Management	387	2,171	$0.00
3	ENERGY STAR Office Equipment	99	2,270	$0.00
4	Energy-Efficient Server Technologies	48	2,318	$0.00
5	Make Use of Daylighting	40	2,358	$0.00
6	Keep Doors Closed (Winter)	16	2,374	$0.00
7	Reduce Number of Fridges	5	2,379	$0.00
8	Use Task Light Instead of Ambient	5	2,384	$0.00
9	Use Shades/Blinds (Winter)	3	2,387	$0.00
10	Keep Doors Closed (Summer)	0	2,387	$0.00
11	Use Shades/Blinds (Summer)	0	2,387	$0.00
12	Use Natural Ventilation (Summer)	0	2,387	$0.00
13	Low-Flow Showerheads	605	2,992	$0.00
14	Low-Flow Faucet Aerators	3,117	6,109	$0.00
15	Lighting Controls (Outdoor)	518	6,626	$0.00
16	Low-Flow Pre-Rinse Spray Valves	129	6,755	$0.00
17	Cooler Night Covers	175	6,929	$0.01

Exhibit 32 Labrador Interconnected Measure Potential and CCE (cont'd…)

Ref #	Measure Name	Savings (MWh/yr.)	Cumulative Savings (MWh/yr.)	CCE ($/kWh)
18	High-Efficiency Air Source Heat Pumps	21,261	28,190	$0.01
19	Automatic Door Closers (Walk-In Coolers & Freezers)	68	28,259	$0.01
20	LED Screw-In Lamps	1,458	29,716	$0.02
21	Programmable Thermostats	6,414	36,130	$0.02
22	LED Screw-In Lamps	1,293	37,423	$0.02
23	Refrigerated Vending Machine Controllers	736	38,159	$0.03
24	High Efficiency Compressors (Refrigeration)	415	38,574	$0.03
25	Hotel Occupancy Sensors	262	38,836	$0.03
26	LED Outdoor Fixtures	2,881	41,717	$0.03
27	New Construction (25% More Efficient)	1,753	43,470	$0.03
28	High Performance T8 Fixtures	461	43,931	$0.03
29	VFDs on HVAC Motors	1,886	45,817	$0.03
30	Ductless Mini-Split Heat Pump	14,318	60,135	$0.03
31	LED Exit Signs	39	60,174	$0.04
32	Building Recommissioning	14,030	74,204	$0.04
33	Heat Pump Water Heaters	1,114	75,317	$0.04
34	High-Efficiency Cooking Equipment	314	75,631	$0.04
35	High Performance T8 Fixtures	1,323	76,953	$0.04
36	Demand Control Kitchen Ventilation (DCKV)	160	77,114	$0.04
37	T5HO Fixtures	78	77,192	$0.04
38	LED High Bay Fixtures	345	77,537	$0.04
39	Premium Efficiency Motors	367	77,904	$0.04
40	LED High Bay Fixtures	105	78,009	$0.04
41	Refrigeration Controls	157	78,167	$0.04
42	Ventilation Heat Recovery	4,624	82,791	$0.04
43	T5HO Fixtures	270	83,061	$0.04
44	Drainwater Heat Recovery	324	83,384	$0.05
45	LED Tubular Lamps	830	84,214	$0.05
46	ECM Motors and Evaporator Fan Motor Controllers	411	84,625	$0.05
47	Occupancy Sensors (Lighting)	3,056	87,681	$0.05
48	Advanced Building Automation Systems	7,460	95,141	$0.05
49	ENERGY STAR Dishwashers	277	95,418	$0.05
50	New Construction (40% More Efficient)	1,031	96,449	$0.06
51	Demand Control Ventilation (DCV)	6,440	102,889	$0.06
52	High Performance Glazing Systems	5,351	108,240	$0.06
53	Radiant Infrared Heaters	554	108,794	$0.06
54	LED Tubular Lamps	2,332	111,126	$0.06
55	LED Street Lighting	883	112,010	$0.08
56	Refrigeration Heat Recovery	637	112,647	$0.08
57	CEE-Rated Refrigerators and Freezers	1,169	113,815	$0.08
58	Ground Source Heat Pumps	5,383	119,198	$0.09
59	Block Heater Controls	407	119,605	$0.10
60	Refrigerated Cases with Doors	650	120,255	$0.11

Exhibit 32 Labrador Interconnected Measure Potential and CCE (cont'd…)

Ref #	Measure Name	Savings (MWh/yr.)	Cumulative Savings (MWh/yr.)	CCE ($/kWh)
61	LED Refrigerated Display Case Lighting	167	120,422	$0.11
62	Roof Insulation	6,822	127,244	$0.13
63	On-Demand Water Heaters	68	127,312	$0.13
64	Wall Insulation	7,924	135,236	$0.14
65	LED Troffers	153	135,389	$0.14
66	Dimming Control (Daylighting)	172	135,561	$0.17
67	Air Curtains	54	135,615	$0.19
68	LED Troffers	417	136,032	$0.19
69	High Efficiency Chillers	41	136,073	$0.21
70	Freezer Defrost Controllers	69	136,142	$0.28
71	High Efficiency RTUs	146	136,288	$0.36

Exhibit 33 Labrador Interconnected Energy Efficiency Supply Curve

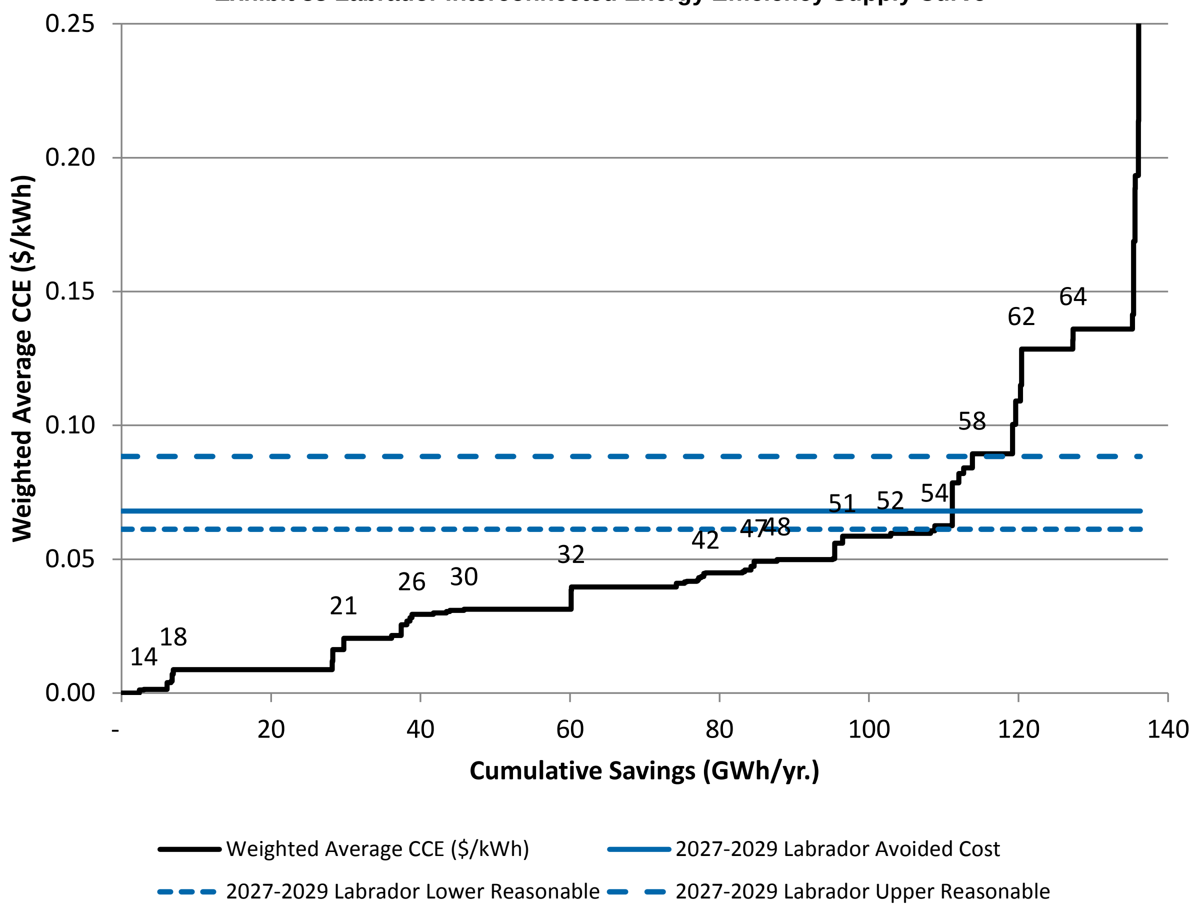


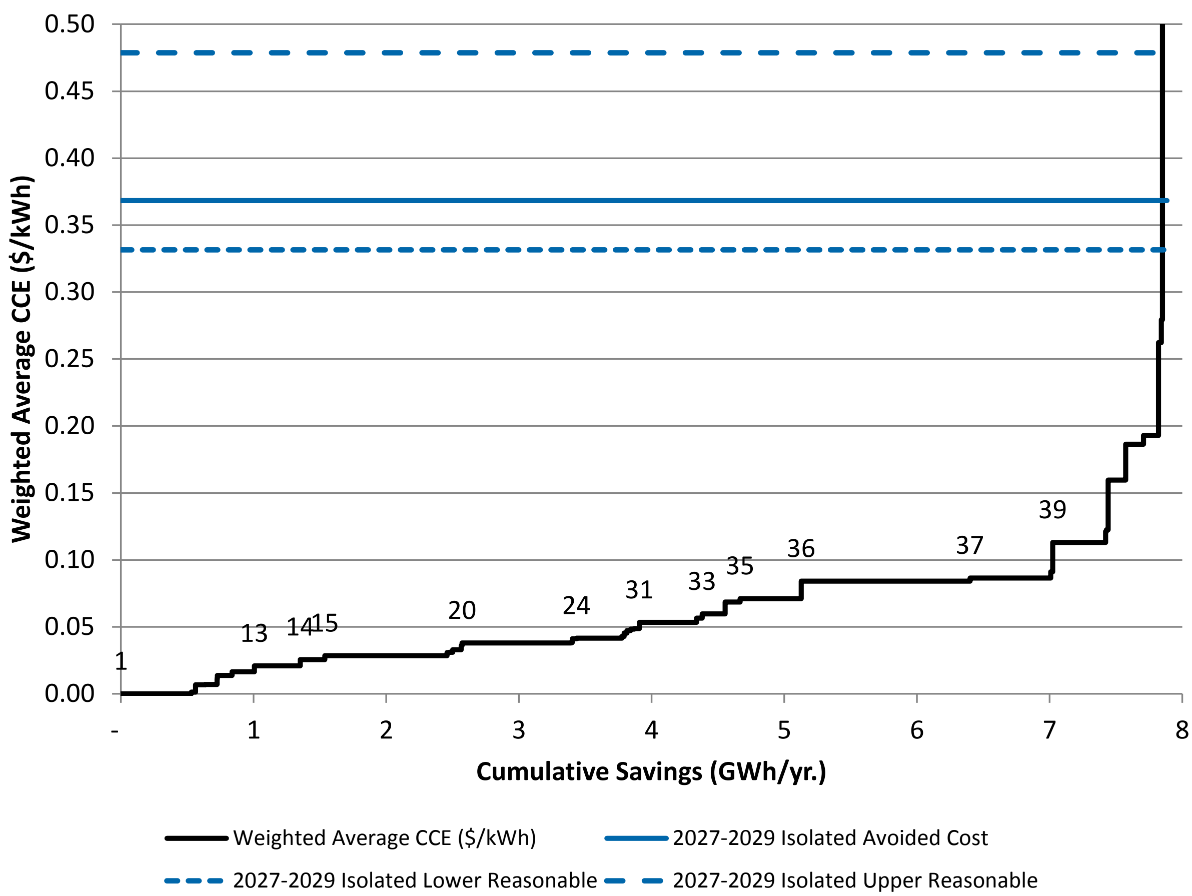
Exhibit 34 Isolated Measure Potential and CCE

Ref #	Measure Name	Savings (MWh/yr.)	Cumulative Savings (MWh/yr.)	CCE ($/kWh)
1	ENERGY STAR Computers	334	334	$0.00
2	Activate PC Power Management	127	462	$0.00
3	Make Use of Daylighting	44	506	$0.00
4	ENERGY STAR Office Equipment	24	529	$0.00
5	Use Shades/Blinds (Winter)	1	530	$0.00
6	Low-Flow Faucet Aerators	30	559	$0.00
7	Low-Flow Showerheads	3	562	$0.00
8	Lighting Controls (Outdoor)	73	635	$0.01
9	Cooler Night Covers	91	725	$0.01
10	Low-Flow Pre-Rinse Spray Valves	2	727	$0.01
11	Programmable Thermostats	110	837	$0.01
12	LED Screw-In Lamps	169	1,006	$0.02
13	LED Screw-In Lamps	345	1,351	$0.02
14	Refrigerated Vending Machine Controllers	186	1,536	$0.03
15	Building Recommissioning	921	2,457	$0.03
16	VFDs on HVAC Motors	18	2,476	$0.03
17	High Performance Glazing Systems	25	2,501	$0.03
18	High Performance T8 Fixtures	64	2,565	$0.03
19	T5HO Fixtures	6	2,571	$0.04
20	New Construction (25% More Efficient)	821	3,392	$0.04
21	LED High Bay Fixtures	9	3,401	$0.04
22	LED Exit Signs	3	3,404	$0.04
23	Ventilation Heat Recovery	30	3,434	$0.04
24	High Performance T8 Fixtures	343	3,777	$0.04
25	Premium Efficiency Motors	17	3,794	$0.04
26	Drainwater Heat Recovery	3	3,796	$0.05
27	T5HO Fixtures	18	3,814	$0.05
28	ECM Motors and Evaporator Fan Motor Controllers	28	3,842	$0.05
29	LED High Bay Fixtures	27	3,869	$0.05
30	Roof Insulation	39	3,908	$0.05
31	Occupancy Sensors (Lighting)	430	4,338	$0.05
32	Wall Insulation	42	4,381	$0.06
33	Ductless Mini-Split Heat Pump	173	4,554	$0.06
34	LED Tubular Lamps	115	4,668	$0.07
35	New Construction (40% More Efficient)	460	5,128	$0.07
36	CEE-Rated Refrigerators and Freezers	1,272	6,400	$0.08
37	LED Tubular Lamps	609	7,008	$0.09
38	High-Efficiency Air Source Heat Pumps	16	7,024	$0.09
39	LED Outdoor Fixtures	397	7,422	$0.11
40	Ground Source Heat Pumps	7	7,428	$0.12
41	Heat Pump Water Heaters	14	7,442	$0.12
42	LED Refrigerated Display Case Lighting	131	7,574	$0.16
43	Dimming Control (Daylighting)	135	7,709	$0.19

Exhibit 34 Isolated Measure Potential and CCE (cont'd…)

Ref #	Measure Name	Savings (MWh/yr.)	Cumulative Savings (MWh/yr.)	CCE ($/kWh)
44	LED Troffers	112	7,820	$0.19
45	LED Troffers	22	7,842	$0.26
46	Freezer Defrost Controllers	9	7,851	$0.28
47	High-Efficiency Cooking Equipment	33	7,884	$1.11

Exhibit 35 Isolated Energy Efficiency Supply Curve



7.6 Demand Reduction Supply Curve

This sub-section includes demand reduction supply curves for each of the three regions studied. It is important to present the supply curves for each region separately, because the avoided costs are different. The supply curves presented are for the year 2029, but the Data Manager can be used to generate supply curves for the other years. Each supply curve shows the avoided cost for that region as a horizontal line, with dashed lines showing the upper and lower edge of the range of reasonableness.

The supply curves were constructed based on the approximate Technical Potential savings associated with the measures listed in Exhibit 28. The following approach was used:

- Measures were introduced in sequence
- Where more than one measure affected the same end use, the reduction shown for the second measure are incremental to those already shown for the first
- Sequence was determined by listing first the items that reduce the electrical load, then those that meet residual load with the most efficient technology. It included consideration of CEPR results from the preceding exhibit, but not for the purposes of economic screening.
- Items appear in order, starting with the lowest average CEPR, but do not stop at the avoided cost threshold. Hence, the supply curve presents a type of Technical Potential scenario.

The results are presented in six exhibits:

- Exhibit 36 presents the potential by measure for the Island Interconnected region. The columns provide the reduction for the measure, cumulative reduction, and CEPR, with measures sorted and numbered in order of increasing CEPR.
- Exhibit 37 presents the supply curve for the Island Interconnected region. A few of the larger measures are numbered as landmarks. The numbers match those in Exhibit 36.
- Exhibit 38 presents the potential by measure for the Labrador Interconnected region. The columns provide the savings for the measure, cumulative savings, and CCE, with measures sorted and numbered in order of increasing CCE.
- Exhibit 39 presents the supply curve for the Labrador Interconnected region. A few of the larger measures are numbered as landmarks. The numbers match those in Exhibit 38.
- Exhibit 40 presents the potential by measure for the Isolated region. The columns provide the savings for the measure, cumulative savings, and CCE, with measures sorted and numbered in order of increasing CCE.
- Exhibit 41 presents the supply curve for the Isolated region. A few of the larger measures are numbered as landmarks. The numbers match those in Exhibit 40.

Exhibit 36 Island Interconnected Measure Potential and CEPR

Ref #	Measure Name	Demand Reduction (MW)	Cumulative Reduction (MW)	CEPR ($/kW)
1	Lighting Demand Controls	3	3	$37.65
2	Refrigeration Demand Controls	1	4	$69.24
3	HVAC Demand Controls	10	14	$72.41
4	Heating Controls	2	16	$87.13
5	DHW Controls	13	29	$89.31
6	Thermal Storage	75	104	$240.96

Exhibit 37 Island Interconnected Demand Reduction Supply Curve

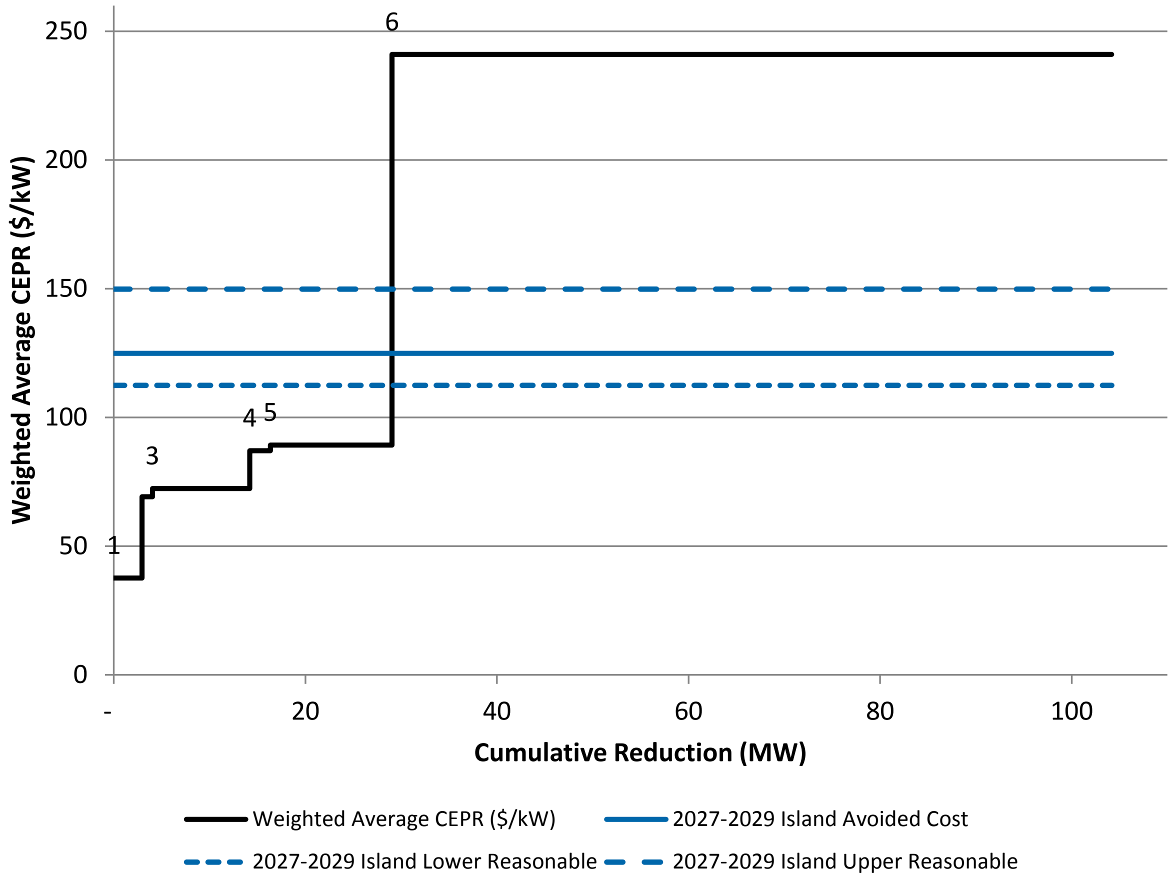


Exhibit 38 Labrador Interconnected Measure Potential and CEPR

Ref #	Measure Name	Demand Reduction (MW)	Cumulative Reduction (MW)	CEPR ($/kW)
1	Lighting Demand Controls	1	1	$37.65
2	Refrigeration Demand Controls	0	1	$69.24
3	HVAC Demand Controls	1	2	$72.41
4	DHW Controls	2	4	$85.31
5	Heating Controls	1	5	$87.13
6	Thermal Storage	8	12	$240.96

Exhibit 39 Labrador Interconnected Demand Reduction Supply Curve

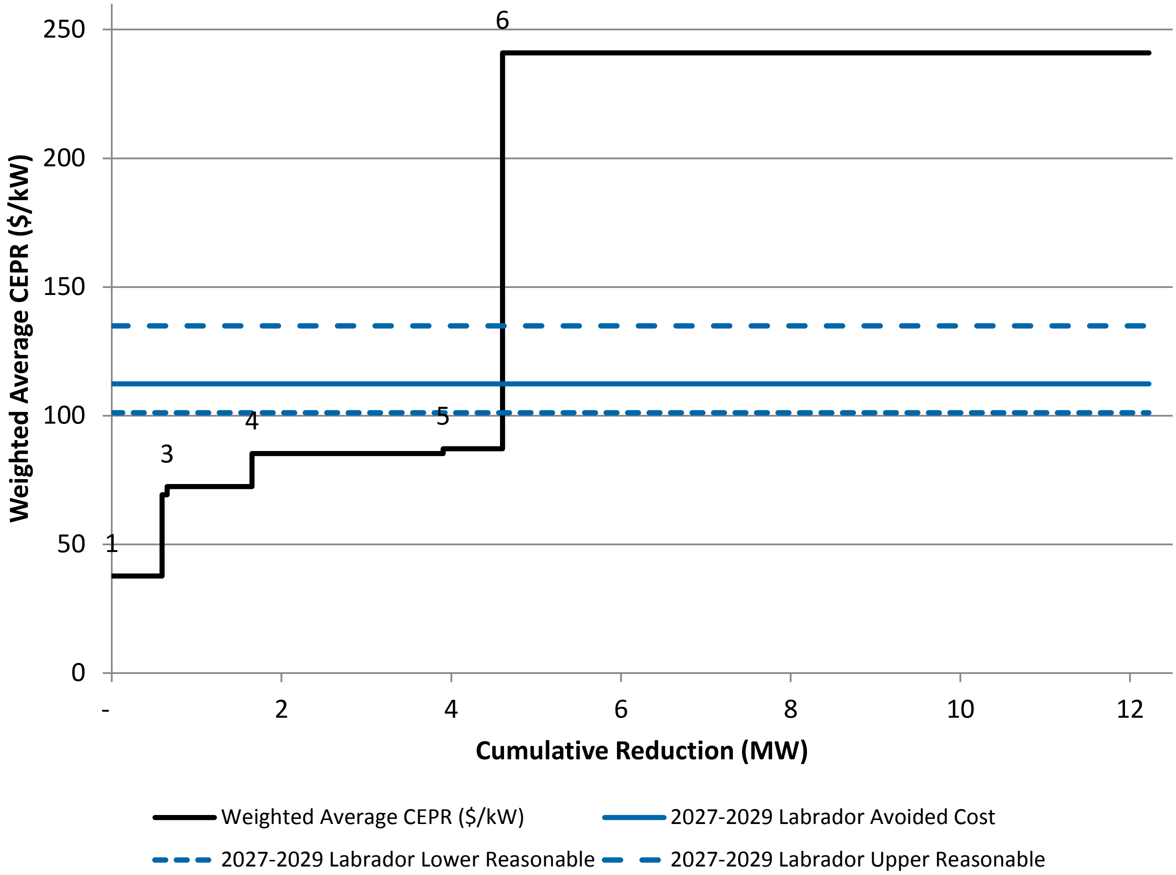
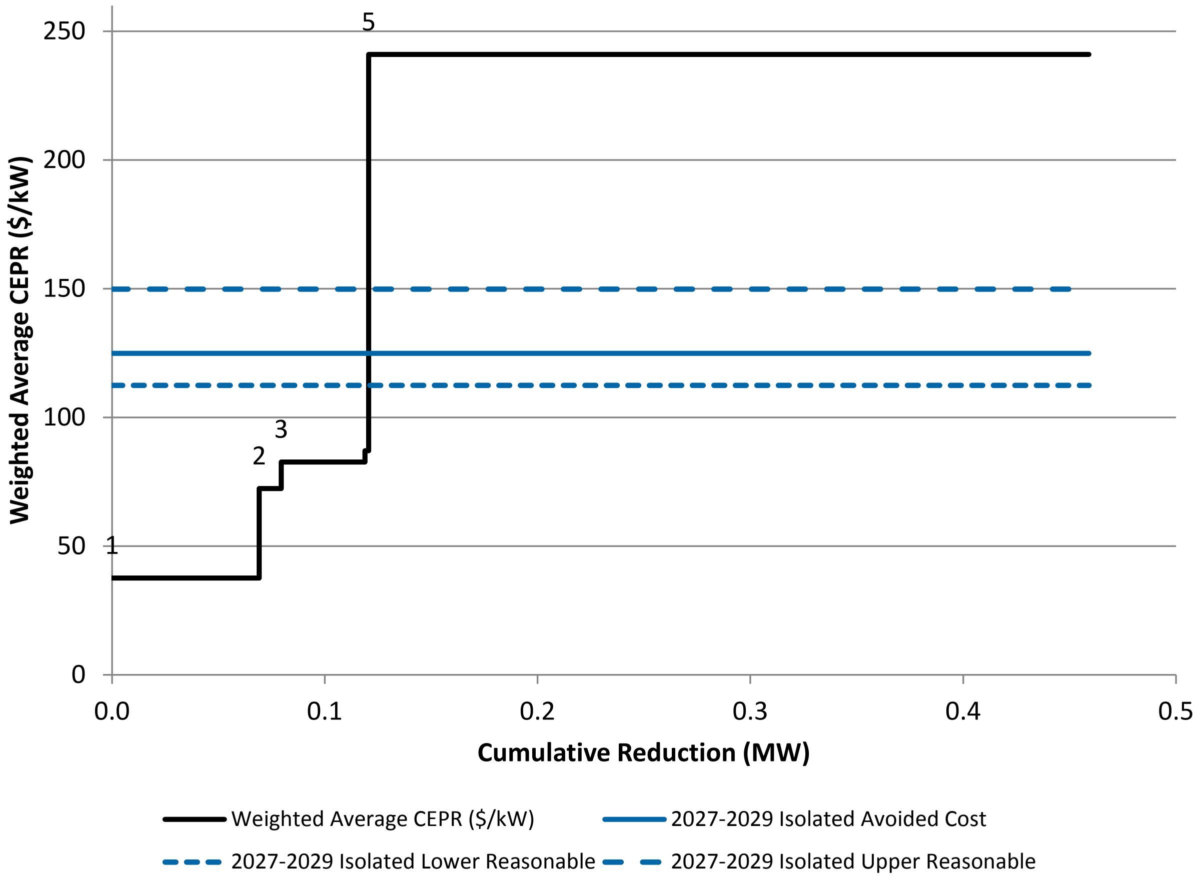


Exhibit 40 Isolated Measure Potential and CEPR

Ref #	Measure Name	Demand Reduction (MW)	Cumulative Reduction (MW)	CEPR ($/kW)
1	Lighting Demand Controls	0.07	0.07	$37.65
2	HVAC Demand Controls	0.01	0.08	$72.41
3	DHW Controls	0.04	0.12	$82.74
4	Heating Controls	0.00	0.12	$87.13
5	Thermal Storage	0.34	0.46	$240.96

Exhibit 41 Isolated Demand Reduction Supply Curve



8 Economic Potential: Electric Energy Forecast

8.1 Introduction

This section presents the Commercial sector Economic Potential Forecast for electric energy and demand for the study period 2014 to 2029. The Economic Potential Electric Energy Forecast estimates the level of electricity consumption that would occur if all equipment and building envelopes were upgraded to the level that is cost effective against the economic threshold values for electricity in the three regions in NL. The model also estimates the peak demand implications of applying all the cost-effective efficiency measures. Starting from that point, the Economic Potential Peak Demand Forecast estimates the level of peak demand that would occur if all cost-effective demand reduction measures were also applied. In this study, "cost effective" means that the technology upgrade cost, referred to as the cost of conserved energy (CCE) or the cost of electricity peak reduction (CEPR) in the preceding section, is equal to or less than the economic threshold value for a given region.

The discussion in this section covers the following:

- Avoided costs used for screening
- Major modelling tasks
- Technologies included in Economic Potential Forecast
- Presentation of energy efficiency results
- Interpretation of energy efficiency results
- Summary of peak load reductions from energy efficiency
- Presentation of load reduction results
- Interpretation of load reduction results
- Range of reasonableness.

8.2 Avoided Costs Used For Screening

The Utilities agreed on a set of economic threshold values for electricity supply to be used in this study. The values vary by region and milestone year as shown in Exhibit 42. Each of the values for the years after 2014 represents the average of the three years in the milestone period.

Exhibit 42 Avoided Costs of New Electricity Supply

Year	Avoided Cost per kWh		
	Island Interconnected	Labrador Interconnected	Isolated
2014	$0.108	$0.037	$0.21
2017	$0.125	$0.039	$0.23
2020	$0.050	$0.045	$0.26
2023	$0.059	$0.053	$0.29
2026	$0.068	$0.061	$0.34
2029	$0.076	$0.068	$0.37

The Economic Potential Electric Energy Forecast then incorporates all the electric energy-efficient upgrades that the technology assessment found to have a CCE equal to or less than these thresholds.

The Utilities also agreed on a set of economic threshold values for new generation capacity to be used in this study. These values also vary by region and milestone year as shown in Exhibit 43. Again, each value for the years after 2014 represents an average of the three years in the milestone period. The cost of new capacity for the Isolated region was not available. For the purposes of the study, the higher of the two values for the other two regions was used in each milestone year.

Exhibit 43 Avoided Costs of New Electric Generation Capacity

Year	Avoided Cost per kW		
	Island Interconnected	Labrador Interconnected	Isolated
2014	$50.911	$72.059	
2017	$65.116	$82.527	
2020	$101.821	$91.601	
2023	$115.126	$103.571	
2026	$124.930	$112.390	
2029	$124.907	$112.370	

The Economic Potential Peak Demand Forecast then incorporates all the demand reduction upgrades that the technology assessment found to have a CEPR equal to or less than these thresholds.

The Utilities also provided a range of reasonableness for all of these avoided costs. The lower range for new electricity supply is considered to be 10% below the costs per kWh shown in Exhibit 42 while the upper range is considered to be 30% above those values. The upper range for new electric generation capacity supply is considered to be 10% below the costs per kW shown in Exhibit 43 while the upper range is considered to be 20% above those values. The purpose for establishing the range of reasonableness is to show the sensitivity of the results to varying avoided cost scenarios and to improve the ability of planners to examine options that may become more cost effective over time.

Emerging end-use technology measures are becoming cheaper over time as these markets become more cost effective. This is apparent by examining a range of measures whose costs have reduced significantly in the last several years (e.g., the cost of LED lamps has reduced by a factor of 5-10x since their introduction). Including these apparently more costly measures in this study allows the review of these measures in the near future, as programs are effective in introducing more competitiveness within these markets. At the same time, new sources of supply are expected to come online during the study period, so it is important to explore the implications of lower avoided costs.

8.3 Major Modelling Tasks

By comparing the results of the Commercial sector Economic Potential Electric Energy and Peak Demand Forecasts with the Reference Case, it is possible to determine the aggregate level of potential electricity savings and demand reductions within the Commercial sector, as well as identify which specific building sub sectors and end uses provide the most significant opportunities for savings.

To develop the Commercial sector Economic Potential Electric Energy Forecast, the following tasks were completed:

- The CCE for each of the energy-efficient upgrades presented in Exhibit 27 were reviewed, using the 7% (real) discount rate.
- Technology upgrades that had a CCE equal to, or less than, the threshold values for each region and milestone year were selected for inclusion in the Economic Potential scenario, either on a full-cost or incremental basis. It is assumed that technical upgrades having a full-cost CCE that met the cost threshold were implemented in the first forecast year. It is assumed that those upgrades that only met the cost threshold on an incremental basis are being introduced more slowly as the existing stock reaches the end of its useful life.
- Electricity use within each of the building sub sectors was modelled with the same energy models that were used to generate the Reference Case. However, for this forecast, the remaining baseline technologies included in the Reference Case forecast were replaced with the most efficient technology upgrade option and associated performance efficiency that met the cost thresholds for each region and milestone period.
- When more than one upgrade option was applied to a given end use, the first measure selected was the one that reduced the electrical load. For example, measures to reduce the overall space heating load (e.g., roof insulation and more efficient glazing) were applied before a heat pump.

To develop the Commercial sector Economic Potential Peak Demand Forecast, the following tasks were completed:

- The Economic Potential Electric Energy Forecast was used to generate the reductions in peak demand associated with efficiency improvements. These reductions were applied to the demand Reference Case to generate a Post-Efficiency Case to serve as the starting point for the demand reduction model. This was intended to avoid any double counting of demand reductions.
- The CEPR for each of the load reduction upgrades presented in Exhibit 28 were reviewed, using the 7% (real) discount rate.
- Technology upgrades that had a CEPR equal to, or less than, the threshold values for each region and milestone year were selected for inclusion in the Economic Potential scenario, either on a full-cost or incremental basis. It is assumed that technical upgrades having a full-cost CEPR that met the cost threshold were implemented in the first forecast year. It is assumed that those upgrades that only met the cost threshold on an incremental basis are being introduced more slowly as the existing stock reaches the end of its useful life.
- Peak demand within each of the building sub sectors was modelled with the same demand models that were used to generate the Reference Case. However, for this forecast, the remaining baseline technologies included in the Reference Case forecast were replaced with the most efficient technology upgrade option and associated performance efficiency that met the cost thresholds for each region and milestone period.

8.4 Technologies Included in Economic Potential Forecast

Exhibit 44 provides a listing of the efficiency technologies included in this forecast. Exhibit 45 provides a listing of the demand reduction technologies included in this forecast. In each case, the exhibits show the following:

- End use affected
- Upgrade option(s) selected
- Building type to which the upgrade options were applied
- Rate at which the upgrade options were introduced into the stock.

Some of the technologies listed in the exhibits below are the subject of current utility programs in the province of NL. The load forecast provided by the Utilities assumed a modest level of continued program activity and continued savings from efficiency improvements made under past programs, but no new program activity. The reference case for this project was constructed to be consistent with that forecast, in that the penetrations of the energy technologies below were not all assumed to remain static at their current levels. Reference case penetrations were assumed to increase, to account for natural adoption and the modest level of program activity assumed in the reference case.

In most cases, current programs are unlikely to capture all the economic potential for the technologies over the next 15 years. Therefore, none of the technologies have actually been removed from consideration in the study. Nonetheless, there are cases where the reference case penetration "catches up" to the economic penetration, and the economic potential diminishes, as can be seen later in this section in Exhibit 48.

Exhibit 44 Efficiency Technologies Included in Economic Potential Forecast

End Use Category	Upgrade Option	Applicability	Rate of Introduction
Computer Equipment	ENERGY STAR Computers	All existing facilities	At natural rate of replacement
	ENERGY STAR Office Equipment	All existing facilities	At natural rate of replacement
	Energy-Efficient Server Technologies	All existing facilities	At natural rate of replacement
Lighting	LED Screw-In Lamps	All existing facilities	Immediate
	LED Tubular Lamps	All existing facilities	At natural rate of replacement/Immediate in some facility types
	LED Troffers	All existing facilities	At natural rate of replacement
	High Performance T8 Fixtures	All existing facilities	Immediate
	LED Exit Signs	All existing facilities	Immediate
	LED High Bay Fixtures	Facilities with high bay fixtures (e.g. warehouses)	Immediate
	T5HO Fixtures	Facilities with high bay fixtures (e.g. warehouses)	Immediate
	Occupancy Sensors (Lighting)	All existing facilities	Immediate
	Dimming Control (Daylighting)	Facilities with a significant proportion of windows	Immediate
	LED Outdoor Fixtures	All existing facilities	At natural rate of replacement/Immediate in some cases
	Lighting Controls (Outdoor)	All existing facilities	Immediate
	LED Street Lighting	All street lighting	At natural rate of replacement/Immediate in some cases
DHW	Low-Flow Faucet Aerators	All existing facilities	Immediate
	On-Demand Water Heaters	Accommodation facilities	Immediate (at time of major renovation)
	Drainwater Heat Recovery	Accommodation facilities	Immediate (at time of major renovation)
	Heat Pump Water Heaters	Facilities with waste heat in their mechanical rooms (excludes retail and warehouses)	At natural rate of replacement/Immediate in some facility types
	Low-Flow Pre-Rinse Spray Valves	Facilities with larger commercial kitchens (excludes Offices)	Immediate
	ENERGY STAR Dishwashers	Facilities with larger commercial kitchens (excludes Offices)	At natural rate of replacement/Immediate in some facility types
	Low-Flow Showerheads	Facilities with significant shower use	Immediate
	Refrigeration Heat Recovery	Large Other facilities (focus on arenas)	Immediate
Refrigeration	LED Refrigerated Display Case Lighting	Food Retail and Large Non-Food Retail	At natural rate of replacement
	Cooler Night Covers	Food Retail and Large Non-Food Retail	Immediate

Exhibit 44 Efficiency Technologies Included in Economic Potential Forecast (cont'd…)

End Use Category	Upgrade Option	Applicability	Rate of Introduction
Refrigeration	Refrigerated Cases with Doors	Food Retail and Large Non-Food Retail	Immediate
	ECM Motors and Evaporator Fan Motor Controllers	All facilities with significant commercial refrigeration loads	Immediate
	Freezer Defrost Controllers	All facilities with significant commercial refrigeration loads	Immediate
	High Efficiency Compressors (Refrigeration)	Food Retail and Large Non-Food Retail	Immediate
	Automatic Door Closers (Walk-In Coolers & Freezers)	Food Retail and Restaurants	Immediate
	Refrigeration Controls	Food Retail and Large Non-Food Retail	Immediate
	CEE-Rated Refrigerators and Freezers	All facilities with stand-alone refrigerators	At natural rate of replacement
HVAC Equipment and Controls	High-Efficiency Air Source Heat Pumps	All commercial facilities with rooftop units (RTUs)	At natural rate of replacement/Immediate in some facility types
	Ground Source Heat Pumps	All existing facilities	At natural rate of replacement/Immediate in some facility types
	Ductless Mini-Split Heat Pump	All small commercial facilities	Immediate
	Ventilation Heat Recovery	Facilities where exhaust air ducting is located close to supply air ducting	Immediate
	Radiant Infrared Heaters	Warehouses	Immediate
	High Efficiency Chillers	All commercial facilities with chillers	At natural rate of replacement
	High Efficiency RTUs	All commercial facilities with rooftop units (RTUs)	At natural rate of replacement
	Hotel Occupancy Sensors	Accommodation facilities	Immediate
	Demand Control Ventilation (DCV)	Facilities with large variances in occupancy, excluding restaurants	Immediate
	Programmable Thermostats	All existing facilities	Immediate
	Demand Control Kitchen Ventilation (DCKV)	Restaurants	Immediate
	VFDs on HVAC Motors	All facilities with variable air volume (VAV) HVAC systems	Immediate
	Premium Efficiency Motors	All existing facilities	At natural rate of replacement
Building Envelope	Roof Insulation	All existing facilities	Immediate (at time of major renovation)
	Wall Insulation	All existing facilities	Immediate (at time of major renovation)
	High Performance Glazing Systems	All existing facilities	At natural rate of replacement
	Air Curtains	Food Retail and Large Non-Food Retail	Immediate

Exhibit 44 Efficiency Technologies Included in Economic Potential Forecast (cont'd…)

End Use Category	Upgrade Option	Applicability	Rate of Introduction
Whole Building	Advanced Building Automation Systems	Larger commercial facilities	Immediate
	Building Recommissioning	All existing facilities	Immediate
New Construction	New Construction (25% More Efficient)	All new facilities	At time of new construction
	New Construction (40% More Efficient)	All new facilities	At time of new construction
Other	Refrigerated Vending Machine Controllers	All facilities with vending machines	Immediate
	High-Efficiency Cooking Equipment	All facilities with commercial kitchens	At natural rate of replacement
	Block Heater Controls	Labrador and Isolated only	Immediate
Behaviour	Activate PC Power Management	All existing facilities	Immediate
	Make Use of Daylighting	Facilities with a significant proportion of windows	Immediate
	Use Task Light Instead of Ambient	Offices	Immediate
	Reduce Number of Fridges	Offices	Immediate
	Use Shades/Blinds (Winter)	Offices	Immediate
	Use Shades/Blinds (Summer)	Offices	Immediate
	Use Natural Ventilation (Summer)	Offices	Immediate
	Keep Doors Closed (Winter)	Retail facilities and Warehouses	Immediate
	Keep Doors Closed (Summer)	Retail facilities and Warehouses	Immediate

Exhibit 45 Load Reduction Technologies Included in Economic Potential Forecast

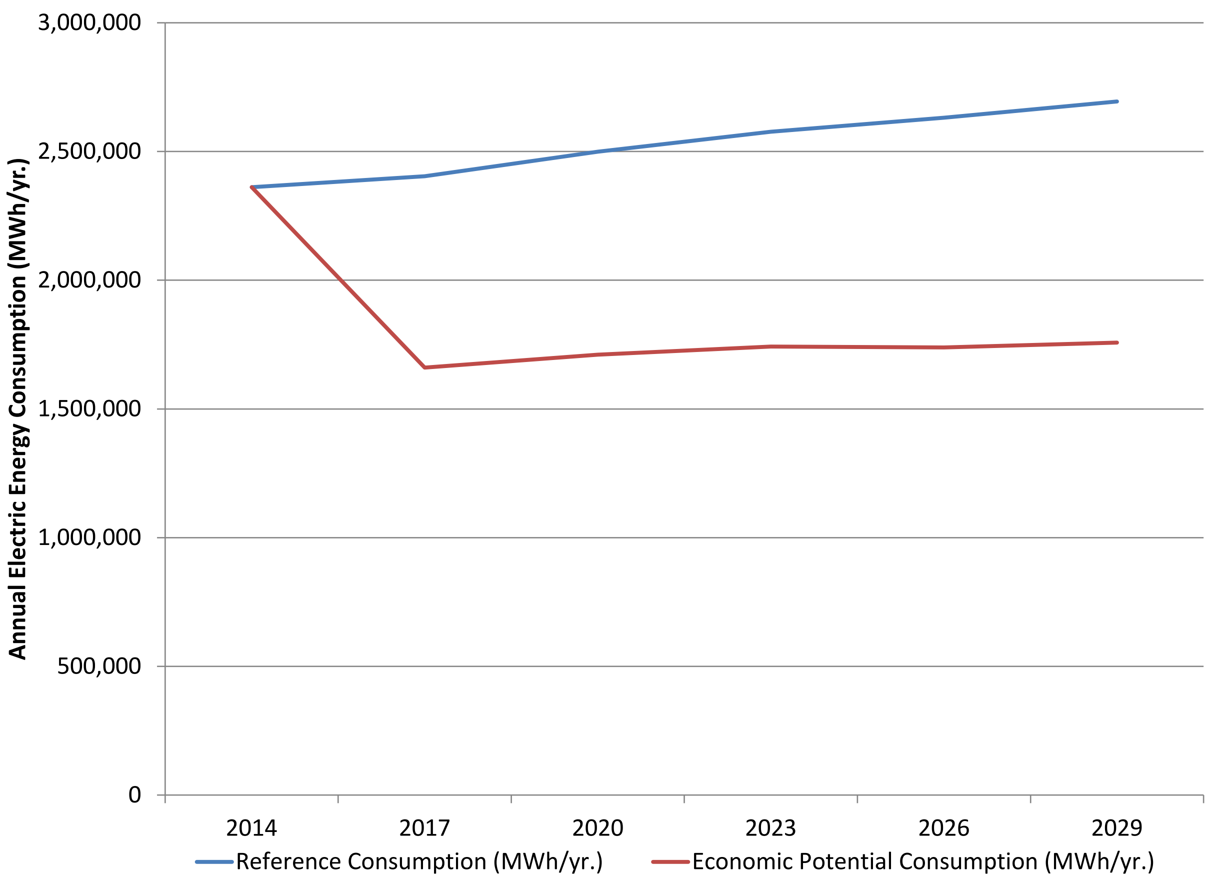
End Use Category	Upgrade Option	Applicability	Rate of Introduction
HVAC	Space Heating Controls	Accommodation facilities	Immediate
	Electric Thermal Storage Systems	All facilities, excluding large retail, Universities and Warehouses	Immediate
	HVAC Fans & Pumps Controls	Larger facilities with central HVAC controls	Immediate
Lighting	Lighting Controls	All facilities	Immediate
DHW	Domestic Hot Water (DHW) Controls	Facilities with DHW loads during peak periods	Immediate
Refrigeration	Refrigeration Controls	All facilities with significant refrigeration loads	Immediate

8.5 Summary of Electric Energy Savings

Exhibit 46 compares the commercial electricity consumption forecasts for the Reference Case and the Economic Potential Electric Energy scenarios.[23] Under the Reference Case, commercial electricity consumption would grow from the Base Year level of about 2,360 GWh/yr. to approximately 2,700 GWh/yr. by 2029. This contrasts with the Economic Potential Forecast in which electricity use would decrease to approximately 1,760 GWh/yr. for the same period. This represents a difference of approximately 940 GWh/yr., or about 35%.

The exhibit shows a large fraction of the economic potential savings occurring in the first milestone period. There are several reasons for this, including a large number of measures that pass on a full-cost basis, and avoided costs in the Island Interconnected region that are forecast to drop sharply after 2018. These factors are discussed in more detail in Section 8.5.2.

Exhibit 46 Reference Case versus Economic Potential Electric Energy Consumption in Commercial Sector (MWh/yr.)



[23] All results are reported at the customer's point-of-use and do not include line losses.

8.5.1 Electric Energy Savings

Further detail on the total potential electric energy savings provided by the Economic Potential Forecast is provided in the following exhibits:[24]

- Exhibit 47 presents the results by end use, sub sector and milestone year
- Exhibit 48 provides a further disaggregation of the savings by measure and milestone year
- Exhibit 49 presents savings by major end use, milestone year and region
- Exhibit 50 presents savings by major end use, milestone year and sub sector
- Exhibit 51 presents savings by major end use, milestone year and vintage

[24] MWh/yr. savings shown in the following exhibits are not incremental. For example, the space heating savings in 2029 are not in addition to the space heating savings from the previous milestone years. Rather, they are the difference between the Reference Case space heating consumption in 2029 and the space heating consumption if all the measures included in the Economic Potential scenario are implemented.

Exhibit 47 Total Economic Potential Electricity Savings by End Use, Sub sector and Milestone Year (MWh/yr.)

Subsector	Milestone Years	Space Heating	General Lighting	HVAC Fans & Pumps	Refrigeration	Domestic Hot Water	Computer Equipment	Secondary Lighting	Outdoor Lighting	Street Lighting	Space Cooling	Other Plug Loads	Food Service Equipment	Computer Servers	TOTAL
Large Office	2017	35,396	21,111	14,702	112	2,009	7,233	4,890	1,856	-	2,385	2,000	-	643	**92,337**
	2020	40,728	20,671	15,130	118	2,047	9,231	4,640	2,251	-	2,430	2,048	-	1,093	**100,389**
	2023	47,060	20,538	15,984	132	2,129	9,532	4,441	2,669	-	2,563	2,101	-	1,114	**108,262**
	2026	51,318	25,502	16,999	148	2,227	9,797	4,260	2,988	-	2,728	2,149	-	1,135	**119,251**
	2029	58,110	25,654	18,382	170	2,363	10,076	4,119	2,902	-	2,967	2,199	-	1,156	**128,099**
Small Office	2017	44,075	15,639	6,969	-	1,515	5,995	1,842	1,540	-	2,384	215	-	534	**80,708**
	2020	44,508	15,394	7,186	-	1,648	7,685	1,745	1,867	-	2,407	231	-	908	**83,577**
	2023	45,850	15,353	7,715	-	1,830	7,923	1,667	2,218	-	2,511	245	-	925	**86,236**
	2026	45,843	18,520	8,269	-	2,012	8,134	1,591	2,479	-	2,621	256	-	943	**90,666**
	2029	48,379	19,236	9,021	-	2,186	8,355	1,526	2,402	-	2,782	268	-	960	**95,116**
Large Non-food Retail	2017	9,704	17,204	9,596	2,257	489	602	1,411	1,471	-	948	829	-	-	**44,511**
	2020	11,305	16,818	9,720	2,300	502	772	1,344	1,786	-	955	846	-	-	**46,347**
	2023	13,142	16,653	10,057	2,405	533	797	1,294	2,126	-	994	862	-	-	**48,864**
	2026	15,226	16,513	10,418	2,492	565	819	1,247	2,382	-	1,037	878	-	-	**51,577**
	2029	17,206	16,521	10,914	2,614	610	843	1,211	2,318	-	1,100	895	-	-	**54,231**
Small Non-food Retail	2017	18,270	16,073	7,408	-	760	887	1,936	2,174	-	1,105	-	-	-	**48,613**
	2020	20,230	15,879	7,578	-	776	1,135	1,842	2,634	-	1,118	-	-	-	**51,191**
	2023	21,848	15,704	7,891	-	805	1,169	1,761	3,112	-	1,159	-	-	-	**53,449**
	2026	23,084	18,549	8,283	-	842	1,200	1,688	3,473	-	1,215	-	-	-	**58,333**
	2029	26,040	18,600	8,817	-	893	1,232	1,628	3,354	-	1,299	-	-	-	**61,863**
Food Retail	2017	8,169	10,190	3,909	33,502	909	688	951	1,071	-	472	789	163	-	**60,813**
	2020	9,536	10,028	3,979	33,872	926	880	924	1,301	-	474	804	345	-	**63,068**
	2023	10,849	9,914	4,099	34,930	969	906	914	1,552	-	487	820	517	-	**65,958**
	2026	12,165	9,812	4,230	35,784	1,016	929	899	1,743	-	501	835	574	-	**68,489**
	2029	13,559	9,786	4,413	37,022	1,079	954	894	1,702	-	524	850	574	-	**71,357**
Large Accomodation	2017	9,754	4,933	2,051	360	6,988	354	2,396	481	-	355	390	58	-	**28,119**
	2020	10,151	4,787	2,075	363	7,455	453	2,281	582	-	356	398	58	-	**28,960**
	2023	10,722	4,692	2,146	389	8,039	467	2,210	691	-	370	405	58	-	**30,189**
	2026	11,309	4,581	2,221	401	8,632	479	2,145	772	-	386	413	58	-	**31,396**
	2029	12,525	4,491	2,325	418	9,316	492	2,108	748	-	409	421	58	-	**33,308**
Small Accomodation	2017	4,724	2,389	340	0	3,337	159	643	214	-	91	174	-	-	**12,069**
	2020	4,840	2,309	347	2	3,545	203	611	259	-	92	177	-	-	**12,384**
	2023	5,032	2,244	365	7	3,804	209	591	306	-	98	181	-	-	**12,836**
	2026	5,332	2,177	384	13	4,072	214	573	342	-	105	184	-	-	**13,396**
	2029	5,579	2,118	411	21	4,378	220	563	330	-	115	187	-	-	**13,922**

Exhibit 47 Total Economic Potential Electricity Savings by End Use, Sub sector and Milestone Year (MWh/yr.) (cont'd…)

Subsector	Milestone Years	Space Heating	General Lighting	HVAC Fans & Pumps	Refrigeration	Domestic Hot Water	Computer Equipment	Secondary Lighting	Outdoor Lighting	Street Lighting	Space Cooling	Other Plug Loads	Food Service Equipment	Computer Servers	TOTAL
Healthcare	2017	36,691	1,670	14,522	162	2,587	1,197	3,849	1,606	-	692	151	173	140	**63,438**
	2020	37,767	1,723	14,946	168	2,858	1,525	3,707	1,938	-	701	154	345	237	**66,070**
	2023	38,734	1,702	15,160	179	3,157	1,566	3,629	2,280	-	709	157	518	242	**68,033**
	2026	39,687	1,903	15,425	193	3,472	1,604	3,580	2,531	-	723	160	576	246	**70,099**
	2029	40,867	1,986	15,793	213	3,770	1,642	3,586	2,424	-	746	163	576	251	**72,016**
Schools	2017	44,326	16,758	2,417	110	2,231	2,306	2,926	2,574	-	63	307	-	-	**74,016**
	2020	45,341	16,530	2,454	115	2,263	2,951	2,790	3,115	-	69	313	-	-	**75,940**
	2023	47,323	16,488	2,526	123	2,322	3,041	2,730	3,668	-	79	319	-	-	**78,619**
	2026	48,896	16,862	2,637	134	2,385	3,123	2,633	4,078	-	92	325	-	-	**81,164**
	2029	50,672	16,994	2,762	147	2,471	3,208	2,710	3,913	-	109	331	-	-	**83,318**
Universities and Colleges	2017	2,922	19,998	17,143	774	489	2,966	1,392	1,347	-	396	956	-	106	**48,488**
	2020	3,408	19,576	17,190	777	500	3,771	1,329	1,622	-	406	974	-	181	**49,734**
	2023	4,224	19,173	17,267	790	516	3,860	1,271	1,897	-	425	993	-	184	**50,599**
	2026	5,118	18,909	17,469	815	554	3,946	1,231	2,106	-	480	1,012	-	188	**51,826**
	2029	6,190	18,643	17,669	839	591	4,032	1,191	2,003	-	536	1,030	-	191	**52,915**
Warehouse/Wholesale	2017	9,491	11,239	727	852	574	555	442	978	-	17	-	-	-	**24,877**
	2020	11,448	11,412	746	862	582	711	411	1,179	-	18	-	-	-	**27,368**
	2023	13,713	11,260	793	986	609	732	394	1,394	-	20	-	-	-	**29,901**
	2026	16,359	11,294	835	1,046	634	751	370	1,548	-	22	-	-	-	**32,859**
	2029	18,576	11,180	886	1,130	666	771	511	1,485	-	25	-	-	-	**35,230**
Restaurants	2017	6,393	1,013	848	1,710	6,693	133	3,930	194	-	222	-	681	-	**21,817**
	2020	7,071	1,012	868	1,807	6,826	170	3,765	236	-	226	-	1,363	-	**23,343**
	2023	7,647	1,006	902	2,072	7,295	175	3,619	279	-	234	-	2,044	-	**25,274**
	2026	8,437	1,004	943	2,288	7,570	180	3,480	311	-	246	-	2,272	-	**26,729**
	2029	9,260	1,013	997	2,588	7,944	184	3,359	301	-	262	-	2,272	-	**28,181**
Labrador Isolated C/I Buildings	2017	- 330	2,812	277	647	49	306	431	542	-	-	157	-	-	**4,893**
	2020	- 310	2,864	310	1,034	53	405	428	529	-	-	160	-	-	**5,473**
	2023	- 266	2,895	343	1,427	56	418	423	516	-	-	164	-	-	**5,975**
	2026	- 221	2,951	384	1,610	59	431	425	507	-	-	167	-	-	**6,312**
	2029	- 174	3,013	436	1,702	64	443	434	502	-	-	170	-	-	**6,589**
Island Isolated C/I Buildings	2017	- 64	263	26	61	-	29	42	51	-	-	15	-	-	**422**
	2020	- 64	270	30	98	-	38	42	50	-	-	15	-	-	**479**
	2023	- 61	274	33	135	-	39	42	49	-	-	15	-	-	**525**
	2026	- 59	280	37	153	-	41	42	48	-	-	16	-	-	**558**
	2029	- 56	287	42	162	-	42	43	48	-	-	16	-	-	**584**

Exhibit 47 Total Economic Potential Electricity Savings by End Use, Sub sector and Milestone Year (MWh/yr.) (cont'd…)

Subsector	Milestone Years	Space Heating	General Lighting	HVAC Fans & Pumps	Refrigeration	Domestic Hot Water	Computer Equipment	Secondary Lighting	Outdoor Lighting	Street Lighting	Space Cooling	Other Plug Loads	Food Service Equipment	Computer Servers	TOTAL
Large Other Buildings	2017	23,286	14,207	9,809	339	4,562	2,385	3,787	1,947	-	845	1,672	-	-	**62,840**
	2020	27,260	14,223	9,936	413	5,124	3,047	3,600	2,352	-	853	1,705	-	-	**68,514**
	2023	32,510	14,408	10,110	529	5,193	3,132	3,436	2,761	-	871	1,738	-	-	**74,687**
	2026	36,861	14,340	10,502	796	5,356	3,210	3,331	3,085	-	931	1,771	-	-	**80,183**
	2029	41,277	14,276	10,898	1,066	5,521	3,290	3,232	2,962	-	990	1,804	-	-	**85,316**
Small Other Buildings	2017	21,487	10,048	5,347	0	2,273	2,127	2,871	1,781	-	593	-	-	-	**46,529**
	2020	22,765	9,988	5,414	38	2,297	2,711	2,721	2,146	-	592	-	-	-	**48,672**
	2023	25,953	10,125	5,540	125	2,351	2,787	2,594	2,518	-	605	-	-	-	**52,597**
	2026	29,908	11,656	5,800	310	2,891	2,857	2,505	2,807	-	644	-	-	-	**59,377**
	2029	32,411	11,573	6,094	520	3,386	2,929	2,428	2,691	-	689	-	-	-	**62,719**
Other Institutional	2017	9,842	-	1,179	-	546	258	22	547	-	19	-	-	-	**12,412**
	2020	17,828	-	1,208	-	546	350	19	631	-	18	-	-	-	**20,600**
	2023	23,123	29	1,239	4	550	357	24	716	-	18	-	-	-	**26,061**
	2026	28,089	2,627	2,411	7	554	364	27	798	-	47	-	-	-	**34,924**
	2029	30,009	2,600	2,439	11	559	371	32	847	-	47	-	-	-	**36,916**
Street Lighting	2017	-	-	-	-	-	-	-	-	17,083	-	-	-	-	**17,083**
	2020	-	-	-	-	-	-	-	-	16,530	-	-	-	-	**16,530**
	2023	-	-	-	-	-	-	-	-	15,941	-	-	-	-	**15,941**
	2026	-	-	-	-	-	-	-	-	15,311	-	-	-	-	**15,311**
	2029	-	-	-	-	-	-	-	-	14,638	-	-	-	-	**14,638**
Grand Total	2017	284,135	165,544	97,271	40,886	36,012	28,181	33,762	20,374	17,083	10,585	7,655	1,074	1,423	**743,986**
	2020	313,812	163,484	99,116	41,968	37,946	36,040	32,199	24,477	16,530	10,714	7,826	2,110	2,418	**788,639**
	2023	347,403	162,458	102,169	44,234	40,157	37,109	31,040	28,751	15,941	11,143	7,998	3,137	2,465	**834,005**
	2026	377,351	177,479	107,245	46,188	42,841	38,078	30,028	31,999	15,311	11,775	8,165	3,479	2,511	**892,450**
	2029	410,430	177,969	112,300	48,622	45,797	39,084	29,576	30,931	14,638	12,600	8,333	3,479	2,558	**936,317**

Notes:
1) Results are measured at the customer's point-of-use and do not include line losses.
2) Any differences in totals are due to rounding.
3) In the above exhibit a value displays as 0 if it is between 0 and 0.5. Totals are calculated using the actual numerical value.
4) MWh/yr. savings are not incremental. The space heating savings in 2029 are not in addition to the savings from the previous milestone years. Rather, they are the difference between the Reference Case space heating consumption in 2029 and the space heating consumption if all the measures included in the Economic Potential scenario are implemented.

Exhibit 48 Economic Potential Electricity Savings by Measure and Milestone Year (MWh/yr.)

Measure	Annual Savings, 2017, (MWh/yr.)	Annual Savings, 2020, (MWh/yr.)	Annual Savings, 2023, (MWh/yr.)	Annual Savings, 2026, (MWh/yr.)	Annual Savings, 2029, (MWh/yr.)
Building Recommissioning	137,102	133,362	128,738	128,412	123,507
High-Efficiency Air Source Heat Pumps	45,572	71,317	96,559	120,842	144,057
Ductless Mini-Split Heat Pump	79,528	81,486	80,623	82,501	82,190
Advanced Building Automation Systems	54,053	52,542	50,623	47,612	45,501
Programmable Thermostats	53,150	51,176	48,444	45,286	42,110
Occupancy Sensors (Lighting)	39,154	38,926	39,384	38,737	38,093
Demand Control Ventilation (DCV)	38,334	36,498	42,422	38,946	35,175
ENERGY STAR Computers	19,568	26,603	27,114	27,626	28,137
VFDs on HVAC Motors	24,176	24,176	24,176	24,205	24,205
LED Tubular Lamps	20,749	18,649	16,599	32,973	31,915
Ventilation Heat Recovery	19,429	23,712	23,712	23,712	23,712
High Performance T8 Fixtures	21,584	22,254	21,869	21,403	20,938
New Construction (25% More Efficient)	925	6,523	17,289	30,239	47,934
Low-Flow Faucet Aerators	19,005	18,906	18,814	18,722	18,629
LED Outdoor Fixtures	7,605	14,484	21,161	26,078	24,502
LED Screw-In Lamps	20,760	19,513	18,277	17,053	15,840
LED Street Lighting	17,083	16,530	15,941	15,311	14,638
High Performance Glazing Systems	5,575	8,854	12,601	19,915	31,999
LED Screw-In Lamps	16,135	15,110	14,101	13,109	12,134
Refrigerated Cases with Doors	13,416	13,416	13,416	13,416	13,416
New Construction (40% More Efficient)	561	2,674	8,009	15,513	24,134
High Efficiency Compressors (Refrigeration)	9,347	9,368	9,389	9,410	9,431
Ground Source Heat Pumps	9,586	9,046	8,511	7,951	7,420
Activate PC Power Management	7,706	7,588	8,110	8,531	8,990
Lighting Controls (Outdoor)	12,729	9,731	6,882	4,659	4,463
Refrigerated Vending Machine Controllers	7,178	7,319	7,460	7,601	7,741
ECM Motors and Evaporator Fan Motor Controllers	6,672	6,574	6,973	6,870	6,768
Heat Pump Water Heaters	5,085	5,852	6,062	6,713	7,204
Low-Flow Showerheads	6,036	5,831	5,640	5,450	5,259
LED Tubular Lamps	6,232	5,870	5,515	5,162	5,122
LED High Bay Fixtures	5,218	5,059	4,900	4,739	4,567
Wall Insulation	2,671	3,437	4,204	5,504	6,443
T5HO Fixtures	4,545	4,503	4,251	3,938	3,633
Cooler Night Covers	4,153	4,138	4,116	4,124	4,138
Radiant Infrared Heaters	3,798	3,799	3,779	4,425	4,415
Refrigeration Controls	3,421	3,642	3,636	3,648	3,660
High Performance T8 Fixtures	3,642	3,568	3,506	3,432	3,357
Hotel Occupancy Sensors	3,293	3,234	3,174	3,097	2,942
ENERGY STAR Dishwashers	2,868	2,865	3,140	3,136	3,133
Roof Insulation	2,047	2,441	2,836	3,231	3,625
CEE-Rated Refrigerators and Freezers	2,096	2,478	2,859	2,986	2,986
High-Efficiency Cooking Equipment	1,074	2,110	3,137	3,479	3,479
Drainwater Heat Recovery	822	1,774	2,661	3,548	4,435

Exhibit 48 Economic Potential Electricity Savings by Measure and Milestone Year (MWh/yr.) (cont'd)

Measure	Annual Savings, 2017, (MWh/yr.)	Annual Savings, 2020, (MWh/yr.)	Annual Savings, 2023, (MWh/yr.)	Annual Savings, 2026, (MWh/yr.)	Annual Savings, 2029, (MWh/yr.)
Energy-Efficient Server Technologies	1,423	2,418	2,465	2,511	2,558
Premium Efficiency Motors	714	1,526	2,286	3,041	3,795
Demand Control Kitchen Ventilation (DCKV)	2,390	2,547	2,360	2,088	1,854
ENERGY STAR Office Equipment	907	1,849	1,885	1,921	1,956
Make Use of Daylighting	1,227	1,278	1,320	1,246	1,263
LED High Bay Fixtures	1,345	1,299	1,253	1,208	1,163
Low-Flow Pre-Rinse Spray Valves	1,171	1,160	1,152	1,143	1,135
T5HO Fixtures	1,153	1,075	1,040	963	888
Refrigeration Heat Recovery	931	922	913	905	896
Automatic Door Closers (Walk-In Coolers & Freezers)	669	670	665	666	667
Use Task Light Instead of Ambient	660	651	643	539	524
LED Refrigerated Display Case Lighting	985	792	598	403	207
Reduce Number of Fridges	477	507	538	564	592
LED Exit Signs	572	477	385	296	211
Use Shades/Blinds (Winter)	295	295	294	286	274
Keep Doors Closed (Winter)	189	184	179	167	157
Dimming Control (Daylighting)	112	129	131	133	135
LED Troffers	31	60	89	116	112
Use Shades/Blinds (Summer)	41	44	46	47	48
Use Natural Ventilation (Summer)	20	21	22	23	23
Keep Doors Closed (Summer)	11	12	12	13	13
Freezer Defrost Controllers	-	-	10	9	9
High Efficiency Chillers	5	4	4	3	3
HVAC Impact from Other Savings	- 35,027	- 36,221	- 34,898	- 39,084	- 38,142
Grand Total	**743,986**	**788,639**	**834,005**	**892,450**	**936,317**

Exhibit 49 Economic Potential Savings by Major End Use, Year and Region (MWh/yr.)

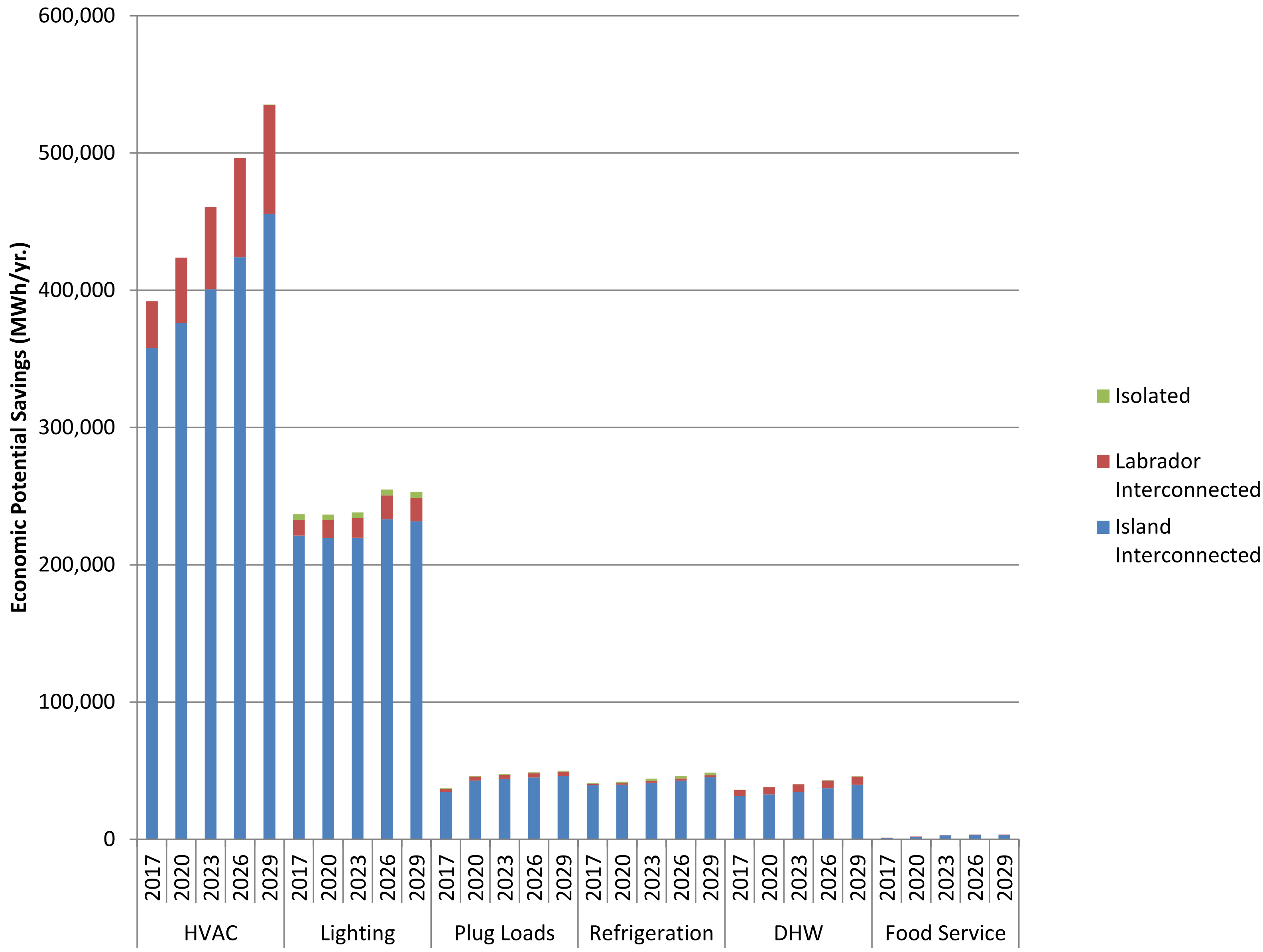
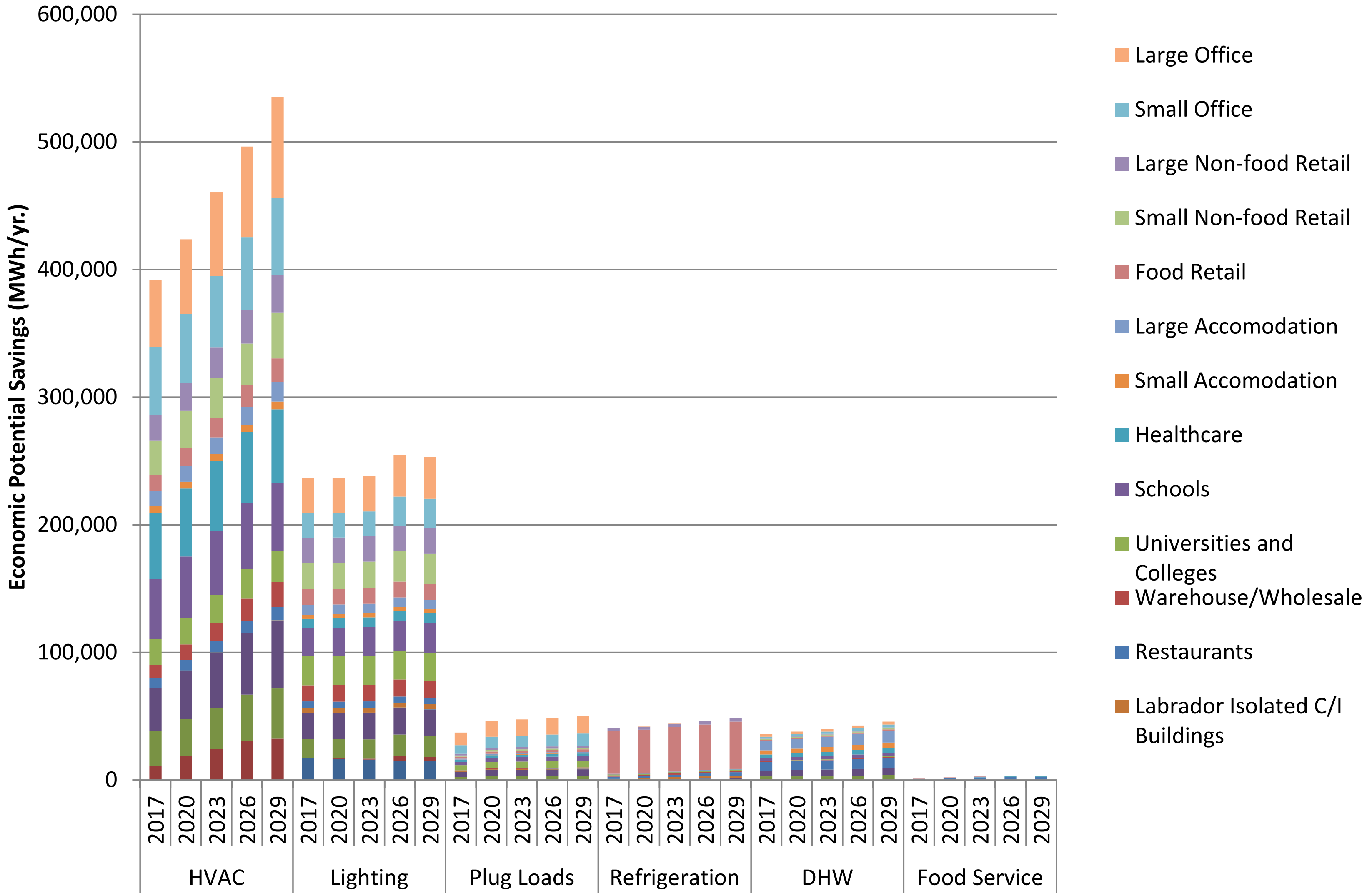


Exhibit 50 Economic Potential Savings by Major End Use, Year and Sub sector Type (MWh/yr.)



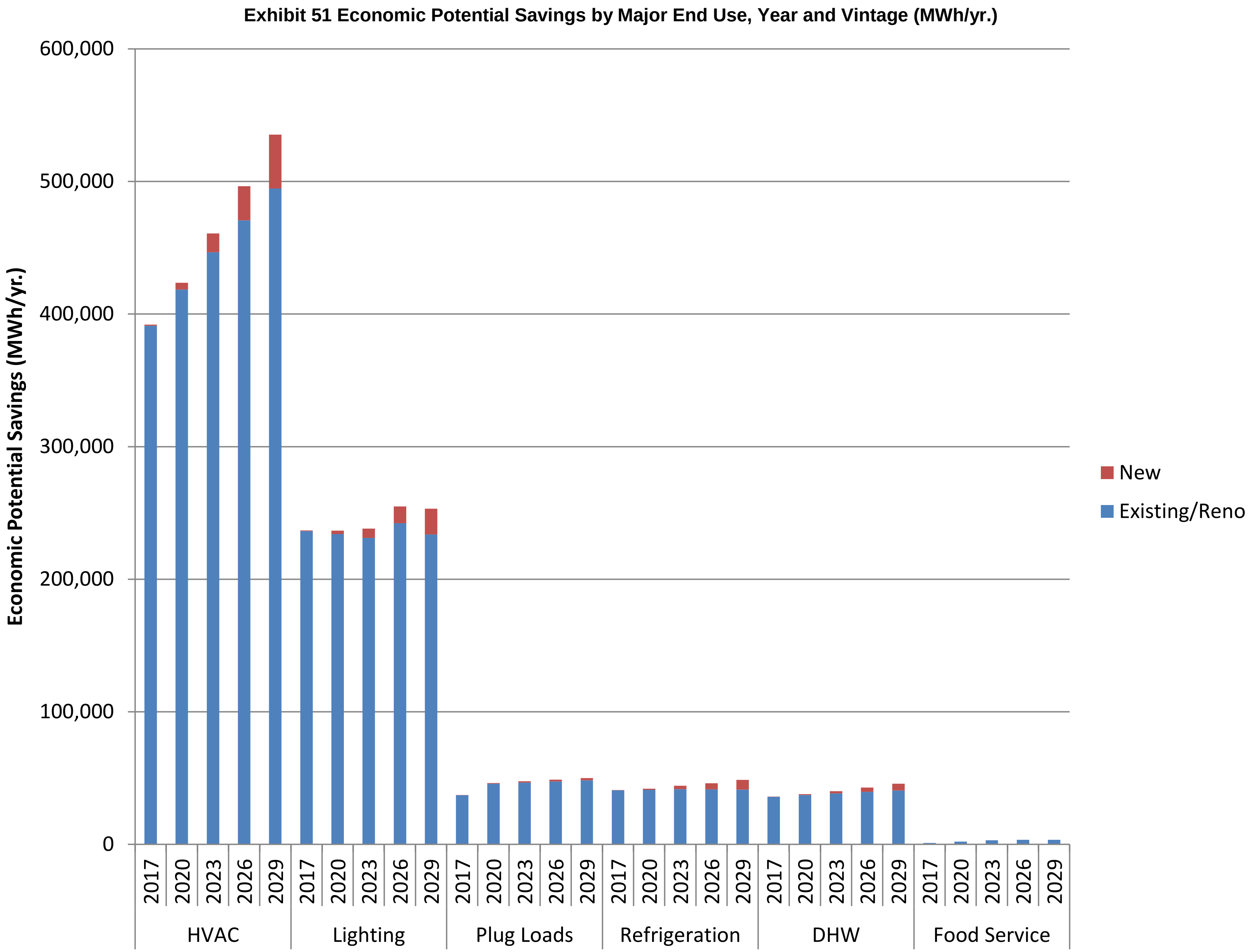


Exhibit 51 Economic Potential Savings by Major End Use, Year and Vintage (MWh/yr.)
Economic Potential Savings (MWh/yr.)
600,000
500,000
400,000
300,000
200,000
100,000
0
2017
2020
2023
2026
2029
HVAC
Lighting
Plug Loads
Refrigeration
DHW
Food Service
New
Existing/Reno

8.5.2 Interpretation of Results

Highlights of the results presented in the preceding exhibits are summarized below:

Savings by Milestone Year

The Economic Potential savings increase modestly from about 740 GWh/yr. in 2017 to approximately 940 GWh/yr. in 2029. As such, almost 80% of the savings possible at the end of the study period are already economically viable within the first milestone period. This occurs because it is economically attractive to implement the majority of the efficiency upgrades immediately, before the existing equipment reaches the end of its useful life. Many of the measures pass the economic screen on the basis of their full cost, meaning that under the definition of economic potential they would be implemented in the first year.

Savings by Sub sector

Office Buildings account for about 24% of the potential savings in 2029, with over 10% of the potential savings in Small Offices and 14% of the savings occurring in Large Offices. This reflects their large share of the commercial floor area and energy use. Retail facilities, including Small Non-Food Retail, Large Non-Food Retail, and Food Retail, also account for a significant portion of the overall 2029 savings, at about 20%. Other notable sub sectors include Educational facilities at about 15% and Hospitality and Healthcare facilities each at about 8% of the 2029 economic potential savings.

Savings by Region

The Island Interconnected region accounts for the overwhelming majority of the potential savings in 2029, at about 88%. The Labrador Interconnected region accounts for about 11% of the 2029 potential savings, and the Isolated region accounts for the remaining 1% of the potential savings. This distribution reflects the overall breakdown in the consumption for the three regions but the 2029 potential savings versus the reference case are highest in the Labrador region (36%) and lowest in the Isolated region (32%). The economic potential savings in the Island region in 2029 represent 35% of the reference case consumption in that milestone year.

Savings By Existing Buildings versus New Construction

Savings in existing buildings account for almost all of the savings potential at the beginning of the study period but, as buildings are constructed, the savings potential associated with them occupies a progressively larger portion of the total. By 2029, savings from new buildings account for about 8% of the total economic potential.

Savings by End Use

Space heating measures dominate the results, including both efficient equipment and building envelope improvements.

Savings in the HVAC major end use (which includes space heating, space cooling, and HVAC Fans and Pumps) accounts for 57% of the total electrical savings in the Economic Potential Forecast. Nearly 77% of this savings, or 44% of the overall savings, is from space heating measures, including air source heat pumps (15% of overall savings), ductless mini-split heat pumps (9% of overall savings), recommissioning (5% of overall savings)[25], and demand control ventilation (4% of overall savings). Other space heating measures account for 3% or less of the overall savings. In addition, the “HVAC Impact from Other Savings” measure, which represents increased heating requirements due to less heat being generated in the buildings envelope, accounts for -4% of the overall economic potential savings (i.e. a penalty on the savings).

[25] As noted below, the recommissioning measure applies to multiple end uses. As such, it accounts for a larger portion of the economic potential savings. Only the savings that apply to the space heating end use are noted here.

Measures related to HVAC Fans and Pumps account for 12% of the total Economic Potential savings. Recommissioning represents 4% of the overall savings[26], while 3% of the overall savings are from VFDs, 2% are from advanced BAS, and another 2% are from programmable thermostats. Space cooling measures account for only 1% of the overall economic potential savings, reflecting the relatively small space cooling load in Newfoundland and Labrador.

The Lighting major end use (which is made up of General Lighting, Secondary Lighting, Outdoor Lighting, and Street Lighting) accounts for 27% of the total electricity savings in the Economic Potential Forecast. General lighting measures account for about 70% lighting savings, followed by outdoor lighting measures (12%), secondary lighting measures (12%), and street lighting measures (6%). LED lighting measures account for about 13% of the total electricity savings at the beginning of the Economic Potential Forecast but fall to 12% by 2029. This is due to the expected natural adoption of LED lighting products or other products of similar efficiency by the end of the study period.

DHW measures account for 5% of the total electricity savings in the Economic Potential Forecast. This is made up of 3% of the overall savings from low flow fixtures, such as showerheads, faucets, and faucet aerators, and 1% of the overall savings from heat pump water heaters. Other DHW measures account for less than 1% of the potential savings.

Measures that pertain to Plug Loads (made up of the Computer Equipment, Computer Servers and Plug Loads end uses) account for 5% of the total electricity savings in the Economic Potential Forecast. Of this, 3% is from ENERGY STAR® Computers, 1% is from the behavior measure related to implementing PC power management features and 1% is from vending machine controllers.

Refrigeration measures also account for about 5% of the total electricity savings in the Economic Potential Forecast. Refrigerated display cases, high efficiency compressors and evaporator fan upgrades each account for approximately 1% of these overall economic potential savings. Other refrigeration measures account for less than 1% of total electricity savings.

Some measures are applied across multiple end uses. The energy saving measures applied across multiple end uses include recommissioning, advanced BAS and the high performance new construction (HPNC) measures. Recommissioning accounts for a total of 13% of the electricity savings in the Economic Potential Forecast, while the HPNC measures account for about 8% of the economic savings (i.e. 5% savings from HPNC (25% better) and 3% savings from HPNC (40% better)). The Advanced BAS measure accounts for approximately 5% of the overall economic potential savings.

8.5.3 Caveats on Interpretation of Results

A systems approach was used to model the energy impacts of the efficiency upgrades presented in the preceding section. In the absence of a systems approach, there would be double counting of savings and an accurate assessment of the total contribution of the energy-efficient upgrades would not be possible. More specifically, there are two particularly important considerations:

- **More than one upgrade may affect a given end use:** For example, improved insulation reduces space heating electricity use, as does the installation of a heat pump. On its own, each measure will reduce overall space heating electricity use. However, the two savings are not additive. The order in which some upgrades are introduced is also important. In this study, the

[26] As noted below, the recommissioning measure applies to multiple end uses. As such, it accounts for a larger portion of the economic potential savings. Only the savings that apply to the HVAC fans and pumps end use are noted here.

approach has been to select and model the impact of "bundles of measures" that reduce the load for a given end use (e.g., wall insulation and window upgrades that reduce the space heating load) and then to introduce measures that meet the remaining load more efficiently (e.g., a high-efficiency space heating system).

- **There are interactive effects among end uses:** For example, the electricity savings from more efficient lighting result in reduced waste heat. During the space heating season, this waste heat contributes to the building's internal heat gains, which lower the amount of heat that must be provided by the space heating system. Interactive effects have been taken into consideration with the measure "HVAC Impact from Other Savings". The magnitude of the interactive effects can be significant. For example, for low bay lighting measures, it was estimated that a 100 kWh savings in lighting electricity use results, on average, in an increased space heating load of up to 30 kWh (a 60% rate of interaction).

  However, it is important to note that assessing the impact of interactive effects in commercial facilities is more complex since heat may be generated in spaces that heat the main conditioned space much less effectively (e.g. high bay fixtures or equipment in mechanical rooms). Interactive effects were captured on a measure by measure basis for measures that were more likely to have an impact on space heating requirements and a 30% heating penalty was assumed for this subset of measures. The subset of measures included low bay lighting measures (i.e. LED screw-in lamps, LED tubular lamps, and high performance T8 fixtures), ENERGY STAR computers and office equipment, and refrigerated vending machine controllers.

  The model implements this interaction by multiplying the savings for any relevant measures with significant interactive effects by the 30% factor. This becomes the additional heating load for the building. This is, in turn, multiplied by the space heating electric share for the type of building, because the non-electric heating sources are assumed to provide their share of the additional heating load. Exhibit 48 shows the total heating penalty caused by internal end use savings as a separate line item, just before the grand total. In other words, the heating penalty is not subtracted from the savings of individual measures, but is instead shown as a separate item in the exhibit.

8.6 Electric Peak Load Reductions from Energy Efficiency

Exhibit 52 presents a summary of the peak load reductions that would occur as a result of the electric energy savings contained in the Economic Potential Forecast. The reductions are shown by milestone year and region. In each case, the reductions are an average value over the peak period and are defined relative to the Reference Case presented previously in Sections 4 and 6. Exhibit 53 shows the same information graphically for the winter peak period.

Exhibit 52 and Exhibit 53 only approximate the potential demand impacts associated with the energy-efficiency measures because they are based on the assumption that the measures do not change the load shape of the end uses they affect. This is not always correct. For example, most of the heat pump measures will not produce any peak demand savings, because during the winter peak period heat pumps (i.e. air source and ductless mini-splits heat pump measures) will revert to back-up electric resistance heating. As such, there will be no net reduction in space heating peak demand for these measures. Accordingly, the demand reductions for the heat pump measures have been manually filtered out of the results presented in these exhibits.

Exhibit 54 shows the demand reductions associated with each electric energy savings measure contained in the Economic Potential Forecast for the milestone year 2029. The heat pump measures are omitted from the exhibit, as with the previous two exhibits.

One notable line item in the exhibit is “HVAC Impact from Other Savings” - the impact on peak space heating load resulting from the savings for other end uses within the facilities. This is to capture the fact that in an electrically-heated facility, savings of energy consuming devices within the facility will not reduce the winter peak demand. On the coldest winter days, reducing the energy used by a lamp will simply make the electric baseboard beside it work harder. However, heat from lamps and other equipment is often generated in areas where the heat is not useful (e.g. near the ceiling of a warehouse). The non-heating end uses also produce some peak load reductions in other cases, such as facilities that are heated by non-electric fuels, in outside light fixtures, or in heated water that drains out of the facility while still warm. The impact of demand reductions for other end uses on the space heating demand can be seen graphically. As the demand impacts for many of the other end uses rise with time, the demand impacts for space heating actually decreases over time.

Electric peak load reductions related to capacity-only measures are presented separately in Section 8.7.

Exhibit 52 Electric Peak Load Reductions from Economic Energy Savings Measures, by Milestone Year, Peak Period and Sub sector (MW)

Sub Sector	Milestone Year	Island Interconnected	Labrador Interconnected	Isolated	Grand Total
Large Office	2017	19	0	0	19
	2020	19	0	0	19
	2023	20	0	0	20
	2026	20	0	0	20
	2029	21	0	0	21
Small Office	2017	13	0	0	13
	2020	13	0	0	14
	2023	14	0	0	14
	2026	14	0	0	15
	2029	16	0	0	16
Large Non-food Retail	2017	8	0	0	9
	2020	8	0	0	9
	2023	8	0	0	9
	2026	8	0	0	9
	2029	8	0	0	8
Small Non-food Retail	2017	8	1	0	9
	2020	8	1	0	9
	2023	8	1	0	9
	2026	9	1	0	10
	2029	9	1	0	10
Food Retail	2017	9	1	0	9
	2020	9	1	0	9
	2023	9	1	0	10
	2026	9	1	0	10
	2029	9	1	0	10
Large Accomodation	2017	5	1	0	6
	2020	5	1	0	6
	2023	6	1	0	6
	2026	6	1	0	7
	2029	6	1	0	7
Small Accomodation	2017	2	0	0	2
	2020	2	0	0	2
	2023	2	0	0	3
	2026	3	0	0	3
	2029	3	0	0	3
Healthcare	2017	9	0	0	9
	2020	10	1	0	10
	2023	10	1	0	11
	2026	11	1	0	12
	2029	12	1	0	12
Schools	2017	12	1	0	13
	2020	12	1	0	13
	2023	13	1	0	13
	2026	13	1	0	14
	2029	14	1	0	15
Universities and Colleges	2017	8	0	0	8
	2020	8	0	0	8
	2023	8	0	0	8
	2026	8	0	0	8
	2029	8	0	0	8

Exhibit 52 Electric Peak Load Reductions from Economic Energy Savings Measures, by Milestone Year, Peak Period and Sub sector (MW) (cont'd)

Sub Sector	Milestone Year	Island Interconnected	Labrador Interconnected	Isolated	Grand Total
Warehouse/Wholesale	2017	5	0	0	5
	2020	5	0	0	5
	2023	5	0	0	5
	2026	5	0	0	5
	2029	5	0	0	5
Restaurants	2017	5	0	0	5
	2020	5	0	0	6
	2023	6	0	0	6
	2026	6	1	0	6
	2029	6	0	0	7
Labrador Isolated C/I Buildings	2017	0	0	1	1
	2020	0	0	1	1
	2023	0	0	1	1
	2026	0	0	1	1
	2029	0	0	1	1
Island Isolated C/I Buildings	2017	0	0	0	0
	2020	0	0	0	0
	2023	0	0	0	0
	2026	0	0	0	0
	2029	0	0	0	0
Large Other Buildings	2017	11	3	0	13
	2020	10	3	0	13
	2023	10	3	0	14
	2026	10	3	0	14
	2029	11	3	0	14
Small Other Buildings	2017	7	2	0	8
	2020	6	2	0	8
	2023	6	2	0	9
	2026	7	2	0	9
	2029	7	2	0	9
Other Institutional	2017	0	1	0	1
	2020	0	2	0	2
	2023	0	3	0	3
	2026	0	5	0	5
	2029	0	5	0	5
Street Lighting	2017	2	0	0	2
	2020	2	0	0	2
	2023	2	0	0	2
	2026	2	0	0	2
	2029	2	0	0	2
Grand Total	2017	123	10	1	134
	2020	124	12	1	137
	2023	127	14	1	142
	2026	131	16	1	148
	2029	136	16	1	153

Notes: 1) In the above exhibit a value displays as 0 if it is between 0 and 0.5. Totals are calculated using the actual numerical value.

Exhibit 53 Electric Peak Load Reductions from Economic Energy Savings Measures, by Milestone Year End Use and Subsector, Winter Peak Period (MW)

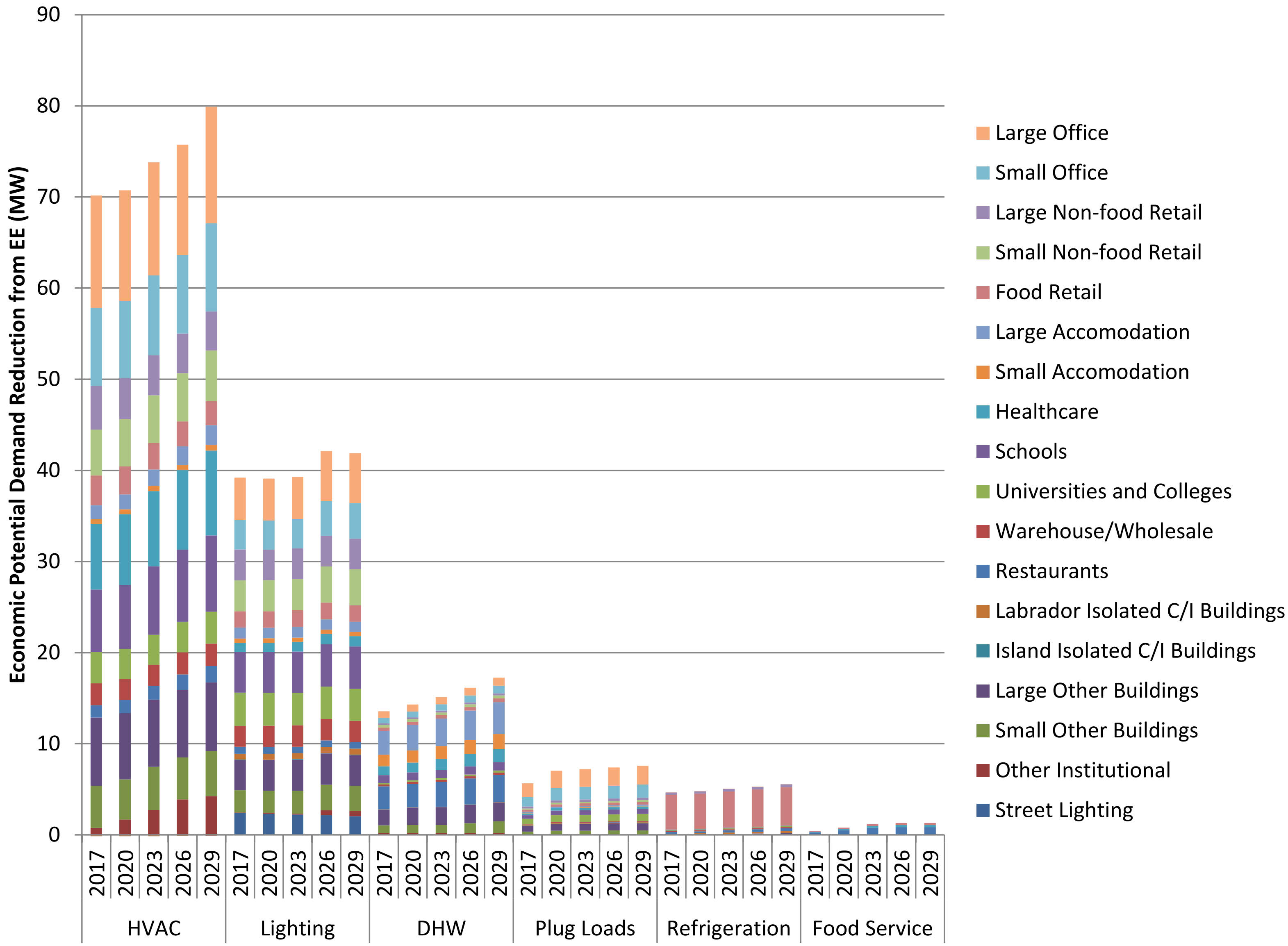


Exhibit 54 Electric Peak Load Reductions from Economic Energy Savings Measures, 2029 (MW)

Measure	Island Interconnected	Labrador Interconnected	Isolated	Grand Total
Building Recommissioning	24	4	0	28
Demand Control Ventilation (DCV)	9	2	0	11
New Construction (25% More Efficient)	11	0	0	11
Programmable Thermostats	9	2	0	11
Advanced Building Automation Systems	10	0	0	10
High Performance Glazing Systems	9	1	0	10
Ventilation Heat Recovery	6	1	0	7
Low-Flow Faucet Aerators	6	1	0	7
Occupancy Sensors (Lighting)	6	1	0	7
New Construction (40% More Efficient)	6	0	0	6
LED Tubular Lamps	5	0	0	5
ENERGY STAR Computers	4	0	0	4
High Performance T8 Fixtures	3	0	0	4
VFDs on HVAC Motors	3	0	0	4
LED Outdoor Fixtures	3	0	0	3
Heat Pump Water Heaters	2	0	0	3
LED Screw-In Lamps	2	0	0	2
Ground Source Heat Pumps	2	0	0	2
LED Street Lighting	2	0	0	2
LED Screw-In Lamps	2	0	0	2
Low-Flow Showerheads	2	0	0	2
Wall Insulation	2	0	0	2
Drainwater Heat Recovery	2	0	0	2
Refrigerated Cases with Doors	2	0	0	2
Radiant Infrared Heaters	1	0	0	1
Activate PC Power Management	1	0	0	1
High-Efficiency Cooking Equipment	1	0	0	1
Refrigerated Vending Machine Controllers	1	0	0	1
ENERGY STAR Dishwashers	1	0	0	1
Roof Insulation	1	0	0	1
High Efficiency Compressors (Refrigeration)	1	0	0	1
LED High Bay Fixtures	1	0	0	1
ECM Motors and Evaporator Fan Motor Controllers	1	0	0	1
Hotel Occupancy Sensors	1	0	0	1
LED Tubular Lamps	1	0	0	1
T5HO Fixtures	1	0	0	1
Lighting Controls (Outdoor)	1	0	0	1
Premium Efficiency Motors	1	0	0	1
Demand Control Kitchen Ventilation (DCKV)	1	0	0	1
High Performance T8 Fixtures	0	0	0	0
Cooler Night Covers	0	0	0	0
Low-Flow Pre-Rinse Spray Valves	0	0	0	0
Refrigeration Controls	0	0	0	0
Energy-Efficient Server Technologies	0	0	0	0

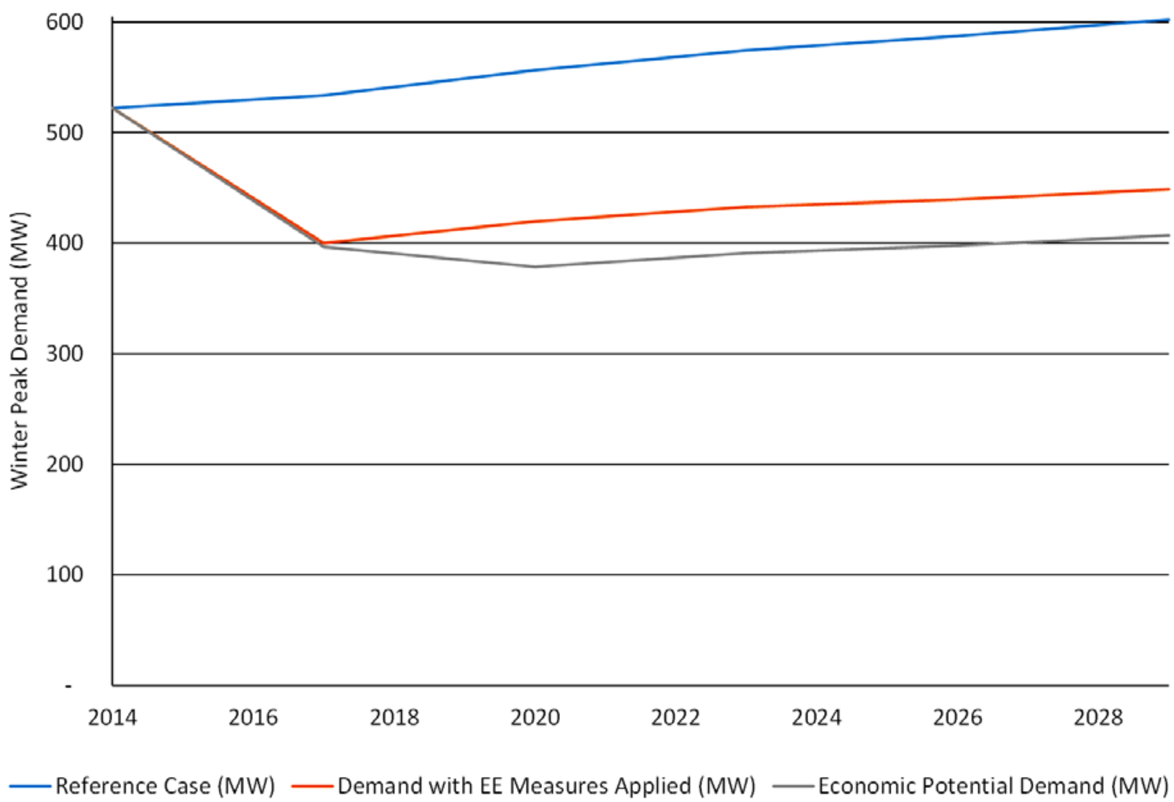
Exhibit 54 Electric Peak Load Reductions from Economic Energy Savings Measures, 2029 (MW) (cont'd…)

Measure	Island Interconnected	Labrador Interconnected	Isolated	Grand Total
CEE-Rated Refrigerators and Freezers	0	0	0	0
Refrigeration Heat Recovery	0	0	0	0
ENERGY STAR Office Equipment	0	0	0	0
Make Use of Daylighting	0	0	0	0
LED High Bay Fixtures	0	0	0	0
T5HO Fixtures	0	0	0	0
Use Task Light Instead of Ambient	0	0	0	0
Reduce Number of Fridges	0	0	0	0
Use Shades/Blinds (Winter)	0	0	0	0
Automatic Door Closers (Walk-In Coolers & Freezers)	0	0	0	0
Keep Doors Closed (Winter)	0	0	0	0
LED Exit Signs	0	0	0	0
LED Refrigerated Display Case Lighting	0	0	0	0
Dimming Control (Daylighting)	0	0	0	0
LED Troffers	0	0	0	0
Use Shades/Blinds (Summer)	0	0	0	0
Use Natural Ventilation (Summer)	0	0	0	0
Keep Doors Closed (Summer)	0	0	0	0
High Efficiency Chillers	0	0	0	0
Freezer Defrost Controllers	0	0	0	0
HVAC Impact from Other Savings	-12	-1	0	-13
Grand Total	136	16	1	153

8.7 Summary of Peak Load Reduction

Exhibit 55 compares the Reference Case and Economic Potential Peak Demand Forecast levels of winter peak demand.[27] Under the Reference Case, commercial peak demand would grow from the Base Year level of about 520 MW to approximately 600 MW by 2029. This contrasts with the Economic Potential Forecast in which peak demand would decrease to approximately 400 MW for the same period, a difference of approximately 200 MW or about 32%. As illustrated in the exhibit, nearly 80% of this reduction comes from the impact of energy efficiency measures.

Exhibit 55 Reference Case Peak Demand versus Economic Potential Peak Demand in Commercial Sector (MW)[28]



[27] All results are reported at the customer's point-of-use and do not include line losses.
[28] Please note that all demand curtailment is accounted for in the Industrial sector analysis and reporting

8.7.1 Peak Demand Reduction

Further detail on the total potential peak demand reduction provided by the Economic Potential Forecast is provided in the following exhibits:[29]

- Exhibit 56 presents the results by end use, sub sector and milestone year
- Exhibit 57 provides a further disaggregation of the savings by end use, technology, and milestone year
- Exhibit 58 presents peak demand reduction by major end use, milestone year and supply system
- Exhibit 59 presents peak demand reduction by major end use, milestone year and sub sector
- Exhibit 60 presents peak demand reduction by major end use, milestone year and vintage

[29] MW reductions shown in the following exhibits are not incremental. For example, the space heating reductions in 2029 are not in addition to the space heating reductions from the previous milestone years. Rather, they are the difference between the Reference Case space heating peak demand in 2029 and the space heating peak demand if all the measures included in the Economic Potential scenario are implemented.

Exhibit 56 Total Economic Potential Peak Demand Reduction by End Use, Sub sector and Milestone Year (MW)

Sub sector	Milestone Year	Domestic Hot Water	HVAC Fans & Pumps	Refrigeration	Secondary Lighting	Space Heating	Grand Total
Large Office	2017	0	0	0	1	0	1
	2020	0	3	0	1	2	5
	2023	0	3	0	1	2	5
	2026	0	3	0	1	2	5
	2029	0	3	0	1	2	5
Small Office	2017	0	0	0	0	0	0
	2020	0	0	0	0	1	1
	2023	0	0	0	0	1	1
	2026	0	0	0	0	1	1
	2029	0	0	0	0	1	1
Large Non-food Retail	2017	0	0	0	0	0	0
	2020	0	2	0	0	1	3
	2023	0	2	0	0	1	3
	2026	0	2	0	0	1	3
	2029	0	2	0	0	1	3
Small Non-food Retail	2017	0	0	0	0	0	0
	2020	0	0	0	0	1	1
	2023	0	0	0	0	1	1
	2026	0	0	0	0	1	1
	2029	0	0	0	0	1	1
Food Retail	2017	0	0	0	0	0	0
	2020	0	1	1	0	1	2
	2023	0	1	1	0	1	2
	2026	0	1	1	0	1	2
	2029	0	1	1	0	0	2
Large Accomodation	2017	0	0	0	0	0	0
	2020	2	0	0	0	1	4
	2023	2	0	0	0	1	4
	2026	2	0	0	0	1	4
	2029	2	0	0	0	1	4
Small Accomodation	2017	0	0	0	0	0	0
	2020	1	0	0	0	0	1
	2023	1	0	0	0	1	2
	2026	1	0	0	0	1	2
	2029	1	0	0	0	1	2
Healthcare	2017	0	0	0	1	0	1
	2020	2	1	0	1	1	4
	2023	2	1	0	1	1	4
	2026	2	1	0	1	1	4
	2029	2	1	0	1	1	4
Schools	2017	0	0	0	0	0	0
	2020	0	1	0	0	1	2
	2023	0	1	0	0	1	2
	2026	0	1	0	0	2	3
	2029	0	1	0	0	2	3
Universities and Colleges	2017	0	0	0	0	0	0
	2020	0	1	0	0	0	2
	2023	0	2	0	0	0	2
	2026	0	2	0	0	0	2
	2029	0	2	0	0	0	2

Exhibit 56 Total Economic Potential Peak Demand Reduction by End Use, Sub sector and Milestone Year (MW) (cont'd…)

Sub sector	Milestone Year	Domestic Hot Water	HVAC Fans & Pumps	Refrigeration	Secondary Lighting	Space Heating	Grand Total
Warehouse/Wholesale	2017	0	0	0	0	0	0
	2020	0	0	0	0	1	1
	2023	0	0	0	0	1	1
	2026	0	0	0	0	0	1
	2029	0	0	0	0	0	1
Restaurants	2020	4	0	0	0	0	4
	2023	4	0	0	0	0	4
	2026	4	0	0	0	0	4
	2029	4	0	0	0	0	4
Labrador Isolated C/I Buildings	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0
Island Isolated C/I Buildings	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0
Large Other Buildings	2017	0	0	0	0	0	0
	2020	2	1	0	1	1	5
	2023	2	2	0	1	1	5
	2026	2	2	0	1	1	5
	2029	2	2	0	1	1	5
Small Other Buildings	2017	0	0	0	0	0	0
	2020	2	0	0	0	1	3
	2023	2	0	0	0	1	3
	2026	2	0	0	0	1	3
	2029	2	0	0	0	1	3
Other Institutional	2017	0	0	0	0	0	0
	2020	0	1	0	0	1	2
	2023	0	1	0	0	1	1
	2026	0	0	0	0	1	1
	2029	0	0	0	0	1	1
Grand Total	2017	0	0	0	3	0	3
	2020	13	10	1	4	13	41
	2023	13	11	1	4	13	42
	2026	13	11	1	4	13	42
	2029	13	11	1	4	12	42

Notes:
1) Results are measured at the customer's point-of-use and do not include line losses.
2) Any differences in totals are due to rounding.
3) In the above exhibit a value displays as 0 if it is between 0 and 0.5. Totals are calculated using the actual numerical value.
4) MW reductions are not incremental. The space heating reductions in 2029 are not in addition to the reductions from the previous milestone years. Rather, they are the difference between the Reference Case space heating peak demand in 2029 and the space heating peak demand if all the measures included in the Economic Potential scenario are implemented.
5) The values in this exhibit do not include peak demand reductions from energy efficiency measures.

Exhibit 57 Economic Potential Peak Demand Reduction by Measure and Milestone Year (MW)

Measure	Peak Demand Reduction, 2017 (MW)	Peak Demand Reduction, 2020 (MW)	Peak Demand Reduction, 2023 (MW)	Peak Demand Reduction, 2026 (MW)	Peak Demand Reduction, 2029 (MW)
DHW Controls	0	13	13	13	13
Heating Controls	0	13	13	13	12
Lighting Demand Controls	3	4	4	4	4
Refrigeration Demand Controls	0	1	1	1	1
HVAC Demand Controls	0	10	11	11	11
Grand Total	3	41	42	42	42

Notes:
1) Results are measured at the customer's point-of-use and do not include line losses.
2) Any differences in totals are due to rounding.
3) In the above exhibit a value displays as 0 if it is between 0 and 0.5. Totals are calculated using the actual numerical value.
4) MW reductions are not incremental. The space heating reductions in 2029 are not in addition to the reductions from the previous milestone years. Rather, they are the difference between the Reference Case space heating peak demand in 2029 and the space heating peak demand if all the measures included in the Economic Potential scenario are implemented.
5) The values in this exhibit do not include peak demand reductions from energy efficiency measures.
6) Demand-specific measure savings are impacted by the demand savings from conservation measures. The demand reference case to which demand-specific measures are applied already factors in the corresponding Economic Potential demand savings from conservation measures. So the more peak demand reductions are generated through conservation measures, the less peak demand remains for demand-specific measures to reduce.

Exhibit 58 Economic Peak Load Reduction by Major End Use, Year and Region (MW)

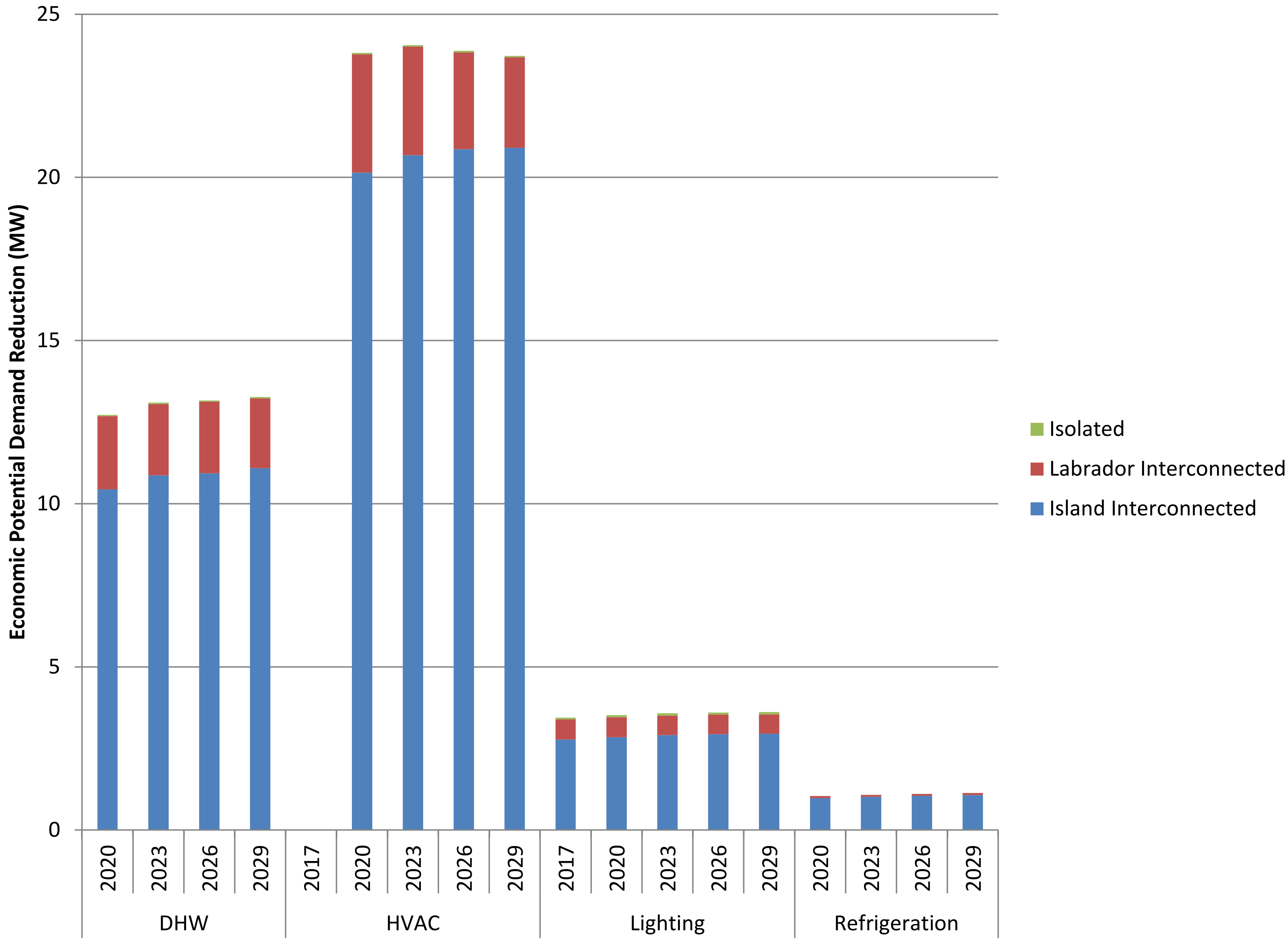
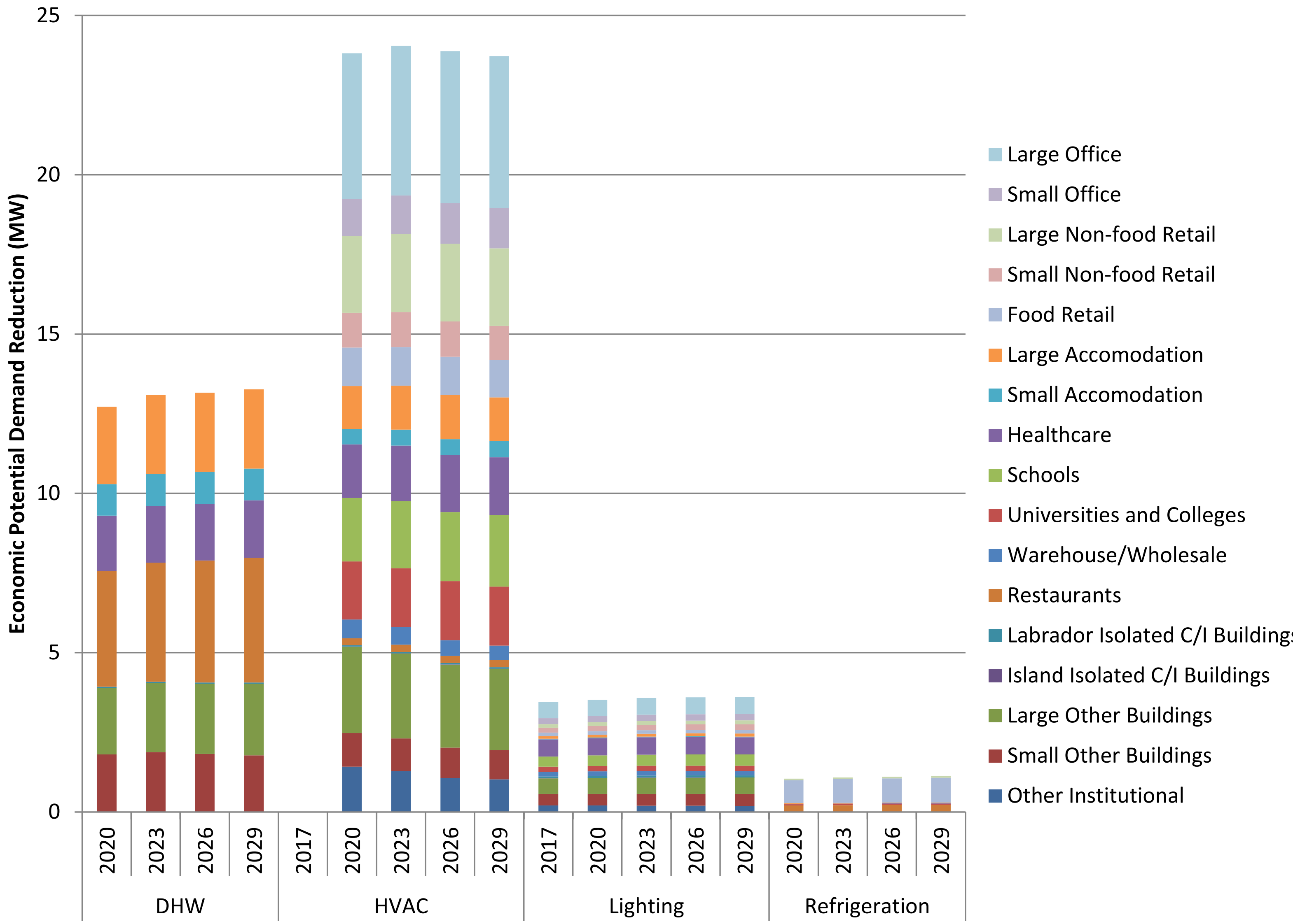


Exhibit 59 Economic Potential Peak Demand Reduction by Major End Use, Year and Sub sector (MW)



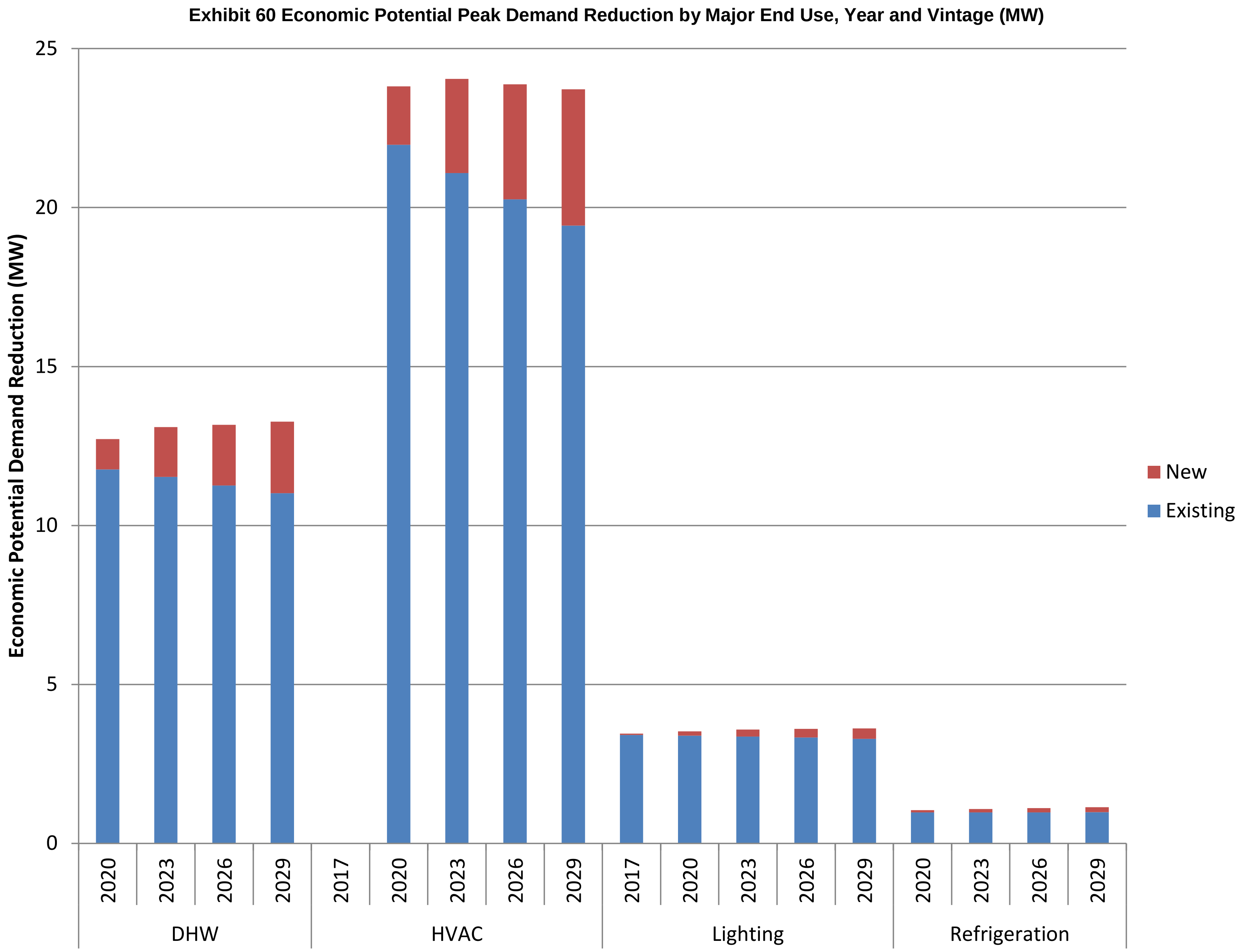


Exhibit 60 Economic Potential Peak Demand Reduction by Major End Use, Year and Vintage (MW)
Economic Potential Demand Reduction (MW)
25
20
15
10
5
0
2020
2023
2026
2029
2017
2020
2023
2026
2029
2017
2020
2023
2026
2029
2020
2023
2026
2029
DHW
HVAC
Lighting
Refrigeration
New
Existing

8.7.2 Interpretation of Results

Highlights of the results presented in the preceding exhibits are summarized below:

Peak Demand Reduction by Milestone Year

The Economic Potential peak load reductions increase from about 3 MW in 2017 to 42 MW in 2029. From 2020 onwards, space heating controls, domestic hot water controls, and HVAC fans and pumps controls are cost effective. The CEPR for electric thermal storage systems does not fall below the avoided cost of demand throughout the study period. As such, this measure does not contribute to the economic potential savings.

Peak Demand Reduction by Sub Sector

Offices account for the largest portion of the potential peak load reductions, at 16%. Peak load reductions in the retail sub sectors also account for a significant portion of the overall peak load reductions in 2029 (14%). Other sub sectors with significant contributions to the peak load reductions include hotels (13%), education (11%), restaurants (10%), and healthcare (10%). Peak load reductions in hotels are mostly due to potential DHW and HVAC savings in this sector, while the potential peak reductions in the healthcare and restaurant sub sectors are largely driven by the relatively high domestic hot water consumption in these sub sectors for cooking, sterilization and bathing.

Peak Demand Reduction by Region

The Island Interconnected region accounts for 86% of the 2029 potential peak load reductions, while the Labrador Interconnected region accounts for about 13% of the potential peak load reductions, and the Isolated region contributes less than 1% to the potential peak load reductions in 2029.

Peak Demand Reduction by Existing Buildings versus New Construction

Peak load reductions in existing buildings account for almost all of the reduction potential at the beginning of the study period, but as buildings are constructed, the savings potential associated with them occupies a progressively larger portion of the total reduction potential. By 2029, peak load reductions from new buildings account for about 17% of the total potential peak load reductions.

Peak Demand Reduction by End Use

DHW controls account for 32% of the 2029 load reductions in the Economic Potential Forecast, not including load reductions from energy efficiency measures. Space heating controls and HVAC fans and pumps controls are also significant opportunities, accounting for 30% and 27% of the overall peak demand potential reductions in 2029, respectively (not including load reductions from energy efficiency measures).

8.8 Sensitivity of the Results to Changes in Avoided Cost

The avoided costs used in the Economic Potential model are varied by region and by milestone year. As with any forecast, the projected avoided costs are subject to uncertainty. Accordingly, the model has been re-run with avoided costs varied within a reasonable range. The lower end of this range is considered to be 10% below the current projection, for both energy cost and demand cost. The upper end of the range is considered to be 30% above the current projections for energy cost and 20% above the current projections for demand cost.

Exhibit 61 shows that the results are sensitive to this range of avoided costs. By 2029, the exhibit shows the following changes in potential:

- The lower range of reasonableness produces energy savings that are about 1% lower in the Island Interconnected and Isolated regions and 3% lower in the Labrador Interconnected region.
- The lower range of reasonableness produces peak demand reductions that are 1% lower in the Island Interconnected region and Isolated regions and less than 1% lower in the Labrador Interconnected region.
- The upper range of reasonableness produces energy savings that are 3% higher in the Island Interconnected region, 6% higher in the Labrador Interconnected region, and almost unchanged in the Isolated region.
- The upper range of reasonableness produces peak demand reductions that are 4% higher in the Island Interconnected and Labrador Interconnected regions, and almost unchanged in the Isolated region.
- The small changes in energy savings and peak demand reductions for the different scenarios reflect the fact that a large number of measures comfortably fall below the economic screen, as shown in the supply curves in Sections 7.5 and 7.6.

Exhibit 61 Sensitivity of the Energy Savings and Peak Demand Reduction to Avoided Cost

Region	Year	Lower Range of Reasonableness		Base Scenario		Upper Range of Reasonableness	
		Energy Savings (MWh/yr.)	Peak Demand Reduction (MW)	Energy Savings (MWh/yr.)	Peak Demand Reduction (MW)	Energy Savings (MWh/yr.)	Peak Demand Reduction (MW)
Island Interconnected	2017	680,044	125	685,417	126	697,977	139
	2020	706,717	157	712,673	159	728,517	163
	2023	737,037	161	743,138	162	763,376	167
	2026	770,962	165	785,647	167	803,522	173
	2029	816,944	171	821,902	172	842,106	180
Labrador Interconnected	2017	51,603	10	53,255	10	67,620	15
	2020	64,137	17	70,014	18	89,763	23
	2023	82,534	20	84,367	20	99,758	22
	2026	95,570	21	99,933	21	107,854	22
	2029	104,065	21	107,242	22	113,548	22
Isolated	2017	5,291	1	5,315	1	5,344	1
	2020	5,906	1	5,952	1	5,979	1
	2023	6,423	1	6,500	1	6,516	1
	2026	6,782	1	6,870	1	6,886	1
	2029	7,089	1	7,173	1	7,189	1

9 Achievable Potential: Electric Energy Forecast

9.1 Introduction

This section presents the Commercial sector Achievable Potential for the study period (2014 to 2029). The Achievable Potential is defined as the proportion of the energy-efficiency opportunities identified in the Economic Potential Forecast that could realistically be achieved within the study period.

The remainder of this discussion is organized into the following sub-sections:

- Description of Achievable Potential
- Approach to the estimation of Achievable Potential
- Achievable Potential Workshop results
- Summary of potential electric energy savings
- Electric peak load reductions for energy efficiency measures
- Summary of peak load reductions
- Sensitivity of the results to changes in avoided cost
- Description of the application of net-to-gross ratios

9.2 Description of Achievable Potential

Achievable Potential recognizes that, in many instances, it is difficult to induce all customers to purchase and install all the energy-efficiency technologies that meet the criteria defined by the Economic Potential Forecast. For example, customer decisions to implement energy-efficient measures can be constrained by important factors such as:

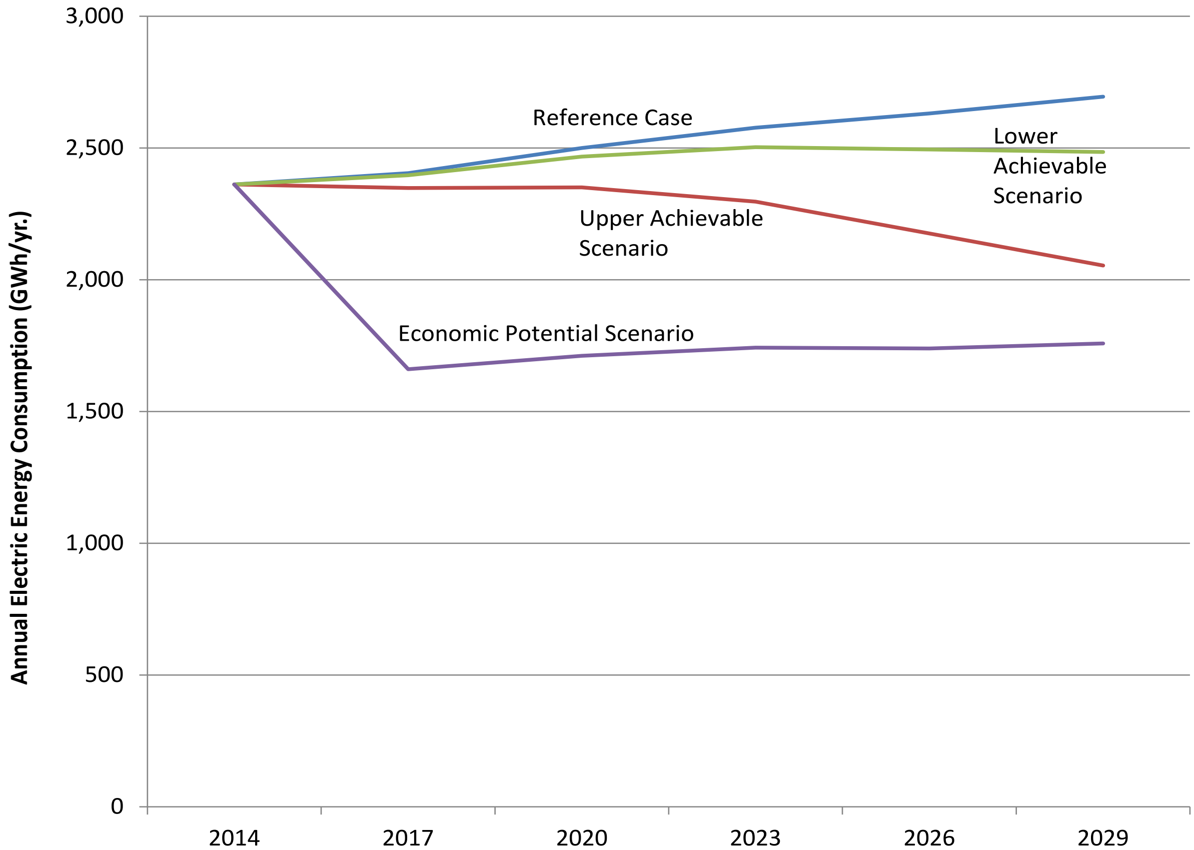
- Higher first cost of efficient product(s)
- Need to recover investment costs in a short period (payback)
- Lack of product performance information
- Lack of product availability
- Lack of available financial resources
- Lack of available human resources to implement the project
- Competing priorities for financial and human resources

The rate at which customers accept and purchase energy-efficiency products will be influenced by the level of financial incentives, information and other measures put in place by the Utilities and the Government of Newfoundland, other levels of government, and the private sector to remove barriers such as those noted above.

Exhibit 62 presents the levels of electricity consumption that are estimated in the Achievable Potential scenario. As illustrated, the Achievable Potential scenarios are banded by the two forecasts presented in previous sections: the Economic Potential Forecast and the Reference Case.

As illustrated in Exhibit 62 electric energy savings under the Achievable Potential scenario are less than in the Economic Potential Forecast. In this CDM study, the primary factor that contributes to the outcome shown in Exhibit 62 is the rate of market penetration. In the Economic Potential Forecast, efficient new technologies are theoretically assumed to fully penetrate the market as soon as it is economically attractive to do so. However, the Achievable Potential recognizes that it is unrealistic to expect customers to purchase and install all the electrical energy efficiency technologies that meet the criteria defined by the Economic Potential Forecast.

Exhibit 62 Annual Electricity Consumption—Energy-efficiency Achievable Potential Relative to Reference Case and Economic Potential Forecast for the Commercial Sector (GWh/yr.)



As also illustrated in Exhibit 62 the Achievable Potential results are presented as a band of possibilities, rather than a single line. This is because any estimate of Achievable Potential over a 20-year period is necessarily subject to uncertainty. Consequently, the results are presented as a range, defined as Lower Achievable and Upper Achievable.

The Lower Achievable Potential assumes Newfoundland market conditions that are similar to those contained in the Reference Case. That is, the customers' awareness of energy-efficiency options and their motivation levels remain similar to those in the recent past, technology improvements continue at historical levels, and new energy performance standards continue as per current known schedules. It also assumes that the ability of the Newfoundland utilities and government to influence customers' decisions towards increased investments in energy-efficiency options remains roughly in line with previous company CDM experience.

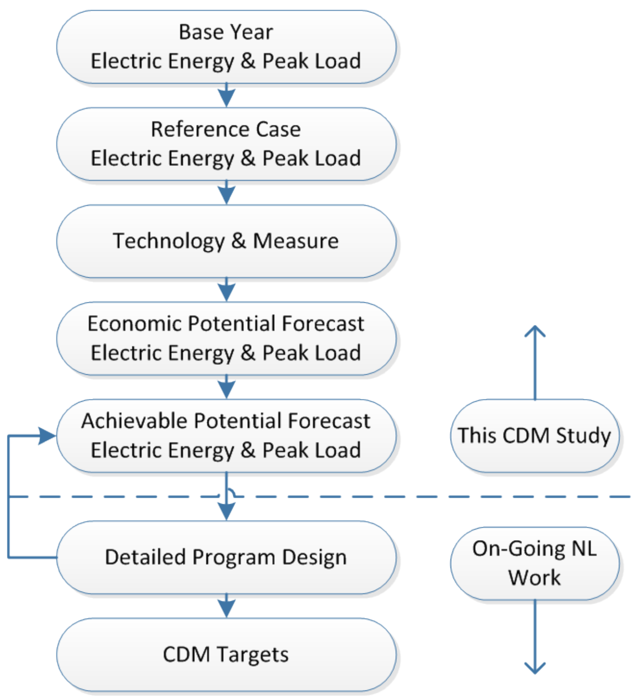
The Upper Achievable Potential assumes Newfoundland market conditions that aggressively support investment in energy efficiency. For example, this scenario assumes that real electricity prices increase over the study period. It also assumes that federal and territorial government actions to mitigate climate change result in increased levels of complementary energy-efficiency initiatives. The upper Achievable Potential typically does not reach economic potential levels; this recognizes that some portion of the market is typically constrained by barriers that cannot realistically be affected by CDM programs within the study period.

9.2.1 Achievable Potential versus Detailed Program Design

It should also be emphasized that the estimation of Achievable Potential is not synonymous with either the setting of specific program targets or with program design. While both are closely linked to the discussion of Achievable Potential, they involve more detailed analysis that is beyond the scope of this study.

Exhibit 63 illustrates the relationship between Achievable Potential and the more detailed program design.

Exhibit 63 Achievable Potential versus Detailed Program Design



This study examined about 80 technologies applicable to commercial electric end uses. Although considerable effort has been made to obtain up-to-date information on each technology and to tailor it to the local market in Newfoundland, this is not a substitute for the type of detailed groundwork needed to prepare a utility program. For each of the technologies selected for further investigation, it will be important to obtain further information on the technical viability and durability of the products in the Newfoundland climate, on the costs in the Newfoundland marketplace, and on real savings under local conditions. If the viability of the technology is confirmed, an assessment of the market barriers is required, leading to the development of program strategies to overcome these barriers.

9.3 Approach to the Estimation of Achievable Potential

Achievable Potential was estimated in a five-step approach.

- Priority opportunities were selected
- Opportunity profiles were created
- Opportunity worksheets were prepared
- A full-day workshop was held
- Workshop results were aggregated and applied to the remaining opportunities.

Further discussion is provided below.

Step 1 Select Priority Opportunities

The first step in developing the Achievable Potential estimates required selection of the energy-saving opportunities identified in the Economic Potential Forecasts to be discussed during the Achievable workshop. Several criteria determined selection, including:

- The priority measures should represent a substantial fraction of the overall economic potential
- The priority measures should represent several different energy end uses
- The priority measures should have a variety of different likely patterns of market adoption, so the discussions will be widely varied.

A summary of the selected energy-efficiency actions, along with the approximate percentage that it represents in the Economic Potential Forecast, is provided in Exhibit 64.

Exhibit 64 Commercial Sector Actions – Energy Efficiency

Measure #	Measure	End Use	Percentage of 2029 Economic Potential	
			Consumption Savings	Demand Savings from EE Measures
C1	LED Tubular Lamps	General Lighting	3%	2%
C2	High-Efficiency Air Source Heat Pumps	Space Heating	15%	21%
C3	ECM Motors and Evaporator Fan Motor Controllers	Refrigeration	1%	0%
C4	VFDs on HVAC Motors	HVAC Fans and Pumps	3%	2%
C5	Advanced Building Automation Systems	Multiple	5%	4%
C6	High Performance New Construction (25% Better)	Multiple	5%	5%
C7	PC Power Management	Computer Equipment	1%	1%
C8	High Performance Glazing Systems	Multiple	3%	4%
Grand Total			**36%**	**39%**

Step 2 Create Opportunity Assessment Profiles

The next step involved the development of brief profiles for each of the opportunities noted above in Exhibit 64, in the form of PowerPoint slides. The slides are presented in Appendix G.

The purpose of the opportunity profiles was to provide a high-level logic framework that would serve as a guide for participant discussions in the Achievable workshop (see Step 4 below). The intent was to define a broad rationale and direction without getting into the much greater detail required of program design, which, as noted previously, is beyond the scope of this project. As illustrated in Appendix G, each opportunity profile addresses the following areas:

- **Technology Description:** Provides a summary statement of the broad goal and rationale for the action.
- **Target Sub sector and Typical Application:** Highlights the sub sectors and applications offering the most significant opportunities, and which provide a good starting point for discussion of the technology.
- **Financial and Economic Indicators:** Provides estimates of average simple payback, cost of conserved electricity (CCE) and basis of assessment (full-cost versus incremental).
- **Eligible Participants:** Provides an estimate of the sub sectors that could be affected during the study period if the entire Economic Potential were to be captured.
- **Economic Potential versus Time:** Shows the pattern of the changing size of the opportunity over the study period, for existing and new buildings. Some opportunities grow steadily through the study period, as more and more equipment reach the age when they would be replaced. Other opportunities are economical to capture immediately, and after that the growth over time is limited to opportunities in new buildings being built. Still other opportunities decline with time as they are eroded by natural conservation activities.

Step 3 Prepare Opportunity Worksheets

A draft assessment worksheet was also prepared for each opportunity profile in advance of the Achievable workshop. The assessment worksheets complemented the information contained in the opportunity profiles by providing quantitative data on the potential electric energy savings for each opportunity as well as providing information on the size and composition of the eligible population of potential participants. Energy impacts and population data were taken from the detailed modelling results contained in the Economic Potential Forecast.

The worksheets, including the results recorded during the workshop discussions, are provided in Appendix H. As illustrated in Appendix H, each opportunity assessment worksheet addresses the following areas:

- **Approximate Cost of Conserved Electricity:** Shows the approximate levelized cost of saving each kWh of electricity saved by the measure. For the purposes of the workshop, this information provided participants with an indication of the cost-effectiveness of measures in certain scenarios.
- **Customer Payback:** Shows the simple payback from the customer's perspective for the package of energy-efficiency measures included in the opportunity. This information provided an indication of the level of attractiveness that the opportunity would present to customers. This

provided an important reference point for the workshop participants when considering potential participation rates. When combined with the preceding CCE information, participants were able to roughly estimate the level of financial incentives that could be employed to increase the opportunity's attractiveness to customers without making it economically unattractive to the Newfoundland utilities.

- **Economic Potential in Terms of Applicable Participants (e.g., number of sites):** Shows the total number of potential participants in terms of either sites or equipment (as appropriate) that could theoretically take part in the opportunity. Numbers shown are from the eligible populations used in the Economic Potential Forecasts.

- **Participation Rates (%):** These fields were filled in during the workshops (described below in the following step), based on input from the participants. They show the percentage of economic savings that workshop participants concluded could be achievable in the last milestone period (usually 2029, but may be earlier for measures that peak earlier).

- **Achievable Potential in Terms of Applicable Participants (e.g., number of sites):** These fields were calculated by the spreadsheet based on the participation rates provided by the participants.

- **Participation Rates Relative to the Discussion Scenario:** These fields were filled in during the workshops to provide guidance to the consulting team on how participation might differ in other regions or sub sectors, or for related or similar technologies.

- **Other Parameters:** These fields were filled in during the workshop to capture highlights of the discussion.

Step 4 Conduct Achievable Workshop

The most critical step in developing the estimates of Achievable Potential was a one-day Achievable Potential workshop that was held on April 22, 2015. Workshop participants consisted of core members of the consultant team, CDM program and technical personnel from the Utilities, industry representatives, and representatives of other stakeholders. Together, the participating personnel brought many years of experience to the workshop related to the technologies and markets.

The purpose of this workshop was to:

- Promote discussion regarding the technical and market constraints confronting the identified energy-efficiency opportunities
- Identify potential strategies for addressing the identified constraints, including potential partners and delivery channels
- Compile participant views related to how much of the identified economic savings could realistically be achieved over the study period.

Following a brief consultant presentation that summarized the Commercial sector study results to date, the workshop provided a structured assessment of each of the selected opportunities. Opportunity assessment consisted of a facilitated discussion of the key elements affecting successful promotion and implementation of the CDM opportunity. More specifically:

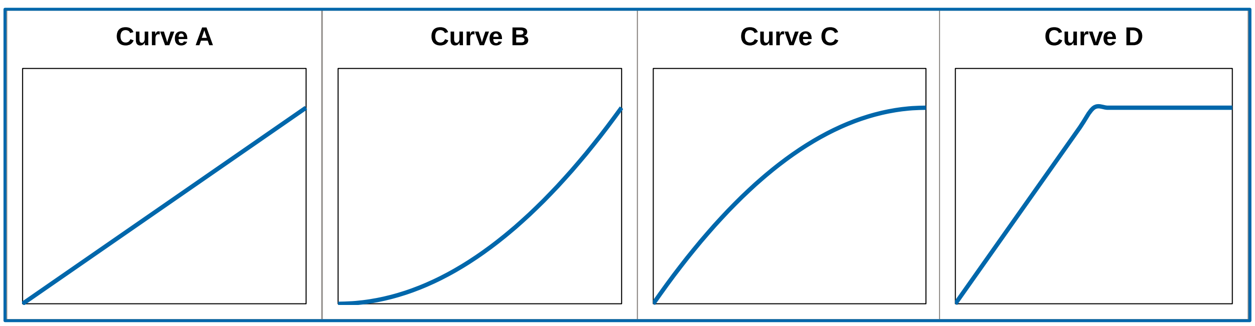
- What are the major constraints/challenges constraining customer adoption of the identified energy-efficiency opportunities?
  - How big is the “won't” portion of the market for this opportunity?
- Preferred strategies and potential partners for addressing identified constraints (high level only)

- Key criteria that determine customers' willingness to proceed
- Key potential channel partners
- Optimum intervention strategies e.g., push, pull, combination
- How sensitive is this opportunity to incentive levels?

Following discussion of market constraints and potential intervention strategies, the participants' views on potential participation rates were recorded. The process involved the following steps:

- The participation rate for the upper Achievable scenario in 2029 was estimated.
- The shape of the adoption curve was selected for the upper Achievable scenario. Rather than seek consensus on the specific values to be employed in each of the intervening years, workshop participants selected one of four curve shapes that best matched their view of the appropriate "ramp-up" rate for each opportunity (see Exhibit 65 below).
- The process was then repeated for the lower Achievable scenario.
- Once participation rates had been established for the specific technology, sub sector and service region selected for the opportunity discussion, workshop participants provided the consultants with guidelines for extrapolating the discussion results to the other sub sectors and service regions included in the opportunity, but not discussed in detail during the workshop. Where time permitted, participants also discussed how the adoption of similar, related technologies might differ from the technology being discussed.

Exhibit 65 Participation Rate "Ramp Up" Curves



Curve A represents a steady increase in the expected participation rate over the study period.

Curve B represents a relatively slow participation rate during the first half of the study period followed by a rapid growth in participation during the second half of the 20-year study period.

Curve C represents a rapid initial participation rate followed by a relatively slow growth in participation during the remainder of the study period.

Curve D represents a very rapid initial participation rate that results in virtual full saturation of the applicable market during the first half of the study period.

Step 5 Aggregate and Extend Opportunity Results

The final step involved aggregating the results of the individual opportunities to provide a view of the potential Achievable in both the Residential and Commercial sectors.

9.4 Achievable Workshop Results

The following sub-sections present a summary of the workshop discussions for each of the commercial opportunities listed in Exhibit 64 above. The adoption rates and curves selected by the participant are summarized in Section 0. Included for each opportunity are:

- Participation estimates (for 2029) made by workshop participants, with comments, where needed, about values assumed in the calculations (presented in Section 0).
- Where needed, additional participation estimates made after the workshop for the purposes of the calculations (presented in Section 0).
- Selected highlights that attempt to capture key discussion themes related to the opportunity.

Appendix H provides copies of the assessment worksheets used during the workshop.

9.4.1 LED Tubular Lamps

For this technology, achievable workshop participants provided 2029 participation rate estimates of 80% for the upper Achievable Potential scenario and 70% for the lower Achievable Potential scenario. Participants thought the most likely adoption curve would be C in the upper Potential scenario and B in the lower potential scenario.

Barriers that tend to lower adoption included the high cost of implementation, the lack of proper incentives, limited customer awareness of LED replacements for fluorescent tubes and public tendering act limitations. Uptake of this technology is limited due to the current economic crunch and in a lot of cases the lowest cost technology must be selected in some facilities where the public tendering act limits the technology that will be implemented. Since LED tubular lamp replacements for fluorescent tubes have not been around for very long, there is limited customer awareness of this particular option while others are still waiting for the LED technology to mature. In addition, workshop participants indicated that it is difficult for utilities to get in touch with the right contacts at the commercial facilities and while the Government in the province may tend to adopt such technologies quickly, the private sector is lagging behind.

Participants suggested that financial barriers could be addressed by using non-energy benefits to help sell the technology and spreading the word through implementers and lighting distributors. With no incentives in place, there are currently a limited number of individuals going to the marketplace to make the case for LED tubular lamps. As such, incentives are key to the overall strategy and there is a high sensitivity to this. Participants believed some facilities may be overlit already, which allows for a deeper savings opportunity. Government agencies are also much more developed than they were 20 years ago and they can be an important partner in spreading the word. Participants believed that this technology is changing very rapidly and the cost is coming down quite quickly.

The initial discussion focused on large offices on the Island grid. Participants believed that participation would be somewhat lower in the Labrador and Isolated regions because of the difficulty of finding materials and qualified installers in these communities. Participants also believed that participation would be similar for the retail sector, higher for the healthcare and education sectors and lower for warehouses and restaurants. Participants also discussed some of the other lighting measures. The adoption of LED Lamps, LED High Bay Fixtures and LED outdoor fixtures were expected to occur at a higher rate while reduced wattage T8 fixtures were expected to have a lower adoption rate. LED low bay fixtures were thought to be adopted at a similar rate.

9.4.2 High-Efficiency Air Source Heat Pumps

For this technology, achievable workshop participants provided 2029 participation rate estimates of 60% for the upper Achievable Potential scenario and 20% for the lower Achievable Potential scenario. Participants thought the most likely adoption curve in both the upper scenario and lower scenarios would be Curve B.

Participants believed that this technology is fairly mature but that the existing infrastructure is fairly old. They also indicated that rooftop units (RTUs) are not very prevalent in large offices and the savings may not be as significant in some retail applications since lighting and internal loads create quite a bit of heat. As such, the heating systems don't need to work as hard as one might expect. Participants indicated that variable refrigerant technology may make more sense in certain applications and that there is about 15% penetration of air source heat pumps (ASHPs) currently, although this may be limited to smaller RTUs. In particular, participants indicated that restaurants are starting to adopt this technology.

Barriers that tend to lower adoption included infrastructure limitations in offices, high maintenance costs, lack of awareness and lack of a push for this technology from HVAC contractors. ASHP's are not practical for many offices since RTUs aren't too common and zoning would be required. In addition, due to most office buildings being leased it is likely that landlords would implement low cost equipment instead. Participants also believed that chains from other jurisdictions have natural gas space heating and may not be aware that there is an opportunity in electric space heating. Finally, participants indicated that many schools in the province are not allowed to be air conditioned. As such, air conditioning capabilities would need to be disabled in these applications.

The initial discussion focused on food retail facilities on the Island grid. Participants believed that participation would be somewhat lower in the Labrador and Isolated regions because of the difficulty of finding materials and qualified installers in these communities. Participants also believed that participation would be similar for the non-food retail and school sectors, higher for the small office, large accommodations, and restaurant sectors and lower for large offices, small accommodations, healthcare, universities, and warehouses. Participants also discussed some of the other heating measures. The adoption of ductless mini-split heat pumps were expected to occur at a higher rate, while ground source heat pumps, high efficiency RTUs and high efficiency chillers were expected to have a lower adoption rate.

9.4.3 ECM Motors and Evaporator Fan Motor Controllers

For this technology, achievable workshop participants provided 2029 participation rate estimates of 80% for the upper Achievable Potential scenario and 25% for the lower Achievable Potential scenario. Participants thought the most likely adoption curve in both the upper and lower Achievable Potential scenarios would be B.

Participants noted that many larger facilities will already possess sophisticated equipment and have the support of qualified maintenance personnel. Smaller communities in Isolated regions have a lot of residential style equipment rather than centralised systems. Older equipment is also much less likely to be retrofitted.

Barriers that tend to lower adoption included implementation cost, especially in smaller facilities, long payback periods, and a lack of awareness of the technology. In addition, many smaller retailers lease space and landlords are unwilling to make the investments in improvements when tenants pay the energy bills. Existing service contracts for refrigeration systems can also restrict retrofits, and participants believe that the technology may not be as widely available as necessary. There may also be a perception among retailers that modifications to refrigeration systems can increase the risk of food spoiling.

Participants identified the need for two different strategies, one tailored to large facilities and another for smaller businesses.

The initial discussion focused on the food retail sector on the Island grid. Participants believed that participation would be somewhat lower in Labrador and much lower in the Isolated regions because of the difficulty of finding materials and qualified installers in these communities. Participants also believed that participation would be somewhat the same for large accommodations and universities, higher for warehouses, and lower for non-food retail and restaurants. Participants also discussed some of the related refrigeration measures. The adoption of LED refrigeration lighting and CEE rated fridges and freezers were expected to occur at a higher rate, while refrigerated display cases with doors, floating head pressure controls, defrost controllers, automatic door closers, and night covers were expected to be adopted more slowly. High efficiency compressors were expected to have a similar adoption rate to ECM Motors and Evaporator Fan Motor Controllers.

9.4.4 VFDs on HVAC Motors

For this technology, achievable workshop participants provided 2029 participation rate estimates of 70% for the upper Achievable Potential scenario and 5% for the lower Achievable Potential scenario. Participants thought the most likely adoption curve would be B for both scenarios.

Participants report that awareness of this measure is quite high, and it is commonly implemented on both fan and pump systems. Implementation is straightforward in many facilities, but significant additional retrofits are required in some cases.

Barriers that tend to lower adoption include high implementation costs in certain situations, and landlords are less likely to make energy efficiency improvements in leased properties. Currently VFDs are only incented under the takeCHARGE Custom Program, which some contractors may not be aware of, and this may be slowing the adoption of VFDs.

Participants suggest that prescriptive incentives may make funding more accessible, but there are potential concerns with the variability of the savings. Other strategies for increasing adoption include working with contractors to drum up sales and awareness, bundling with other retrofit measures, and an increased number of energy audits in order to identify retrofit opportunities.

The initial discussion focused on the large office sector on the Island grid. Participants believed that participation would be somewhat lower in the Labrador and Isolated regions because of the difficulty of finding materials and qualified installers in these communities. Participants also believed that participation would be similar for the retail sectors, lower for small offices, and higher for large accommodations, healthcare, schools, and universities. Participants also discussed some of the related HVAC measures. The adoption of high efficiency motors is expected to occur at a higher rate, while lower adoption rates are expected for demand controlled ventilation (DCV) and kitchen fume hood DCV.

9.4.5 Advanced Building Automation Systems

For this technology, achievable workshop participants provided 2029 participation rate estimates of 70% for the upper Achievable Potential scenario and 20% for the lower Achievable Potential scenario. Participants thought the most likely adoption curve would be B for both scenarios.

Barriers that tend to lower adoption include a lack of familiarity and trust of the technology among building operators, a lack of training for operators in the use of sophisticated control systems, a negative perception of the technology due to improperly installed and operated systems, and a reluctance among building owners to sign up for service contracts with controls suppliers. Equipment can also be relatively easily overridden which both erodes savings from installed systems and discourages the adoption of the technology.

Strategies to mitigate these barriers include ensuring that equipment is being well maintained and that there is a service contract in place, increased education for both building operators and contractors, and improved commissioning and continuous optimisation. Participants suggested that advanced BAS controls can be bundled with a recommissioning program.

The initial discussion focused on the large office sector on the Island grid. Participants believed that participation would be similar in Labrador and lower in the Isolated regions because of the difficulty of finding materials and qualified installers in these communities. Participants also believed that participation would be similar for the retail, large accommodation and school sectors, higher for healthcare, lower for small offices and universities, and much lower for warehouses. Participants also discussed some of the related controls measures. The adoption of hotel occupancy controls is expected to occur at a lower rate, daylighting controls at the same rate, and higher adoption rates are expected for programmable thermostats, and indoor and outdoor lighting controls.

9.4.6 High Performance New Construction

For this measure, achievable workshop participants provided 2029 participation rate estimates of 80% for the upper Achievable Potential scenario and 50% for the lower Achievable Potential scenario. Participants thought the most likely adoption curve would be C for the upper achievable scenario and A for the lower achievable scenario.

The primary barrier to implementation is the incremental cost of high performance new construction. Additionally, high performance building rating systems like LEED include many measures that don't improve energy efficiency. Participants also noted that if energy efficiency improvements are missed at the time of new construction, it represents a major lost opportunity.

Participants indicated that much of the recent new construction in the province has been for government buildings, and many of these are being built to high energy efficiency standards which is pushing the local industry to adopt better building standards overall. Strategies to encourage further adoption include presenting the non-energy benefits as part of the business case, including the ability to rent high performance buildings at a premium. Expert engineering consultants are considered key to successfully delivering projects, and increased training for building owners and the design community would help, particularly workshops on how to deal with the administrative burden of certification or strategies to implement energy efficiency outside of established rating systems.

The initial discussion focused on large offices on the Island grid. Participants believed participation would be similar in Labrador and lower in Isolated regions. Participants also believed that participation would be higher for schools and universities, but lower in all other sub sectors. The adoption of high performance new construction practices that result in energy efficiency that is 40%

better than code are expected to be adopted at a much lower rate than practices that are 25% better than code.

9.4.7 PC Power Management

For this measure, achievable workshop participants provided 2029 participation rate estimates of 50% for the upper Achievable Potential scenario and 10% for the lower Achievable Potential scenario. Participants thought the most likely adoption curve would be B for both scenarios.

Barriers that tend to lower adoption included the potential for IT departments needing to make updates during off hours, individuals overriding power management settings, and the increased use of remote work computers limiting the proportion of computer equipment that can be shut down.

Strategies to encourage adoption include driving implementation through the IT department and educating users in order to ensure the persistence of savings. Holding competitions among users, for example between different floors of an office building, can encourage participation.

The initial discussion focused on the large office sector on the Island grid. Participants believed that participation would be somewhat lower in the Labrador and Isolated regions. Participants also believed that participation would be similar for small offices, schools, and universities while participation is expected to be lower for all other sub sectors. Participants also discussed some of the related behavioural measures. The adoption of ENERGY STAR® certified computers, office equipment, and servers is expected to be similar, while the use of task lighting, natural ventilation, and keeping doors closed is expected to be lower.

9.4.8 High Performance Glazing Systems

For this measure, achievable workshop participants provided 2029 participation rate estimates of 80% for the upper Achievable Potential scenario and 10% for the lower Achievable Potential scenario. Participants thought the most likely adoption curve would be C for the upper achievable scenario and B for the lower achievable scenario.

Barriers that tend to lower adoption include some presence of low quality products in the market, a lack of awareness about competitively priced high efficiency options, and a higher first cost. Landlords are also less likely to implement energy efficiency measures in leased buildings. Currently high performance glazing systems are only incented under the takeCHARGE Custom Program, which has seen a very low uptake to date.

Strategies to improve adoption include engaging architects and contractors as partners to promote high efficiency glazing options, ensuring that high efficiency glazing is specified during design, and promoting the non-energy benefits such as improved occupant comfort.

The initial discussion focused on the large office sector on the Island grid. Participants believed that participation would be higher in the Labrador and Isolated regions. Participants also believed that participation would be similar for large accommodations, higher for healthcare, schools, and universities, and lower for small offices, retail, small accommodations, warehouses, and restaurants. Participants also discussed some of the related whole building measures. The adoption of wall insulation and roof insulation is expected to be similar, while the penetration of recommissioning is expected to be higher.

9.4.9 Aggregate Results

Exhibit 66 summarizes the participant rate and “ramp up” curve assumptions discussed above.

Exhibit 66 Summary of Achievable Potential Participation Rates and Curves

Technology	Lower Potential Scenario		Upper Potential Scenario	
	2029 Participation Factor	Adoption Curve	2029 Participation Factor	Adoption Curve
C1: LED Tubular Lamps	70%	Curve B	80%	Curve C
C2: High-Efficiency Air Source Heat Pumps	20%	Curve B	60%	Curve B
C3: ECM Motors and Evaporator Fan Motor Controllers	25%	Curve B	80%	Curve B
C4: VFDs on HVAC Motors	5%	Curve B	70%	Curve B
C5: Advanced Building Automation Systems	20%	Curve B	70%	Curve B
C6: High Performance New Construction	50%	Curve A	80%	Curve C
C7: PC Power Management	10%	Curve B	50%	Curve B
C8: High Performance Glazing Systems	10%	Curve B	80%	Curve C

As noted earlier, it was not possible to fully address all opportunities in the one-day workshop. Consequently, the workshop focused on opportunities selected based on the criteria described in Step 1. Estimated participation rates for the remaining opportunities were extrapolated from the workshop results shown above and an aggregate set of results was prepared that included all of the eligible technologies.

The results shown in the attached appendices and in the following summary section incorporate the results of all these inputs.

9.5 Summary of Potential Electric Energy Savings

This section presents a summary of the electric energy savings for the upper and lower achievable potential scenarios. The summary is organized and presented in the following sub-sections:

- Overview and selected highlights
- Electric energy savings – Upper Achievable scenario
- Electric energy savings – Lower Achievable scenario.

It should be noted that measures are applied separately for each combination of region, sub sector, and milestone year. Some of the parameters that are used to assess measures in each circumstance can vary. For example, the potential savings or cost for a measure in one sub sector or region may be different from the savings or cost in another sub sector or region. In addition, the economic threshold value that is used to assess cost-effectiveness varies for each of the milestones. As such, measures that are marginally cost-effective, such as multi-split heat pumps, are only cost-effective in a subset of the regions, sub sectors, and milestone years being considered.

9.5.1 Overview and Selected Highlights

Exhibit 67 presents an overview of the results for the total Newfoundland service territory by milestone year, for three scenarios: Economic Potential, upper Achievable Potential and lower Achievable Potential.

Exhibit 67 Electricity Savings by Milestone Year for Three Scenarios (GWh/yr.)

Year	Economic Potential Scenario		Upper Achievable Potential Scenario		Lower Achievable Potential Scenario	
	Potential Savings (GWh/yr.)	% Savings Relative to Reference Case	Potential Savings (GWh/yr.)	% Savings Relative to Reference Case	Potential Savings (GWh/yr.)	% Savings Relative to Reference Case
2017	744	31%	56	2.3%	8	0.3%
2020	789	32%	149	6.0%	32	1.3%
2023	834	32%	280	11%	73	2.8%
2026	892	34%	456	17%	137	5.2%
2029	936	35%	640	24%	209	7.8%

Selected Highlights – Potential Electric Energy Savings

Selected highlights of the potential electric energy savings for the upper and lower achievable potential scenarios shown in Exhibit 67 are summarized below. Further detail is provided in the following sub-sections and in the accompanying appendices.

Savings by Milestone Year

Savings in both Achievable scenarios are achieved somewhat more steadily throughout the period than in the Economic Potential scenario. In the upper Achievable Potential scenario, 23% of the 2029 savings would be achieved by 2020, rising to 44% in 2023 and 71% by 2026. In the lower Achievable Potential scenario, 15% of the 2029 savings would be achieved by 2020, rising to 35% in 2023 and 66% by 2026. Although there are some measures in both scenarios that can be implemented early in the study period, the majority are expected to follow an adoption curve that starts slowly and builds up towards 2029.

Savings by Sub Sector

Offices account for the largest portion of achievable savings with 21-23% of the achievable potential savings coming from this sector. Of this, large offices account for approximately 13% and 11% of the upper and lower Achievable Potential savings, respectively, and small offices account for 10% each of the upper and lower achievable potential savings. This reflects the larger market share of offices and their generally higher level of energy intensity. The retail sector accounts for 19-21% of the achievable potential savings with 6% of savings in large non-food retail for both scenarios, 7% savings in small non-food retail for both scenarios and 7% and 8% savings in food retail for the upper and lower scenarios respectively. Educational facilities also provide for a total of 16 -17% of achievable potential savings with schools accounting for approximately 11% and 10% of the upper and lower Achievable Potential savings, respectively, and Universities and colleges accounting for 6% each of the upper and lower achievable potential savings.

Savings by Region

The Island Interconnected region accounts are expected to comprise 88% of potential savings in 2029. The Labrador Interconnected region accounts provides 11% of the savings, and the Isolated region provides 1% of the potential savings in 2029.

Savings by End Use

Savings in the HVAC major end use (which includes space heating, space cooling, and HVAC Fans and Pumps) account for 57% of the upper achievable savings and 38% of the lower achievable savings in 2029. Space heating is the biggest contributor, at 42% of the overall upper achievable savings and 29% of the overall lower Achievable Potential savings. HVAC Fans and Pumps savings account for 13% of the overall 2029 upper Achievable Potential savings and 8% of the overall lower Achievable Potential savings. The most significant measures that save HVAC include ductless mini-split heat pumps, building recommissioning, air source heat pumps, demand control ventilation, and programmable thermostats.

Although HVAC accounts for a very large percentage of the potential, the space heating savings potential is also a very large percentage of the reference case space heating consumption. Between 7% and 32% of HVAC consumption could potentially be saved, respectively, in the lower and upper Achievable Potential scenarios.

Lighting savings accounts for 32% of the upper achievable savings and 53% of the lower achievable savings. Of this, the General Lighting savings accounts for 22% of the upper Achievable Potential savings in 2029 and 32% of the lower Achievable Potential savings. The most significant lighting savings come from LED lighting measures, building recommissioning, lighting occupancy sensors, and T8 Fixtures. Secondary Lighting accounts for 4% of the upper Achievable Potential savings and 10% of the lower Achievable Potential savings in 2029. The most significant savings for secondary lighting come from LED lighting measures. Street Lighting accounts for 2% of the upper Achievable Potential savings and 6% of the lower Achievable Potential savings. The potential reduction for street lighting comes solely from the LED Street Lighting measure.

Refrigeration accounts for 5% of each of the 2029 upper Achievable Potential savings and lower Achievable Potential savings. The most significant refrigeration measures are the refrigerated display cases, high efficiency compressors and the evaporator fan upgrades measure (ECM Motors and Evaporator Fan Motor Controllers).

The remaining major end uses are all under 5% in both scenarios. There are savings available in three other major end uses, including Domestic Hot Water, Food Service, and Plug Loads. Together they account for 7% of upper Achievable Potential savings in 2029 and 4% of lower Achievable Potential savings in 2029.

Savings by Measure

The most significant savings in the Achievable Potential come from the following measures:

- **Building recommissioning**, which accounts for 20% of the upper Achievable Potential savings in 2029 and 9% of the lower Achievable Potential savings in 2029
- **Ductless mini-split heat pumps**, which account for 10% of the upper Achievable Potential savings in 2029 and 11% of the lower Achievable Potential savings in 2029
- **Programmable Thermostats**, which accounts for 6% of each of the upper Achievable Potential savings and lower Achievable Potential savings in 2029
- **Air Source Heat Pumps**, which accounts for 6% of the upper Achievable Potential savings in 2029 and 7% of the lower Achievable Potential savings in 2029
- **Advanced BAS**, which accounts for 6% of each of the upper Achievable Potential savings and lower Achievable Potential savings in 2029
- **Lighting Occupancy sensors**, which accounts for 5% of the upper Achievable Potential savings in 2029 and 4% of the lower Achievable Potential savings in 2029
- **High performance new construction (25% better)**, which accounts for 5% of the upper Achievable Potential savings in 2029 and 8% of the lower Achievable Potential savings in 2029
- **LED tubes** (applied to general and secondary lighting), which accounts for 5% of the upper Achievable Potential savings in 2029 and 10% of the lower Achievable Potential savings in 2029
- **LED lamps** (applied to general and secondary lighting), which accounts for 4% of the upper Achievable Potential savings in 2029 and 11% of the lower Achievable Potential savings in 2029

There are numerous other smaller measures that contribute to the overall Achievable Potential results.

9.5.2 Electric Energy Savings – Upper Achievable Scenario

The following exhibits present the potential electricity savings[30] under the upper Achievable Potential scenario. The results shown are relative to the Reference Case. The results are broken down as follows:

- Exhibit 68 presents the results by region and by milestone year
- Exhibit 69 presents the results for the total NL service territory by sub sector and milestone year
- Exhibit 70 presents the results for the total NL service territory by end use and milestone year
- Exhibit 71 presents the results for the total NL service territory by technology and milestone year.

Exhibit 68 Upper Achievable Electricity Savings by Region (MWh/yr.)

Region	2017	2020	2023	2026	2029	2029 Savings Relative to Ref Case	Percentage of Total 2029 Savings
Island Interconnected	52,821	137,859	255,655	407,167	566,388	24%	88%
Labrador Interconnected	2,763	10,142	22,594	45,474	70,163	24%	11%
Isolated	634	1,384	2,185	3,027	3,890	17%	1%
Grand Total	56,218	149,386	280,435	455,668	640,441	24%	100%

[30] Note: A value of "0" in the following exhibits means a relatively small number, not an absolute value of zero.

Exhibit 69 Upper Achievable Electricity Savings by Sub sector and Milestone Year (MWh/yr.)

Sub Sector	2017	2020	2023	2026	2029	2029 Savings Relative to Ref Case	% of Total 2029 Savings
Large Office	5,972	16,935	33,303	56,863	80,714	25%	13%
Small Office	4,344	13,029	26,310	44,485	64,337	28%	10%
Large Non-food Retail	3,909	9,491	16,928	25,828	35,879	25%	6%
Small Non-food Retail	3,866	9,947	18,305	30,723	42,647	26%	7%
Food Retail	3,481	10,040	19,787	31,915	45,989	23%	7%
Large Accomodation	2,626	6,740	12,238	18,636	26,101	33%	4%
Small Accomodation	703	1,559	2,650	3,948	5,393	17%	1%
Healthcare	4,110	12,952	25,506	40,432	56,049	33%	9%
Schools	4,772	15,172	30,587	49,433	70,032	35%	11%
Universities and Colleges	3,683	9,793	18,078	28,355	39,881	30%	6%
Warehouse/Wholesale	2,324	5,191	8,925	13,422	18,393	20%	3%
Restaurants	1,473	3,655	6,850	10,856	15,287	12%	2%
Labrador Isolated C/I Buildings	581	1,270	2,008	2,783	3,579	17%	1%
Island Isolated C/I Buildings	53	114	178	244	311	16%	0%
Large Other Buildings	4,573	12,327	23,578	38,402	55,173	23%	9%
Small Other Buildings	3,294	8,581	16,430	28,921	41,187	21%	6%
Other Institutional	365	2,115	5,516	15,870	24,997	29%	4%
Street Lighting	6,088	10,474	13,256	14,552	14,491	40%	2%
Grand Total	56,218	149,386	280,435	455,668	640,441	26%	100%

Note: Any difference in totals is due to rounding.

Exhibit 70 Upper Achievable Electricity Savings by End Use and Milestone Year (MWh/yr.)

End Use	2017	2020	2023	2026	2029	2029 Savings Relative to Ref Case	% of Total 2029 Savings
Space Heating	5,847	37,190	94,421	173,631	269,770	35%	42%
Space Cooling	353	1,455	3,340	5,909	9,053	19%	1%
Secondary Lighting	10,833	18,230	22,812	24,915	25,251	20%	4%
Refrigeration	1,310	5,087	11,544	20,102	30,448	15%	5%
Outdoor Lighting	3,029	8,494	15,338	21,245	23,345	49%	4%
Other Plug Loads	237	968	2,222	4,028	6,416	9%	1%
HVAC Fans & Pumps	3,337	13,675	31,083	55,554	85,286	25%	13%
General Lighting	23,528	47,516	73,094	112,552	140,673	33%	22%
Food Service Equipment	21	102	282	389	389	0%	0%
Domestic Hot Water	1,026	4,297	9,967	17,954	28,026	22%	4%
Computer Servers	28	107	115	130	153	1%	0%
Computer Equipment	581	1,791	2,959	4,709	7,139	6%	1%
Street Lighting	6,088	10,474	13,256	14,552	14,491	40%	2%
Grand Total	56,218	149,386	280,435	455,668	640,441	26%	100%

Note: Any difference in totals is due to rounding.

Exhibit 71 Upper Achievable Electricity Savings by Technology and Milestone Year (MWh/yr.)

Measure	Year					Adoption Curve	Weighted Average CCE		
	2017	2020	2023	2026	2029		Island	Labrador	Isolated
Energy-Efficient Server Technologies	28	107	115	130	153	B	0.0	0.0	N/A
Use Natural Ventilation (Summer)	0	2	4	7	10	B	0.0	0.0	N/A
Activate PC Power Management	185	780	1,852	3,433	5,598	B	0.0	0.0	0.0
Use Task Light Instead of Ambient	16	62	128	185	254	B	0.0	0.0	N/A
Use Shades/Blinds (Summer)	1	3	7	12	19	B	0.0	0.0	N/A
Use Shades/Blinds (Winter)	8	32	68	108	145	B	0.0	0.0	0.0
Make Use of Daylighting	30	117	250	393	561	B	0.0	0.0	0.0
Keep Doors Closed (Summer)	0	1	2	3	5	B	0.0	0.0	N/A
Keep Doors Closed (Winter)	4	16	35	58	80	B	0.0	0.0	N/A
ENERGY STAR Computers	378	921	1,010	1,168	1,415	B	0.0	0.0	0.0
ENERGY STAR Office Equipment	18	90	97	108	125	B	0.0	0.0	0.0
Reduce Number of Fridges	7	28	68	126	207	B	0.0	0.0	N/A
Low-Flow Showerheads	170	678	1,516	2,663	4,088	B	0.1	0.1	0.1
Low-Flow Faucet Aerators	588	2,348	5,273	9,347	14,544	B	0.2	0.1	0.1
Lighting Controls (Outdoor)	458	1,551	2,769	3,819	5,378	B	0.4	0.4	0.7
Low-Flow Pre-Rinse Spray Valves	37	149	335	594	923	B	0.4	0.5	1.1
Cooler Night Covers	149	578	1,236	2,041	2,894	B	0.7	0.7	0.7
Automatic Door Closers (Walk-In Coolers & Freezers)	18	70	154	264	393	B	1.2	1.2	N/A
LED Screw-In Lamps	6,843	11,430	14,044	14,968	14,474	C	1.7	1.6	1.6
Programmable Thermostats	2,091	8,157	17,286	28,318	39,705	B	1.7	2.0	1.4
High-Efficiency Air Source Heat Pumps	978	4,514	11,628	23,109	39,600	B	2.0	0.9	9.1
LED Screw-In Lamps	5,507	9,166	11,224	11,922	11,491	C	2.2	2.2	2.1
Refrigerated Vending Machine Controllers	230	939	2,154	3,901	6,209	B	2.6	2.6	2.6
High Efficiency Compressors (Refrigeration)	342	1,352	2,988	5,176	7,817	B	2.7	2.7	N/A
Heat Pump Water Heaters	125	523	1,139	2,042	2,979	B	2.7	3.9	12.2
High-Efficiency Cooking Equipment	21	102	282	389	389	B	2.8	2.7	N/A
High Performance T8 Fixtures	908	1,581	2,038	2,279	2,323	C	3.0	3.0	3.3
LED Outdoor Fixtures	2,562	6,843	12,228	16,737	16,806	C	3.0	2.9	11.3
VFDs on HVAC Motors	772	3,087	6,946	12,361	19,315	B	3.0	3.1	3.1
New Construction (25% More Efficient)	232	2,664	8,851	17,383	29,530	C	3.1	3.0	3.8
Building Recommissioning	6,339	24,394	51,663	89,675	126,323	B	3.2	4.0	2.8
Wall Insulation	731	1,216	1,853	2,918	3,790	C	3.2	3.6	5.6
Roof Insulation	545	795	1,123	1,498	1,888	C	3.5	2.5	4.9
LED Exit Signs	170	251	266	233	173	C	3.8	3.8	3.8
Hotel Occupancy Sensors	72	267	550	885	1,188	B	3.9	2.9	N/A
Premium Efficiency Motors	25	132	360	765	1,397	B	4.0	4.2	4.3

Exhibit 71 Upper Achievable Electricity Savings by Technology and Milestone Year (MWh/yr.) (cont'd…)

Measure	Year					Adoption Curve	Weighted Average CCE		
	2017	2020	2023	2026	2029		Island	Labrador	Isolated
High Performance Glazing Systems	1,620	3,544	6,313	11,969	22,110	C	4.2	5.8	3.1
Demand Control Kitchen Ventilation (DCKV)	60	252	531	843	1,145	B	4.2	4.2	N/A
T5HO Fixtures	946	1,642	2,030	2,148	2,063	C	4.5	4.5	4.5
Refrigeration Controls	121	492	1,058	1,764	2,531	B	4.5	4.5	N/A
Occupancy Sensors (Lighting)	1,419	5,417	11,949	20,758	31,654	B	4.5	4.8	5.3
Drainwater Heat Recovery	13	73	199	423	773	B	4.5	4.5	4.5
ECM Motors and Evaporator Fan Motor Controllers	237	927	2,140	3,682	5,538	B	4.7	4.7	4.7
LED High Bay Fixtures	1,782	3,016	3,784	4,144	4,143	C	4.8	2.1	4.8
High Performance T8 Fixtures	4,967	9,019	11,633	13,012	13,259	C	4.8	4.2	4.2
T5HO Fixtures	317	525	662	701	673	C	5.0	4.3	3.6
ENERGY STAR Dishwashers	54	214	520	924	1,442	B	5.0	5.0	N/A
Ventilation Heat Recovery	570	2,636	5,932	10,545	16,477	B	5.2	4.2	4.1
LED High Bay Fixtures	504	848	1,058	1,156	1,156	C	5.2	3.6	3.8
New Construction (40% More Efficient)	106	807	3,037	6,827	11,360	C	5.3	2.6	7.1
Radiant Infrared Heaters	74	296	663	1,338	2,088	B	5.9	6.1	N/A
Demand Control Ventilation (DCV)	1,149	4,503	11,254	18,613	26,045	B	5.9	4.5	N/A
LED Tubular Lamps	2,078	3,435	4,205	4,482	4,598	C	6.0	3.5	6.8
Ground Source Heat Pumps	223	652	1,291	2,056	2,861	B	6.4	N/A	12.1
LED Tubular Lamps	6,452	9,659	11,469	25,145	25,694	C	7.1	N/A	8.7
LED Street Lighting	6,088	10,474	13,256	14,552	14,491	C	7.8	N/A	N/A
Advanced Building Automation Systems	1,960	7,531	15,931	25,891	36,727	B	8.1	4.3	N/A
Refrigeration Heat Recovery	18	71	158	277	429	B	8.2	N/A	N/A
CEE-Rated Refrigerators and Freezers	52	75	127	157	157	B	8.4	N/A	8.4
Ductless Mini-Split Heat Pump	2,651	10,777	23,888	42,741	66,022	B	8.9	2.4	6.0
High Efficiency Chillers	0	0	0	0	0	B	10.5	N/A	N/A
Refrigerated Cases with Doors	339	1,357	3,053	5,427	8,480	B	10.9	N/A	N/A
LED Refrigerated Display Case Lighting	35	42	52	66	82	B	11.5	N/A	16.0
Dimming Control (Daylighting)	2	10	22	39	62	B	N/A	N/A	18.6
Freezer Defrost Controllers	-	-	1	2	3	B	N/A	N/A	27.9
LED Troffers	8	22	41	62	66	C	N/A	N/A	19.3
HVAC Impact from Other Savings	(8,214)	(13,872)	(17,362)	(23,095)	(23,877)	N/A	N/A	N/A	N/A
Grand Total	56,218	149,386	280,435	455,668	640,441				

Note: Curves A and B in this exhibit are as presented in Exhibit 65. In the exhibit, a zero indicates a value that rounds off to zero (i.e., less than 0.5). A dash indicates a value that is actually zero.

9.5.3 Electric Energy Savings – Lower Achievable Scenario

The following exhibits present the potential electricity savings[31] under the lower Achievable Potential scenario. The results shown are relative to the Reference Case. The results are broken down as follows:

- Exhibit 72 presents the results by supply system, by region and milestone year
- Exhibit 73 presents the results for the total NL by sub sector and milestone year
- Exhibit 74 presents the results for the total NL by end use and milestone year
- Exhibit 75 presents the results for the total NL by technology and milestone year.

Exhibit 72 Lower Achievable Electricity Savings by Region (MWh/yr.)

Region	2017	2020	2023	2026	2029	2029 Savings Relative to Ref Case	% of Total 2029 Savings
Island Interconnected	7,528	29,913	68,110	126,145	191,279	8%	91%
Labrador Interconnected	433	2,109	5,117	10,676	17,359	6%	8.3%
Isolated	14	77	172	311	498	2%	0.2%
Grand Total	7,974	32,099	73,399	137,132	209,136	8%	100%

[31] A value of "0" in the following exhibits means a relatively small number, not an absolute value of zero.

Exhibit 73 Lower Achievable Electricity Savings by Sub sector and Milestone Year (MWh/yr.)

Sub Sector	2017	2020	2023	2026	2029	2029 Savings Relative to Ref Case	% of Total 2029 Savings
Large Office	790	3,113	7,361	15,622	23,795	7%	11%
Small Office	769	3,053	7,010	13,560	20,838	9%	10%
Large Non-food Retail	530	2,126	4,851	8,507	12,901	9%	6%
Small Non-food Retail	534	2,133	4,874	9,821	14,585	9%	7%
Food Retail	656	2,596	5,889	10,313	15,696	8%	8%
Large Accomodation	389	1,536	3,447	5,974	9,225	12%	4%
Small Accomodation	90	360	825	1,468	2,252	7%	1%
Healthcare	638	2,611	5,934	10,561	16,027	9%	8%
Schools	829	3,385	7,779	13,863	21,251	11%	10%
Universities and Colleges	513	2,018	4,471	7,906	11,862	9%	6%
Warehouse/Wholesale	295	1,181	2,728	4,895	7,432	8%	4%
Restaurants	176	733	1,721	3,082	4,870	4%	2%
Labrador Isolated C/I Buildings	12	70	157	284	455	2%	0%
Island Isolated C/I Buildings	1	7	15	27	43	2%	0%
Large Other Buildings	625	2,555	5,895	10,792	16,736	7%	8%
Small Other Buildings	432	1,732	4,027	8,414	12,723	6%	6%
Other Institutional	97	576	1,393	3,470	5,637	7%	3%
Street Lighting	598	2,314	5,021	8,574	12,808	35%	6%
Grand Total	7,974	32,099	73,399	137,132	209,136	8%	100%

Note: Any difference in totals is due to rounding.

Exhibit 74 Lower Achievable Electricity Savings by End Use and Milestone Year (MWh/yr.)

End Use	2017	2020	2023	2026	2029	2029 Savings Relative to Ref Case	% of Total 2029 Savings
Space Heating	1,763	7,874	19,308	35,251	60,300	8%	29%
Space Cooling	72	315	773	1,448	2,374	5%	1%
Secondary Lighting	1,079	4,102	8,770	14,713	21,848	17%	10%
Refrigeration	408	1,604	3,730	6,707	10,573	5%	5%
Outdoor Lighting	388	1,756	4,477	7,963	9,032	19%	4%
Other Plug Loads	66	271	621	1,126	1,793	3%	1%
HVAC Fans & Pumps	576	2,459	5,884	10,951	17,737	5%	8%
General Lighting	2,780	10,455	22,741	46,640	66,590	16%	32%
Food Service Equipment	7	34	94	130	130	0%	0%
Domestic Hot Water	115	536	1,363	2,658	4,486	4%	2%
Computer Servers	6	21	23	26	31	0%	0%
Computer Equipment	115	357	592	945	1,435	1%	1%
Street Lighting	598	2,314	5,021	8,574	12,808	35%	6%
Grand Total	7,974	32,099	73,399	137,132	209,136	9%	100%

Note: Any difference in totals is due to rounding.

Exhibit 75 Lower Achievable Electricity Savings by Technology and Milestone Year (MWh/yr.)

Measure	Year					Adoption	Weighted Average CCE (¢/kWh)		
	2017	2020	2023	2026	2029	Curve	Island	Labrador	Isolated
Energy-Efficient Server Technologies	6	21	23	26	31	B	0.0	0.0	N/A
Make Use of Daylighting	6	25	55	93	139	B	0.0	0.0	N/A
Keep Doors Closed (Summer)	0	0	0	1	1	B	0.0	0.0	N/A
Keep Doors Closed (Winter)	1	3	8	14	22	B	0.0	0.0	N/A
ENERGY STAR Computers	75	182	200	231	280	B	0.0	0.0	N/A
ENERGY STAR Office Equipment	3	18	19	21	25	B	0.0	0.0	N/A
Reduce Number of Fridges	1	6	14	25	41	B	0.0	0.0	N/A
Use Natural Ventilation (Summer)	0	0	1	2	2	B	0.0	0.0	N/A
Activate PC Power Management	37	157	373	692	1,130	B	0.0	0.0	0.0
Use Task Light Instead of Ambient	3	13	29	45	66	B	0.0	0.0	N/A
Use Shades/Blinds (Summer)	0	1	2	3	4	B	0.0	0.0	N/A
Use Shades/Blinds (Winter)	2	7	16	28	42	B	0.0	0.0	N/A
Low-Flow Showerheads	13	53	118	210	328	B	0.1	0.1	N/A
Low-Flow Faucet Aerators	43	173	390	693	1,083	B	0.2	0.1	N/A
Lighting Controls (Outdoor)	138	508	1,019	1,567	2,267	B	0.4	0.4	N/A
Low-Flow Pre-Rinse Spray Valves	3	11	25	44	69	B	0.4	0.5	N/A
Cooler Night Covers	46	184	408	709	1,076	B	0.7	0.7	N/A
Automatic Door Closers (Walk-In Coolers & Freezers)	6	22	50	87	134	B	1.2	1.2	N/A
Programmable Thermostats	610	2,418	5,269	9,022	13,483	B	1.6	2.0	N/A
LED Screw-In Lamps	682	2,564	5,401	8,953	12,985	B	1.7	1.6	N/A
Roof Insulation	8	15	33	64	113	B	2.0	2.5	N/A
High-Efficiency Air Source Heat Pumps	329	1,534	4,016	8,183	14,538	B	2.0	0.9	9.1
LED Screw-In Lamps	546	2,046	4,298	7,105	10,279	B	2.2	2.2	N/A
Refrigerated Vending Machine Controllers	65	265	608	1,101	1,751	B	2.6	2.6	N/A
Wall Insulation	10	26	60	149	259	B	2.6	3.6	N/A
High Efficiency Compressors (Refrigeration)	107	427	955	1,684	2,605	B	2.7	2.7	N/A
Heat Pump Water Heaters	42	180	412	793	1,287	B	2.7	3.8	N/A
High-Efficiency Cooking Equipment	7	34	94	130	130	B	2.8	2.7	N/A
High Performance T8 Fixtures	87	341	753	1,311	2,004	B	3.0	3.0	N/A
LED Outdoor Fixtures	247	1,210	3,313	6,067	6,135	B	3.0	2.9	N/A
VFDs on HVAC Motors	55	221	496	883	1,380	B	3.0	3.1	3.1
New Construction (25% More Efficient)	81	1,033	3,800	8,253	15,860	A	3.1	3.0	3.8
Building Recommissioning	821	3,253	7,153	13,099	19,702	B	3.2	4.0	N/A
LED Exit Signs	16	55	99	135	150	B	3.8	3.8	N/A

Exhibit 75 Lower Achievable Electricity Savings by Technology and Milestone Year (MWh/yr.) (cont'd…)

Measure	Year					Adoption	Weighted Average CCE (¢/kWh)		
	2017	2020	2023	2026	2029	Curve	Island	Labrador	Isolated
Hotel Occupancy Sensors	22	84	181	304	436	B	3.9	2.9	N/A
Premium Efficiency Motors	2	10	26	56	102	B	4.0	4.2	N/A
Demand Control Kitchen Ventilation (DCKV)	4	19	41	70	105	B	4.2	4.2	N/A
High Performance Glazing Systems	23	83	233	707	1,980	B	4.4	5.9	3.1
T5HO Fixtures	91	358	758	1,247	1,797	B	4.5	4.5	N/A
Refrigeration Controls	38	157	349	609	929	B	4.5	4.5	N/A
Occupancy Sensors (Lighting)	420	1,635	3,614	6,243	9,234	B	4.5	4.8	N/A
Drainwater Heat Recovery	1	5	14	30	55	B	4.5	4.5	N/A
ECM Motors and Evaporator Fan Motor Controllers	74	292	680	1,183	1,807	B	4.7	4.7	4.7
LED High Bay Fixtures	179	685	1,472	2,489	3,686	B	4.8	2.1	N/A
High Performance T8 Fixtures	476	1,947	4,305	7,490	11,449	B	4.8	4.2	N/A
T5HO Fixtures	31	114	247	407	586	B	5.0	4.3	N/A
ENERGY STAR Dishwashers	4	15	37	66	103	B	5.0	5.0	N/A
Ventilation Heat Recovery	41	188	423	753	1,176	B	5.2	4.2	N/A
LED High Bay Fixtures	56	213	455	767	1,132	B	5.3	3.6	N/A
New Construction (40% More Efficient)	37	301	1,291	3,273	6,140	A	5.3	2.6	N/A
Demand Control Ventilation (DCV)	83	331	852	1,485	2,245	B	5.9	4.5	N/A
Radiant Infrared Heaters	25	99	223	449	702	B	5.9	6.1	N/A
LED Tubular Lamps	202	754	1,584	2,615	3,983	B	6.0	3.5	N/A
Ground Source Heat Pumps	75	229	480	829	1,281	B	6.4	N/A	N/A
LED Tubular Lamps	637	1,941	3,896	14,090	17,506	B	7.3	N/A	8.7
LED Street Lighting	598	2,314	5,021	8,574	12,808	B	7.8	N/A	N/A
Advanced Building Automation Systems	573	2,258	4,938	8,421	12,606	B	8.0	4.3	N/A
Refrigeration Heat Recovery	1	5	11	20	31	B	8.2	N/A	N/A
CEE-Rated Refrigerators and Freezers	14	14	14	14	14	B	8.4	N/A	N/A
Ductless Mini-Split Heat Pump	887	3,624	8,099	14,683	23,256	B	8.9	2.3	N/A
High Efficiency Chillers	0	0	0	0	0	B	10.5	N/A	N/A
Refrigerated Cases with Doors	106	424	954	1,696	2,650	B	10.9	N/A	N/A
LED Refrigerated Display Case Lighting	10	10	10	10	10	B	11.5	N/A	N/A
HVAC Impact from Other Savings	(832)	(3,017)	(6,319)	(12,875)	(18,078)	N/A	0.0	0.0	0.0
Grand Total	7,974	32,099	73,399	137,132	209,136				

Note: Curves A, B, and C in this exhibit are as presented in Exhibit 65.

9.6 Electric Peak Load Reductions from Energy Efficiency

Exhibit 76 presents a summary of the peak load reductions that would occur as a result of the electric energy savings contained in the Achievable Potential Forecast. The reductions are shown by milestone year, region and sub sector for both lower and upper achievable potential savings. In each case, the reductions are an average value over the peak period and are defined relative to the Reference Case presented previously in Sections 4 and 6. Exhibit 77 and Exhibit 78 show the lower and upper Achievable Potential savings by region, sub sector and principal end use for each milestone year.

Exhibit 76, Exhibit 77 and Exhibit 78 only approximate the potential demand impacts associated with the energy-efficiency measures because they are based on the assumption that the measures do not change the load shape of the end uses they affect. This is not always correct. For example, most of the heat pump measures will not produce any peak demand savings, because during the winter peak period the heat pumps and mini-splits will revert to back-up electric resistance heating.[32] Therefore, there will be no net reduction in space heating peak demand for these measures. Accordingly, the demand reductions for the heat pump measures have been manually filtered out of the results presented in these exhibits.

Exhibit 79 shows the demand reductions associated with each electric energy savings measure contained in the Achievable Potential Forecast for the milestone year 2029. The heat pump measures are omitted from the exhibit, as with the previous two exhibits. One notable line item in the exhibit is “HVAC Impact from Other Savings” - the impact on peak space heating load resulting from the savings for other end uses within the sub sector. This is to capture the fact that in an electrically-heated building, savings of energy consuming equipment within the building will not reduce the winter peak demand. The impact of demand reductions for other end uses on the space heating demand can be seen graphically in Exhibit 77. As the demand impacts for many of the other end uses rise with time, the demand impacts for space heating actually decreases over time.

Electric peak load reductions related to capacity-only measures are presented separately in Section 9.7.

[32] In fact, this is a conservative assumption for the Island Interconnected region. Although the demand peak occurs on the coldest winter days, in a climate such as that of St. John’s the temperature is typically not very extreme on those peak days. Therefore, many heat pumps will continue to work in heat pump mode and not revert to electric resistance. In this study, we have retained the conservative assumption that they do not provide demand relief.

Exhibit 76 Electric Peak Load Reductions from Lower and Upper Achievable Potential Energy Savings Measures by Milestone Year, Region and Subsector (MW)

Sub Sector	Milestone Year	Island Interconnected		Labrador Interconnected		Isolated		Grand Total	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Large Office	2017	0.1	1.1	0.0	0.0	0.0	0.0	0.1	1.1
	2020	0.6	3.4	0.0	0.0	0.0	0.0	0.6	3.4
	2023	1.3	7.0	0.0	0.0	0.0	0.0	1.3	7.0
	2026	2.6	11.7	0.0	0.0	0.0	0.0	2.6	11.7
	2029	4.1	16.8	0.0	0.0	0.0	0.0	4.1	16.8
Small Office	2017	0.1	0.7	0.0	0.0	0.0	0.0	0.1	0.7
	2020	0.4	2.1	0.0	0.0	0.0	0.0	0.4	2.1
	2023	0.9	4.2	0.0	0.1	0.0	0.0	0.9	4.2
	2026	1.7	6.7	0.0	0.1	0.0	0.0	1.7	6.8
	2029	2.7	9.7	0.0	0.1	0.0	0.0	2.7	9.9
Large Non-food Retail	2017	0.1	0.5	0.0	0.0	0.0	0.0	0.1	0.5
	2020	0.3	1.5	0.0	0.1	0.0	0.0	0.3	1.6
	2023	0.7	2.9	0.0	0.1	0.0	0.0	0.8	3.0
	2026	1.3	4.6	0.1	0.2	0.0	0.0	1.3	4.9
	2029	1.9	6.5	0.1	0.4	0.0	0.0	2.0	6.9
Small Non-food Retail	2017	0.1	0.5	0.0	0.0	0.0	0.0	0.1	0.6
	2020	0.3	1.5	0.0	0.2	0.0	0.0	0.3	1.6
	2023	0.7	2.9	0.1	0.3	0.0	0.0	0.7	3.3
	2026	1.3	5.0	0.1	0.6	0.0	0.0	1.4	5.6
	2029	1.9	6.9	0.2	0.8	0.0	0.0	2.1	7.7
Food Retail	2017	0.1	0.4	0.0	0.0	0.0	0.0	0.1	0.4
	2020	0.3	1.3	0.0	0.1	0.0	0.0	0.3	1.4
	2023	0.7	2.7	0.1	0.2	0.0	0.0	0.8	3.0
	2026	1.2	4.5	0.1	0.4	0.0	0.0	1.3	4.9
	2029	1.9	6.4	0.1	0.6	0.0	0.0	2.0	7.0
Large Accomodation	2017	0.1	0.4	0.0	0.0	0.0	0.0	0.1	0.4
	2020	0.2	1.1	0.0	0.1	0.0	0.0	0.2	1.2
	2023	0.5	2.1	0.0	0.2	0.0	0.0	0.5	2.4
	2026	0.8	3.4	0.1	0.4	0.0	0.0	0.9	3.8
	2029	1.3	4.8	0.1	0.5	0.0	0.0	1.4	5.3
Small Accomodation	2017	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
	2020	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
	2023	0.1	0.3	0.0	0.0	0.0	0.0	0.1	0.3
	2026	0.2	0.5	0.0	0.0	0.0	0.0	0.2	0.5
	2029	0.3	0.7	0.0	0.0	0.0	0.0	0.3	0.7
Healthcare	2017	0.1	0.7	0.0	0.0	0.0	0.0	0.1	0.7
	2020	0.4	2.3	0.0	0.1	0.0	0.0	0.4	2.4
	2023	0.9	4.7	0.0	0.2	0.0	0.0	1.0	4.9
	2026	1.7	7.5	0.1	0.4	0.0	0.0	1.7	7.8
	2029	2.5	10.3	0.1	0.5	0.0	0.0	2.6	10.8
Schools	2017	0.1	0.9	0.0	0.0	0.0	0.0	0.1	0.9
	2020	0.5	2.9	0.0	0.1	0.0	0.0	0.5	3.0
	2023	1.2	5.8	0.1	0.3	0.0	0.0	1.3	6.1
	2026	2.1	9.3	0.1	0.6	0.0	0.0	2.3	9.8
	2029	3.3	12.9	0.2	0.8	0.0	0.0	3.5	13.7
Universities and Colleges	2017	0.1	0.5	0.0	0.0	0.0	0.0	0.1	0.5
	2020	0.3	1.5	0.0	0.0	0.0	0.0	0.3	1.5
	2023	0.7	2.8	0.0	0.1	0.0	0.0	0.7	2.9
	2026	1.2	4.6	0.0	0.1	0.0	0.0	1.2	4.7
	2029	1.8	6.6	0.0	0.2	0.0	0.0	1.8	6.8
Warehouse/Wholesale	2017	0.1	0.4	0.0	0.0	0.0	0.0	0.1	0.4
	2020	0.2	0.9	0.0	0.0	0.0	0.0	0.2	1.0
	2023	0.5	1.6	0.0	0.1	0.0	0.0	0.5	1.7
	2026	0.8	2.4	0.0	0.2	0.0	0.0	0.9	2.6
	2029	1.3	3.2	0.1	0.3	0.0	0.0	1.3	3.5

Exhibit 76 Electric Peak Load Reductions from Lower and Upper Achievable Potential Energy Savings Measures by Milestone Year, Region and Subsector (MW) (cont'd…)

Sub Sector	Milestone Year	Island Interconnected		Labrador Interconnected		Isolated		Grand Total	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Restaurants	2017	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
	2020	0.1	0.6	0.0	0.0	0.0	0.0	0.1	0.7
	2023	0.2	1.3	0.0	0.1	0.0	0.0	0.3	1.4
	2026	0.5	2.2	0.0	0.2	0.0	0.0	0.5	2.4
	2029	0.7	3.2	0.0	0.2	0.0	0.0	0.8	3.4
Labrador Isolated C/I Buildings	2017	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
	2020	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2
	2023	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3
	2026	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.4
	2029	0.0	0.0	0.0	0.0	0.1	0.5	0.1	0.5
Island Isolated C/I Buildings	2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2020	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2023	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2026	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Large Other Buildings	2017	0.1	0.6	0.0	0.1	0.0	0.0	0.1	0.8
	2020	0.3	1.8	0.1	0.5	0.0	0.0	0.4	2.3
	2023	0.8	3.5	0.2	1.1	0.0	0.0	1.0	4.7
	2026	1.5	6.0	0.4	1.8	0.0	0.0	1.8	7.9
	2029	2.3	8.6	0.6	2.9	0.0	0.0	2.8	11.4
Small Other Buildings	2017	0.0	0.4	0.0	0.1	0.0	0.0	0.1	0.5
	2020	0.2	1.2	0.0	0.3	0.0	0.0	0.2	1.4
	2023	0.4	2.2	0.1	0.7	0.0	0.0	0.6	2.9
	2026	0.9	4.0	0.2	1.1	0.0	0.0	1.2	5.0
	2029	1.4	5.5	0.4	1.7	0.0	0.0	1.8	7.2
Other Institutional	2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2020	0.0	0.0	0.1	0.2	0.0	0.0	0.1	0.2
	2023	0.0	0.0	0.1	0.8	0.0	0.0	0.1	0.8
	2026	0.0	0.0	0.5	2.7	0.0	0.0	0.5	2.7
	2029	0.0	0.0	0.8	4.5	0.0	0.0	0.8	4.5
Non-Buildings	2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2020	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2023	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2026	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Street Lighting	2017	0.1	0.9	0.0	0.0	0.0	0.0	0.1	0.9
	2020	0.3	1.5	0.0	0.0	0.0	0.0	0.3	1.5
	2023	0.7	1.9	0.0	0.0	0.0	0.0	0.7	1.9
	2026	1.2	2.0	0.0	0.0	0.0	0.0	1.2	2.0
	2029	1.8	2.0	0.0	0.0	0.0	0.0	1.8	2.0
Grand Total	2017	1.1	8.3	0.1	0.5	0.0	0.1	1.2	8.8
	2020	4.5	23.7	0.3	1.8	0.0	0.2	4.8	25.7
	2023	10.3	46.1	0.8	4.3	0.0	0.3	11.1	50.7
	2026	19.0	74.4	1.7	8.8	0.0	0.4	20.7	83.6
	2029	29.1	104.2	2.7	13.4	0.1	0.6	31.8	118.2

Exhibit 77 Electric Peak Load Reductions from Upper Achievable Potential Energy Savings Measures, by Milestone Year End Use and Sub sector, Winter Peak Period (MW)

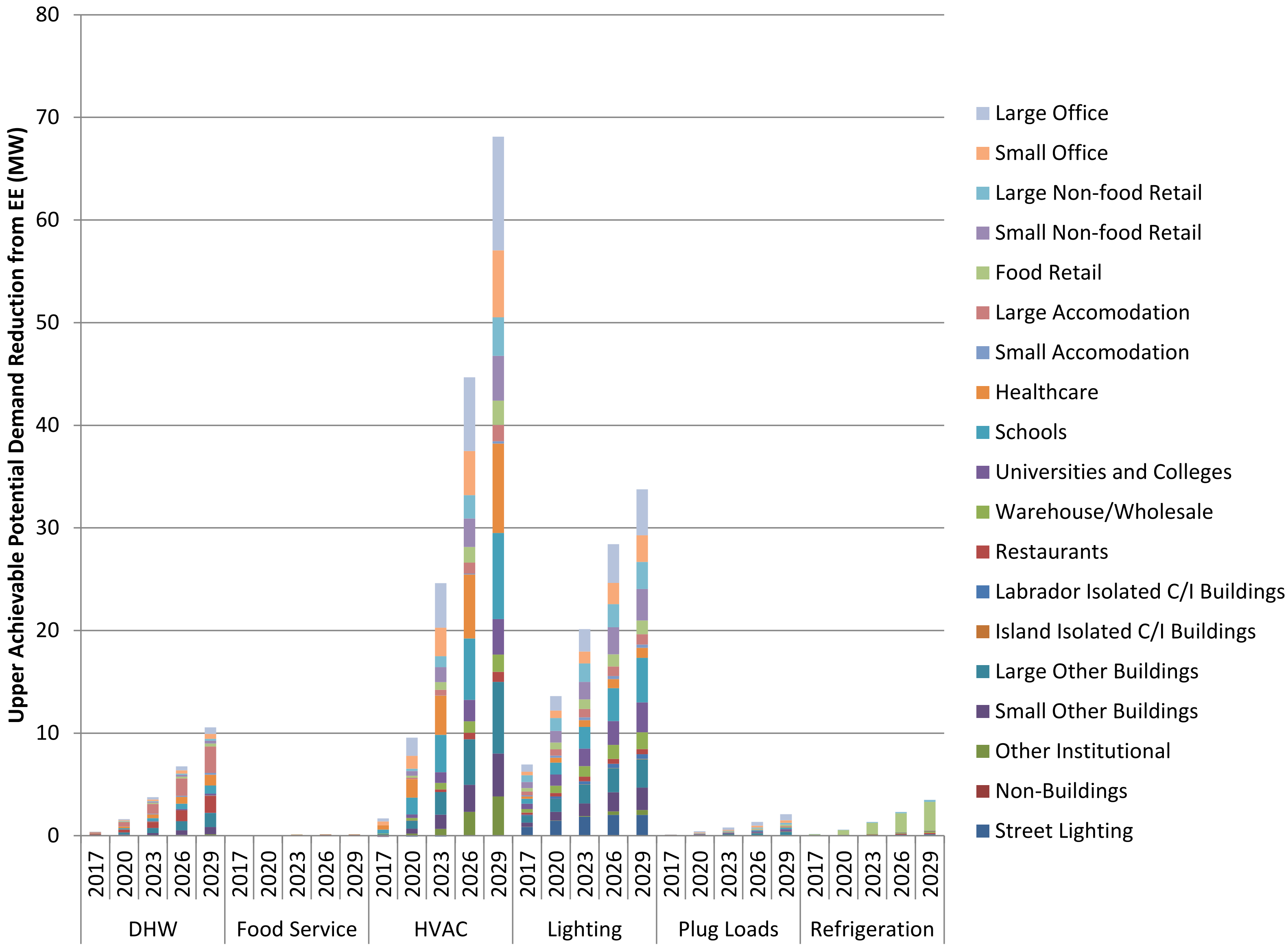


Exhibit 78 Electric Peak Load Reductions from Lower Achievable Potential Energy Savings Measures, by Milestone Year End Use and Sub sector, Winter Peak Period (MW)

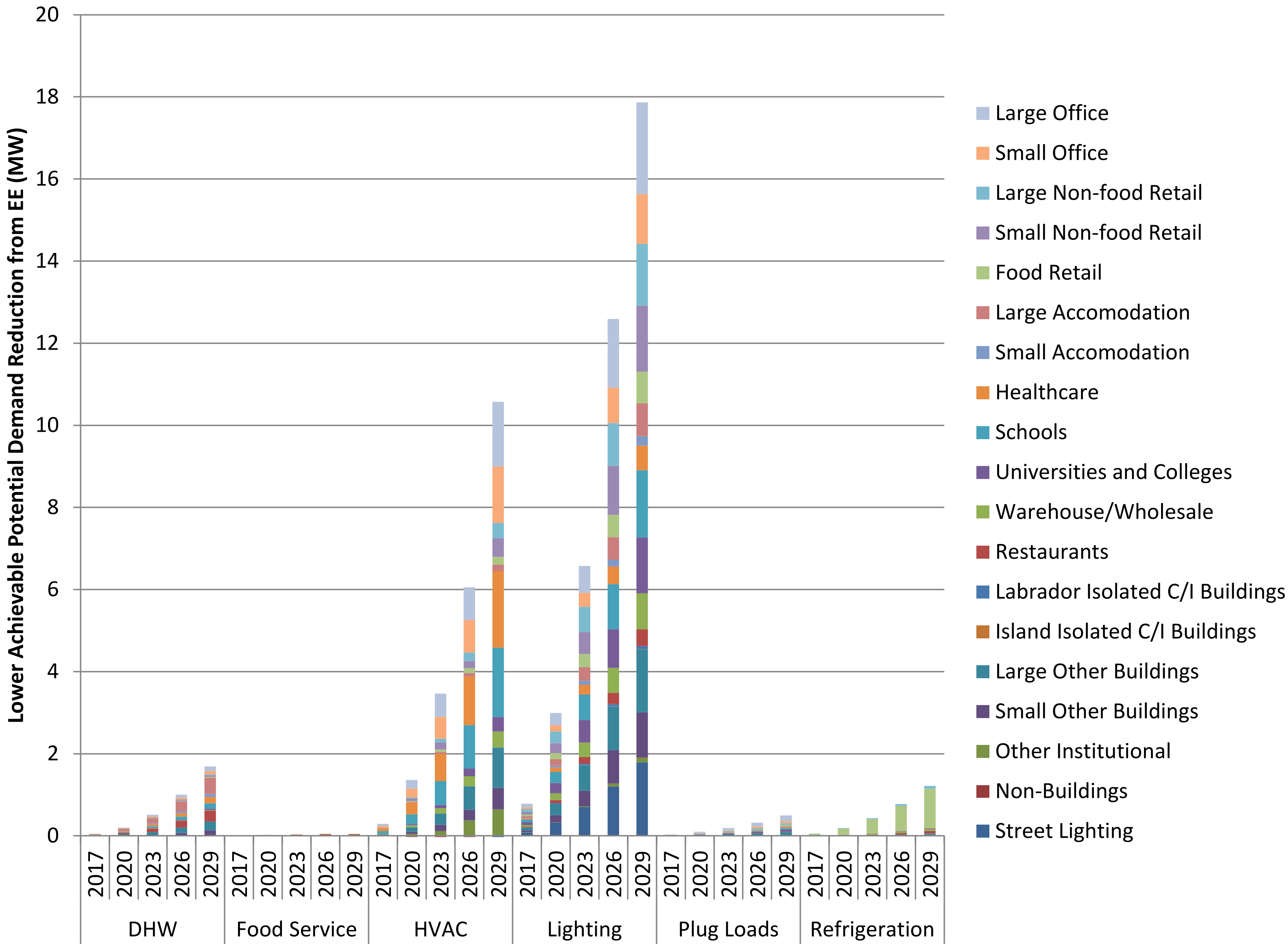


Exhibit 79 Electric Peak Load Reductions from Achievable Potential Energy Savings Measures, 2029 (MW)

Measure	Island		Labrador		Isolated		Grand Total	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Building Recommissioning	4.0	24.9	0.8	5.1	0.0	0.2	4.8	30.1
New Construction (25% More Efficient)	3.7	6.9	0.1	0.3	0.0	0.1	3.9	7.2
Programmable Thermostats	3.1	8.8	0.6	1.9	0.0	0.0	3.7	10.7
Advanced Building Automation Systems	3.0	8.6	0.0	0.1	0.0	0.0	3.1	8.7
LED Tubular Lamps	2.9	4.3	0.0	0.0	0.1	0.1	2.9	4.3
High Performance T8 Fixtures	1.9	2.1	0.1	0.1	0.0	0.0	2.0	2.3
LED Screw-In Lamps	1.8	2.0	0.2	0.2	0.0	0.0	2.0	2.2
LED Street Lighting	1.8	2.0	0.0	0.0	0.0	0.0	1.8	2.0
Occupancy Sensors (Lighting)	1.6	5.3	0.1	0.5	0.0	0.0	1.7	5.8
LED Screw-In Lamps	1.5	1.7	0.2	0.2	0.0	0.0	1.7	1.9
New Construction (40% More Efficient)	1.4	2.6	0.0	0.0	0.0	0.0	1.4	2.7
LED Outdoor Fixtures	0.8	2.1	0.1	0.2	0.0	0.0	0.9	2.4
LED High Bay Fixtures	0.6	0.7	0.0	0.0	0.0	0.0	0.7	0.7
Demand Control Ventilation (DCV)	0.6	7.3	0.1	1.3	0.0	0.0	0.7	8.6
LED Tubular Lamps	0.6	0.7	0.0	0.0	0.0	0.0	0.6	0.7
High Performance Glazing Systems	0.5	5.6	0.2	1.3	0.0	0.0	0.6	6.9
Heat Pump Water Heaters	0.4	1.0	0.1	0.2	0.0	0.0	0.5	1.1
Ground Source Heat Pumps	0.4	0.9	0.0	0.0	0.0	0.0	0.4	0.9
Low-Flow Faucet Aerators	0.3	4.7	0.1	0.8	0.0	0.0	0.4	5.5
Ventilation Heat Recovery	0.3	4.5	0.0	0.6	0.0	0.0	0.4	5.1
Refrigerated Cases with Doors	0.3	1.0	0.0	0.0	0.0	0.0	0.3	1.0
T5HO Fixtures	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.4
High Efficiency Compressors (Refrigeration)	0.3	0.9	0.0	0.0	0.0	0.0	0.3	0.9
Lighting Controls (Outdoor)	0.3	0.7	0.0	0.1	0.0	0.0	0.3	0.8
High Performance T8 Fixtures	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.3
Refrigerated Vending Machine Controllers	0.2	0.8	0.0	0.1	0.0	0.0	0.3	1.0
Radiant Infrared Heaters	0.2	0.6	0.0	0.1	0.0	0.0	0.2	0.7
ECM Motors and Evaporator Fan Motor Controllers	0.2	0.6	0.0	0.0	0.0	0.0	0.2	0.6
VFDs on HVAC Motors	0.2	2.7	0.0	0.2	0.0	0.0	0.2	2.8
LED High Bay Fixtures	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.2
Activate PC Power Management	0.2	0.8	0.0	0.0	0.0	0.0	0.2	0.9
Cooler Night Covers	0.1	0.3	0.0	0.0	0.0	0.0	0.1	0.3
Low-Flow Showerheads	0.1	1.4	0.0	0.2	0.0	0.0	0.1	1.5
Hotel Occupancy Sensors	0.1	0.3	0.0	0.0	0.0	0.0	0.1	0.3
Refrigeration Controls	0.1	0.3	0.0	0.0	0.0	0.0	0.1	0.3
T5HO Fixtures	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1
Wall Insulation	0.1	1.1	0.0	0.0	0.0	0.0	0.1	1.1
High-Efficiency Cooking Equipment	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
ENERGY STAR Computers	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
ENERGY STAR Dishwashers	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5
Roof Insulation	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.6
Demand Control Kitchen Ventilation (DCKV)	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3
Make Use of Daylighting	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1

Exhibit 79 Electric Peak Load Reductions from Achievable Potential Energy Savings Measures, 2029 (MW) (cont'd…)

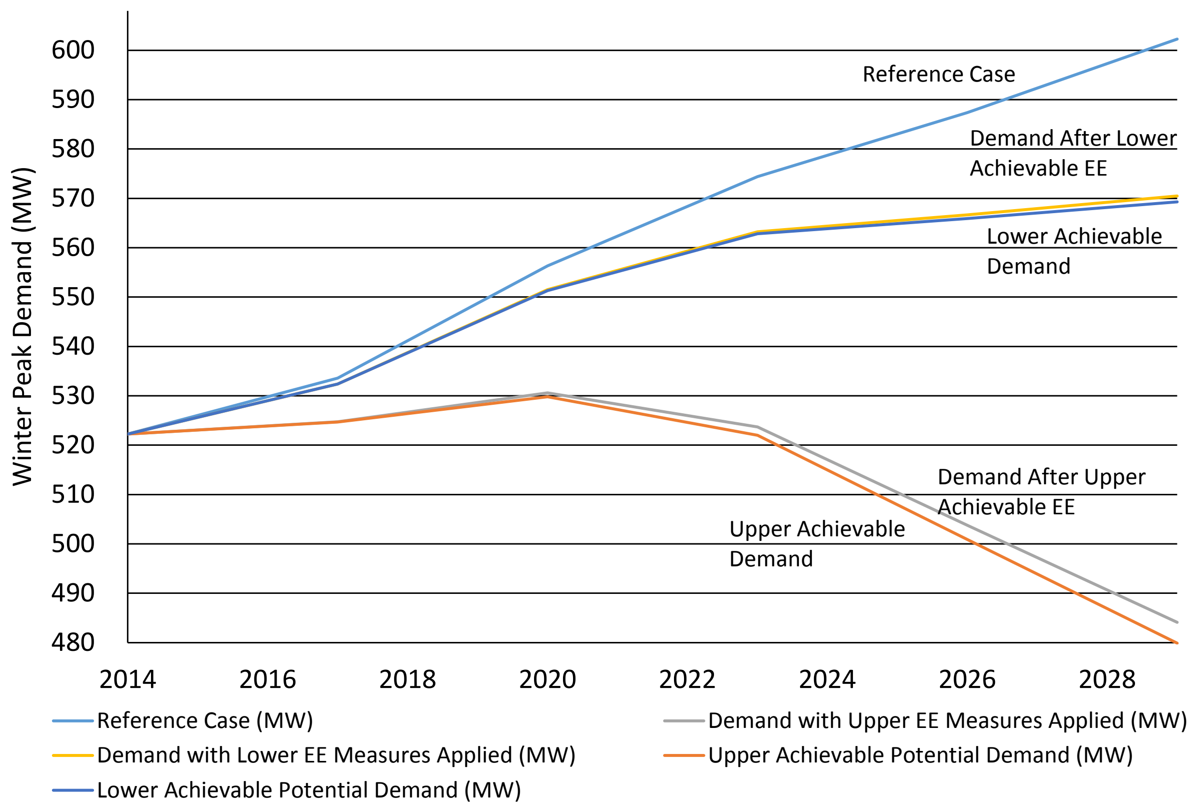
Measure	Island		Labrador		Isolated		Grand Total	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Low-Flow Pre-Rinse Spray Valves	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3
Drainwater Heat Recovery	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3
LED Exit Signs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Premium Efficiency Motors	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
Automatic Door Closers (Walk-In Coolers & Freezers)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Use Shades/Blinds (Winter)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Refrigeration Heat Recovery	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
Use Task Light Instead of Ambient	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Keep Doors Closed (Winter)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduce Number of Fridges	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Energy-Efficient Server Technologies	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENERGY STAR Office Equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Use Shades/Blinds (Summer)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CEE-Rated Refrigerators and Freezers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LED Refrigerated Display Case Lighting	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Use Natural Ventilation (Summer)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Keep Doors Closed (Summer)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
High Efficiency Chillers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Freezer Defrost Controllers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LED Troffers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dimming Control (Daylighting)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HVAC Impact from Other Savings	-5.8	-7.5	-0.3	-0.3	0.0	-0.1	-6.0	-8.0
Grand Total	**29.1**	**104.2**	**2.7**	**13.4**	**0.1**	**0.6**	**31.8**	**118.2**

9.7 Summary of Peak Load Reductions

This section presents a summary of the electric peak load reductions that would result from the application of peak demand measures. Exhibit 80 compares the Reference Case, Lower Achievable Potential and Upper Achievable Potential Peak Demand Forecast levels of winter peak demand.[33]

As illustrated, under the Reference Case commercial peak demand would grow from the Base Year level of 520 MW to approximately 600 MW by 2029. This contrasts with the Lower Achievable Potential Forecast in which peak demand would decrease to approximately 570 MW for the same period, a difference of approximately 35 MW or about 6%. The Upper Achievable Potential forecasts peak demand at 480 MW, a difference of approximately 120 MW or 20%. The other two lines on the chart show the peak demand that would result if all the energy efficiency measures were applied but none of the demand reduction measures in each of the Lower and Upper Achievable Potential scenarios. As illustrated in the exhibit, approximately 97% of the reduction comes from the impact of energy efficiency measures in both the Upper Achievable Potential scenario and the Lower Achievable Potential scenario.

Exhibit 80 Peak Demand of Reference Case, Lower Achievable Potential and Upper Achievable Potential in Commercial Sector (MW)[34]



[33] All results are reported at the customer's point-of-use and do not include line losses.
[34] Please note that all demand curtailment is accounted for in the Industrial sector analysis and reporting

9.7.1 Peak Demand Reduction

Further detail on the total potential peak demand reduction provided by the Upper and Lower Achievable Potential Forecast is provided in the following exhibits:[35]

- Exhibit 81 presents the results by end use, sub sector and milestone year
- Exhibit 82 provides a further disaggregation of the peak demand reduction by technology and milestone year
- Exhibits 83 and 84 present peak demand reduction by major end use, milestone year and region
- Exhibits 85 and 86 present peak demand reduction by major end use, milestone year and sub sector
- Exhibit 87 and Exhibit 88 present 2029 peak demand reduction by major end use and vintage.

[35] MW reductions shown in the following exhibits are not incremental. For example, the space heating reductions in 2029 are not in addition to the space heating reductions from the previous milestone years. Rather, they are the difference between the Reference Case space heating peak demand in 2029 and the space heating peak demand if all the measures included in the Lower or Upper Achievable Potential scenario are implemented.

Exhibit 81 Total Lower and Upper Achievable Potential Peak Demand Reduction by End Use, Sub sector and Milestone Year (MW)

Sub sector	Milestone Year	Domestic Hot Water		HVAC Fans & Pumps		Refrigeration		Secondary Lighting		Space Heating		Grand Total	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Large Office	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
	2020	0.00	0.00	0.03	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.12
	2023	0.00	0.00	0.07	0.27	0.00	0.00	0.00	0.00	0.00	0.01	0.07	0.28
	2026	0.00	0.00	0.13	0.46	0.00	0.00	0.00	0.01	0.00	0.01	0.14	0.48
	2029	0.00	0.00	0.21	0.69	0.00	0.00	0.00	0.01	0.00	0.02	0.22	0.72
Small Office	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
	2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.01	0.04
	2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06	0.02	0.06
	2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.08	0.03	0.08
Large Non-food Retail	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06
	2023	0.00	0.00	0.03	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.13
	2026	0.00	0.00	0.06	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.23
	2029	0.00	0.00	0.10	0.32	0.00	0.00	0.00	0.00	0.00	0.01	0.10	0.34
Small Non-food Retail	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02
Food Retail	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.01	0.02	0.01	0.03	0.00	0.00	0.00	0.01	0.02	0.07
	2023	0.00	0.00	0.01	0.05	0.02	0.07	0.00	0.01	0.00	0.01	0.04	0.15
	2026	0.00	0.00	0.03	0.09	0.03	0.12	0.00	0.02	0.01	0.02	0.07	0.25
	2029	0.00	0.00	0.04	0.13	0.05	0.18	0.01	0.03	0.01	0.03	0.11	0.36
Large Accomodation	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.01	0.10	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.11
	2023	0.03	0.21	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.25
	2026	0.06	0.34	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.01	0.08	0.40
	2029	0.09	0.46	0.03	0.08	0.00	0.00	0.00	0.00	0.00	0.01	0.12	0.57
Small Accomodation	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04
	2023	0.01	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.10
	2026	0.03	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.19
	2029	0.04	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.30

Exhibit 81 Total Lower and Upper Achievable Potential Peak Demand Reduction by End Use, Sub sector and Milestone Year (MW) (cont'd…)

Sub sector	Milestone Year	Domestic Hot Water		HVAC Fans & Pumps		Refrigeration		Secondary Lighting		Space Heating		Grand Total	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Healthcare	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.08
	2023	0.00	0.01	0.04	0.13	0.00	0.00	0.00	0.00	0.01	0.02	0.05	0.17
	2026	0.00	0.02	0.07	0.20	0.00	0.00	0.00	0.00	0.01	0.04	0.08	0.27
	2029	0.01	0.05	0.10	0.26	0.00	0.00	0.00	0.01	0.02	0.05	0.13	0.36
Schools	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.03
	2023	0.00	0.00	0.01	0.04	0.00	0.00	0.01	0.03	0.00	0.01	0.02	0.07
	2026	0.00	0.00	0.02	0.07	0.00	0.00	0.01	0.05	0.00	0.01	0.03	0.12
	2029	0.00	0.00	0.03	0.10	0.00	0.00	0.02	0.07	0.00	0.02	0.05	0.19
Universities and Colleges	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.09
	2023	0.00	0.00	0.05	0.17	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.18
	2026	0.00	0.00	0.09	0.27	0.00	0.00	0.00	0.00	0.00	0.01	0.09	0.29
	2029	0.00	0.00	0.13	0.35	0.00	0.01	0.00	0.00	0.00	0.02	0.14	0.38
Warehouse/ Wholesale	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.03
	2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.01	0.04
Restaurants	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	2023	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.04
	2026	0.01	0.04	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.01	0.07
	2029	0.01	0.08	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.01	0.02	0.12
Labrador Isolated C/I Buildings	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
	2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02
Island Isolated C/I Buildings	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2029	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Exhibit 81 Total Lower and Upper Achievable Potential Peak Demand Reduction by End Use, Sub sector and Milestone Year (MW) (cont'd…)

Sub sector	Milestone Year	Domestic Hot Water		HVAC Fans & Pumps		Refrigeration		Secondary Lighting		Space Heating		Grand Total	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Large Other Buildings	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.02	0.06	0.00	0.00	0.01	0.02	0.00	0.00	0.02	0.09
	2023	0.00	0.01	0.04	0.14	0.00	0.00	0.01	0.04	0.00	0.00	0.05	0.19
	2026	0.00	0.03	0.07	0.23	0.00	0.00	0.02	0.07	0.00	0.01	0.09	0.33
	2029	0.01	0.05	0.11	0.34	0.00	0.00	0.03	0.10	0.00	0.01	0.14	0.50
Small Other Buildings	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
	2023	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.01	0.04
	2026	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.05	0.00	0.00	0.02	0.07
	2029	0.01	0.04	0.00	0.00	0.00	0.00	0.02	0.08	0.00	0.01	0.03	0.12
Other Institutional	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2020	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
	2023	0.00	0.00	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04
	2026	0.00	0.00	0.02	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.07
	2029	0.00	0.00	0.03	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.09
Grand Total	2017	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.01	0.03
	2020	0.02	0.15	0.12	0.46	0.01	0.04	0.01	0.05	0.01	0.06	0.18	0.76
	2023	0.05	0.36	0.28	1.00	0.02	0.09	0.03	0.12	0.03	0.13	0.41	1.69
	2026	0.10	0.63	0.50	1.66	0.04	0.15	0.06	0.21	0.05	0.22	0.75	2.87
	2029	0.16	0.97	0.78	2.36	0.07	0.23	0.09	0.33	0.09	0.32	1.18	4.21

Notes:
1) Results are measured at the customer's point-of-use and do not include line losses.
2) Any differences in totals are due to rounding.
3) In the above exhibit a value displays as 0 if it is between 0 and 0.5. Totals are calculated using the actual numerical value. 4) MW reductions are not incremental. The space heating reductions in 2029 are not in addition to the reductions from the previous milestone years. Rather, they are the difference between the Reference Case space heating peak demand in 2029 and the space heating peak demand if all the measures included in the Economic Potential scenario are implemented.
5) The values in this exhibit do not include peak demand reductions from energy efficiency measures.
6) Demand-specific measure savings will fluctuate based on the demand savings from conservation measures. The demand reference case to which demand-specific measures are applied already factors in the corresponding Upper or Lower Achievable demand savings from conservation measures. So the more peak demand reductions are generated through conservation measures, the less peak demand remains for demand-specific measures to reduce.

Exhibit 82 Lower and Upper Achievable Potential Peak Demand Reduction by Measure and Milestone Year (MW)

Measure	Lower Achievable Potential Peak Demand Reduction (MW)					Upper Achievable Potential Peak Demand Reduction (MW)				
	2017	2020	2023	2026	2029	2017	2020	2023	2026	2029
DHW Controls	0.00	0.02	0.05	0.10	0.16	0.00	0.15	0.36	0.63	0.97
Heating Controls	0.00	0.01	0.03	0.05	0.09	0.00	0.06	0.13	0.22	0.32
Lighting Demand Controls	0.01	0.01	0.03	0.06	0.09	0.03	0.05	0.12	0.21	0.33
Refrigeration Demand Controls	0.00	0.01	0.02	0.04	0.07	0.00	0.04	0.09	0.15	0.23
HVAC Demand Controls	0.00	0.12	0.28	0.50	0.78	0.00	0.46	1.00	1.66	2.36
Grand Total	0.01	0.18	0.41	0.75	1.18	0.03	0.76	1.69	2.87	4.21

Exhibit 83 Lower Achievable Potential Peak Load Reduction by Major End Use, Year and Region (MW)

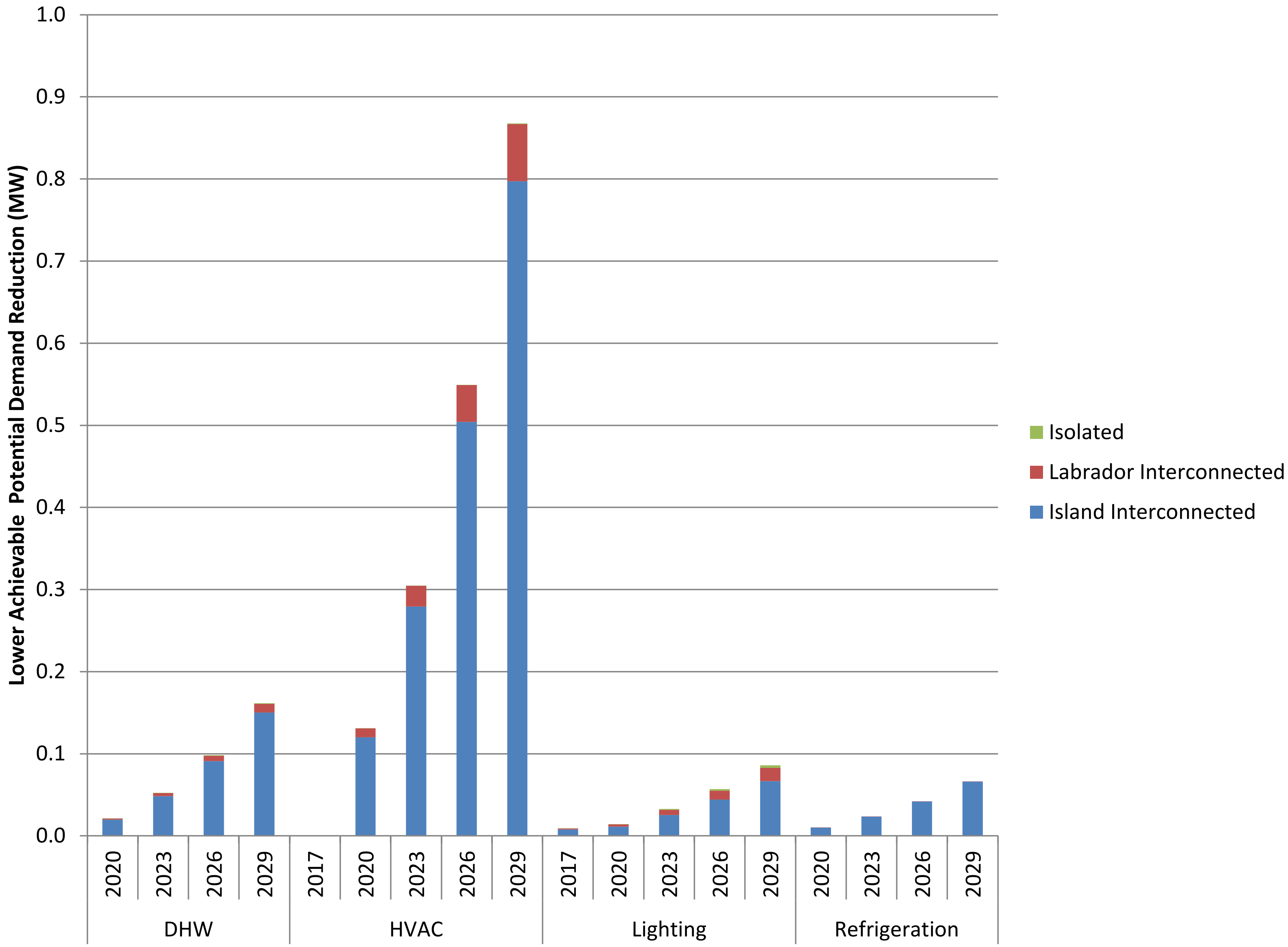


Exhibit 84 Upper Achievable Potential Peak Load Reduction by Major End Use, Year and Region (MW)

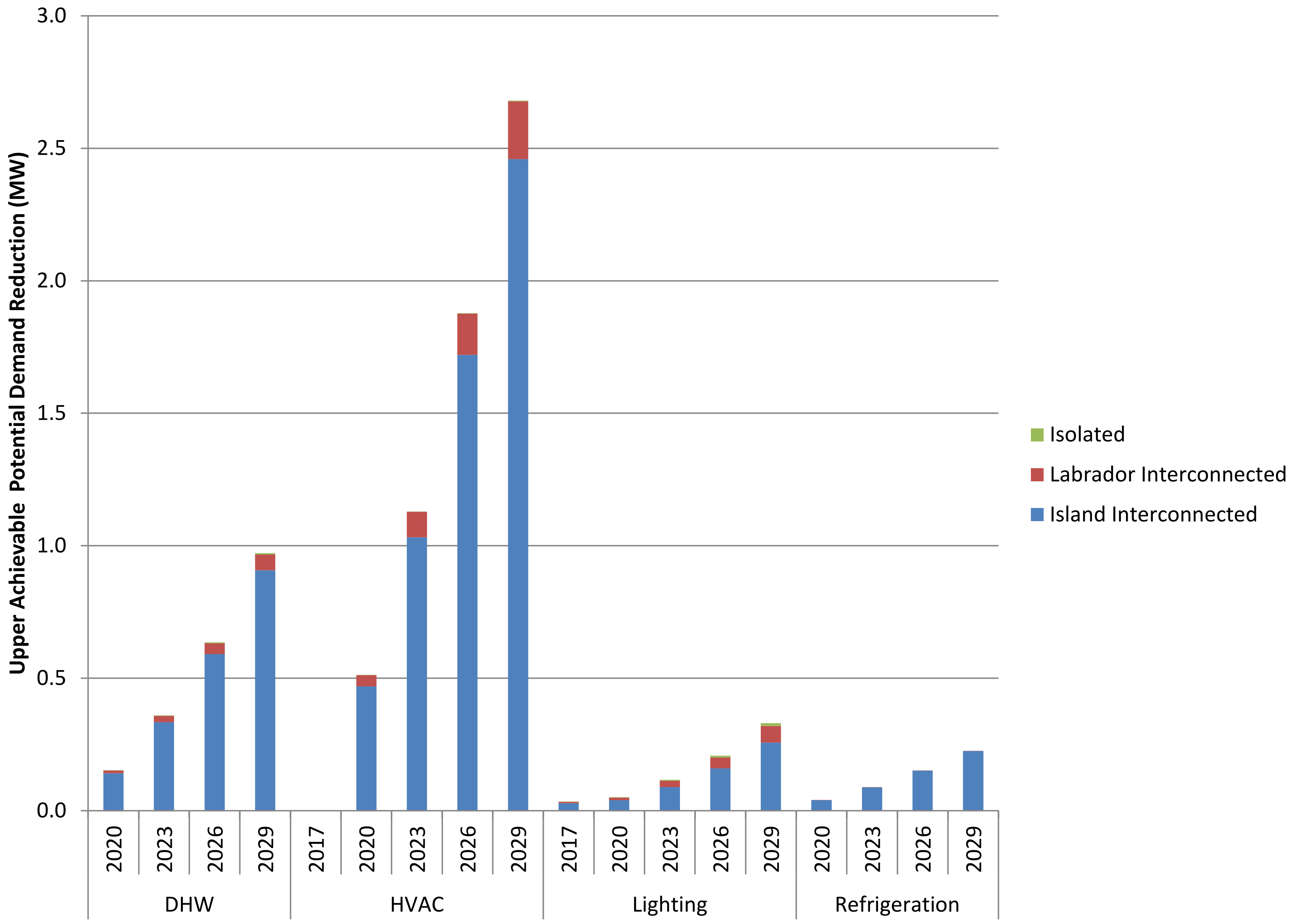


Exhibit 85 Lower Achievable Potential Peak Demand Reduction by Major End Use, Year and Sub sector (MW)

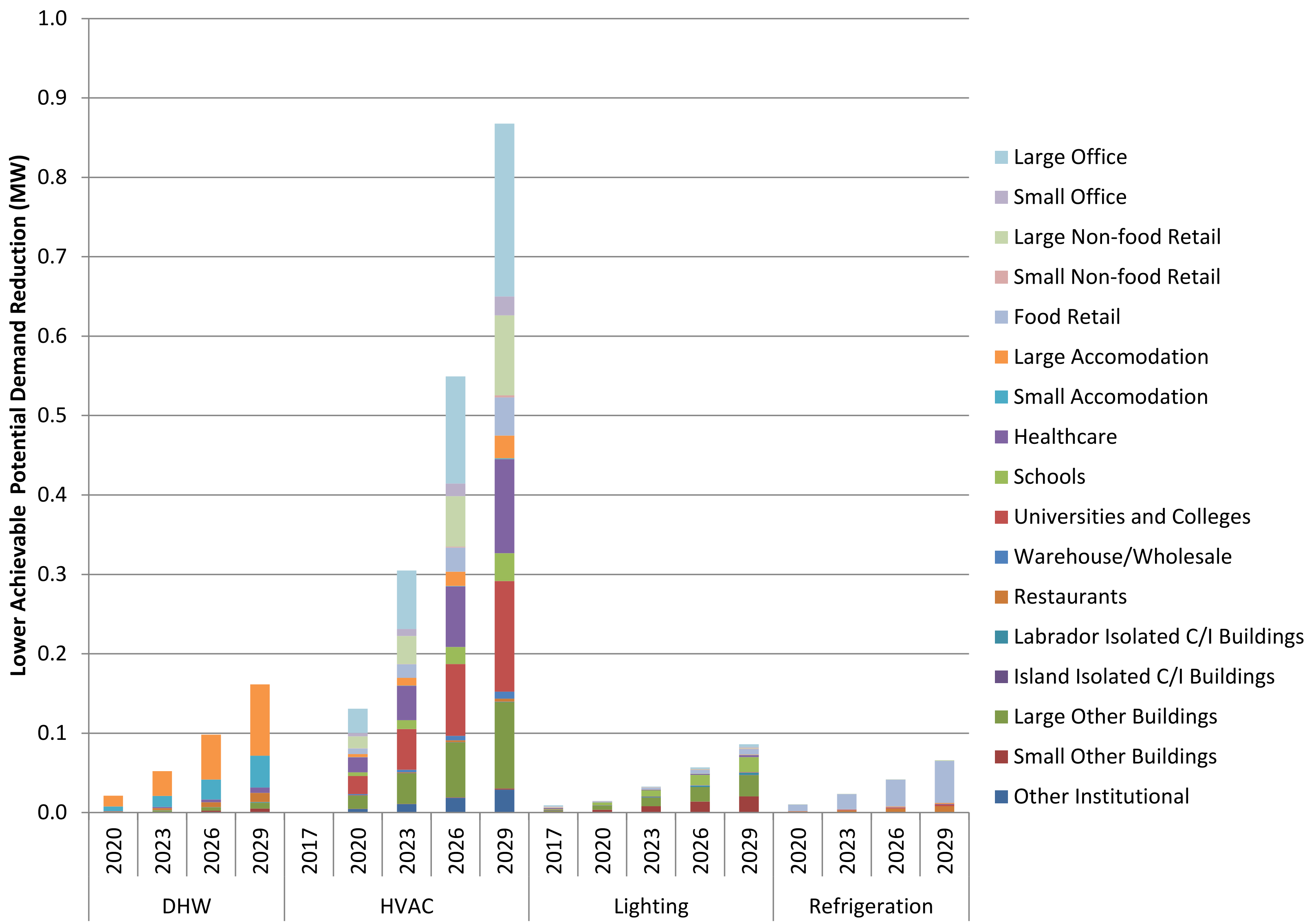


Exhibit 86 Upper Achievable Potential Peak Demand Reduction by Major End Use, Year and Sub sector (MW)

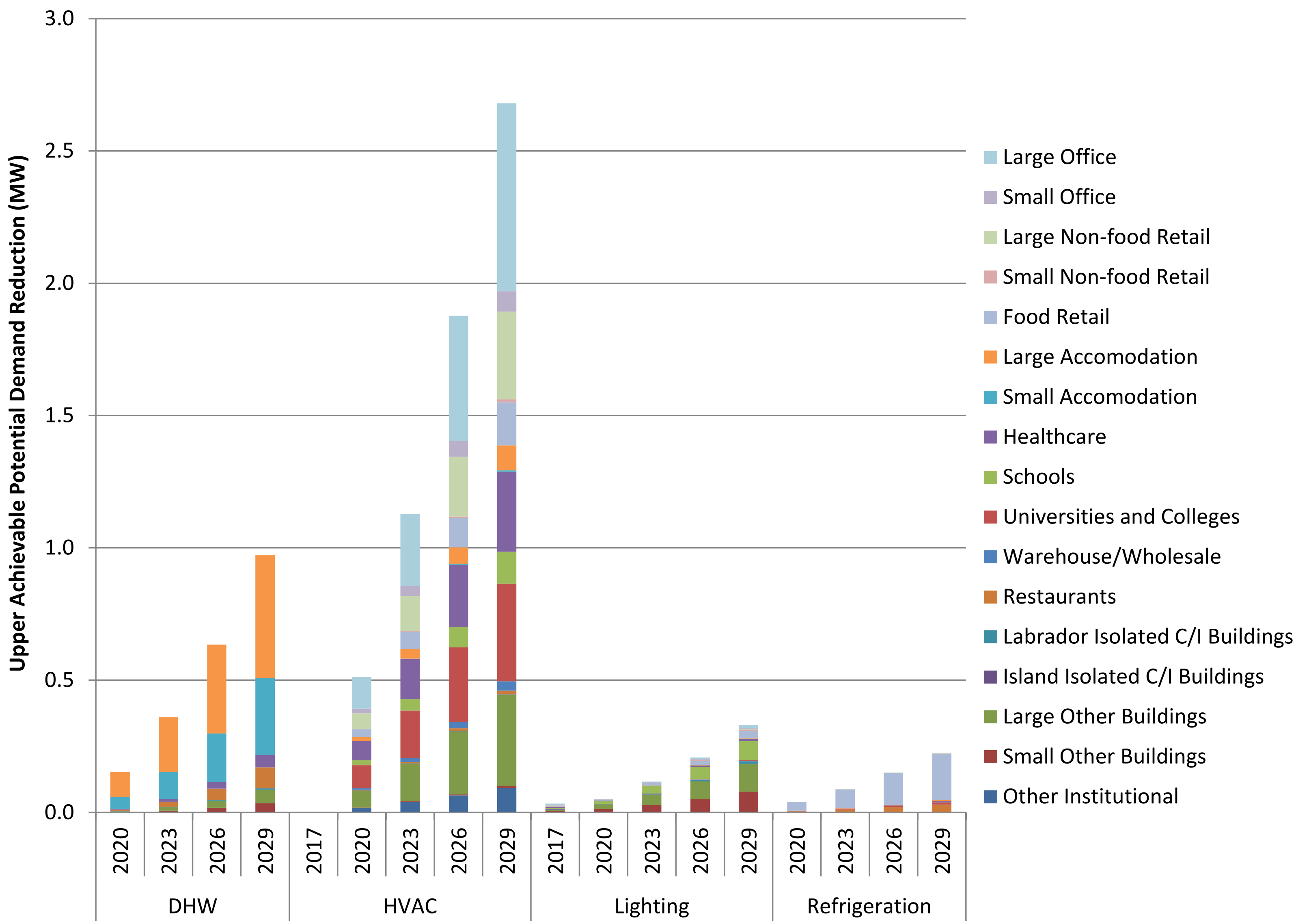


Exhibit 87 Lower Achievable Potential Peak Load Reduction by Major End Use, Year and Vintage (MW)

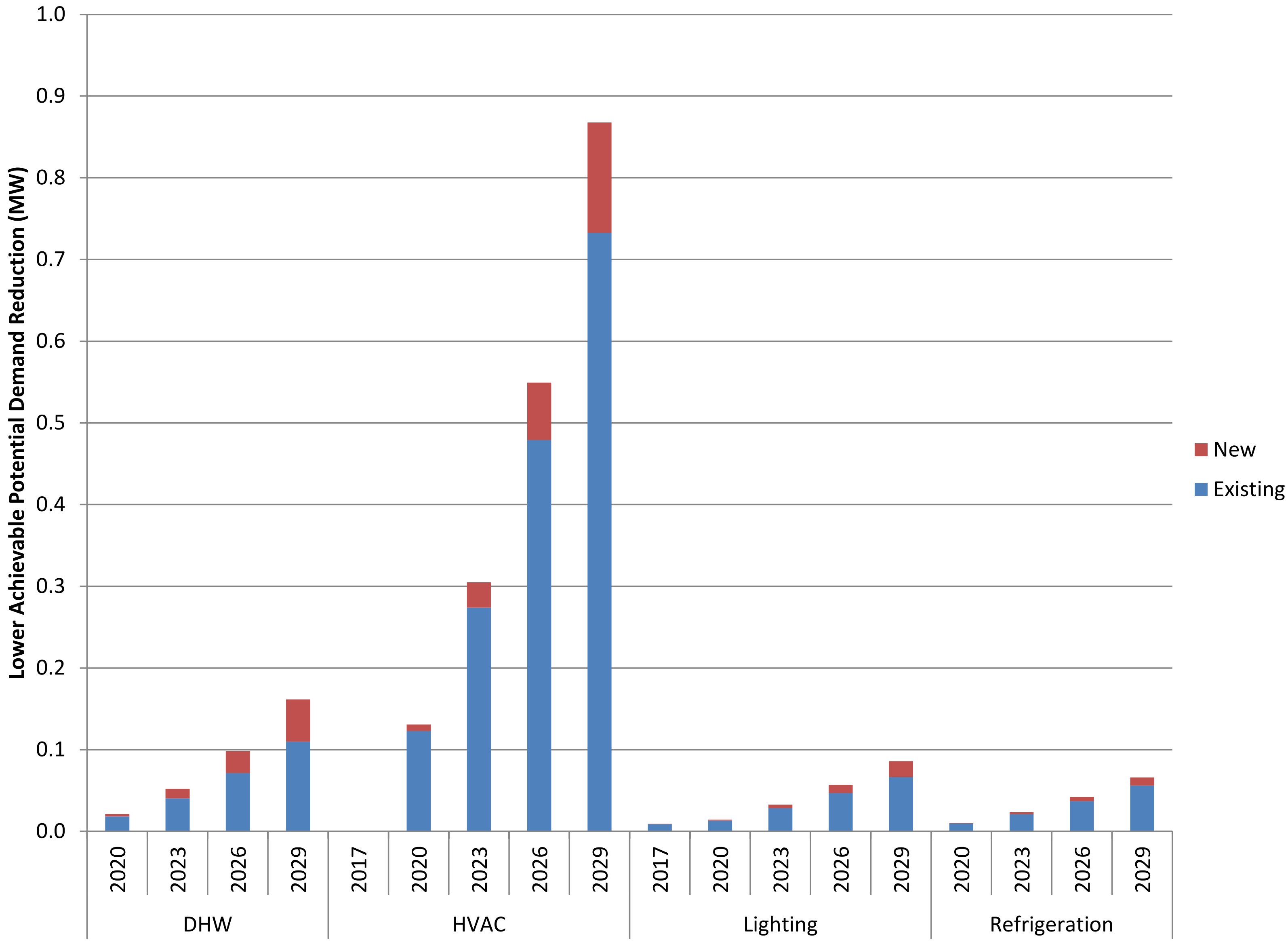
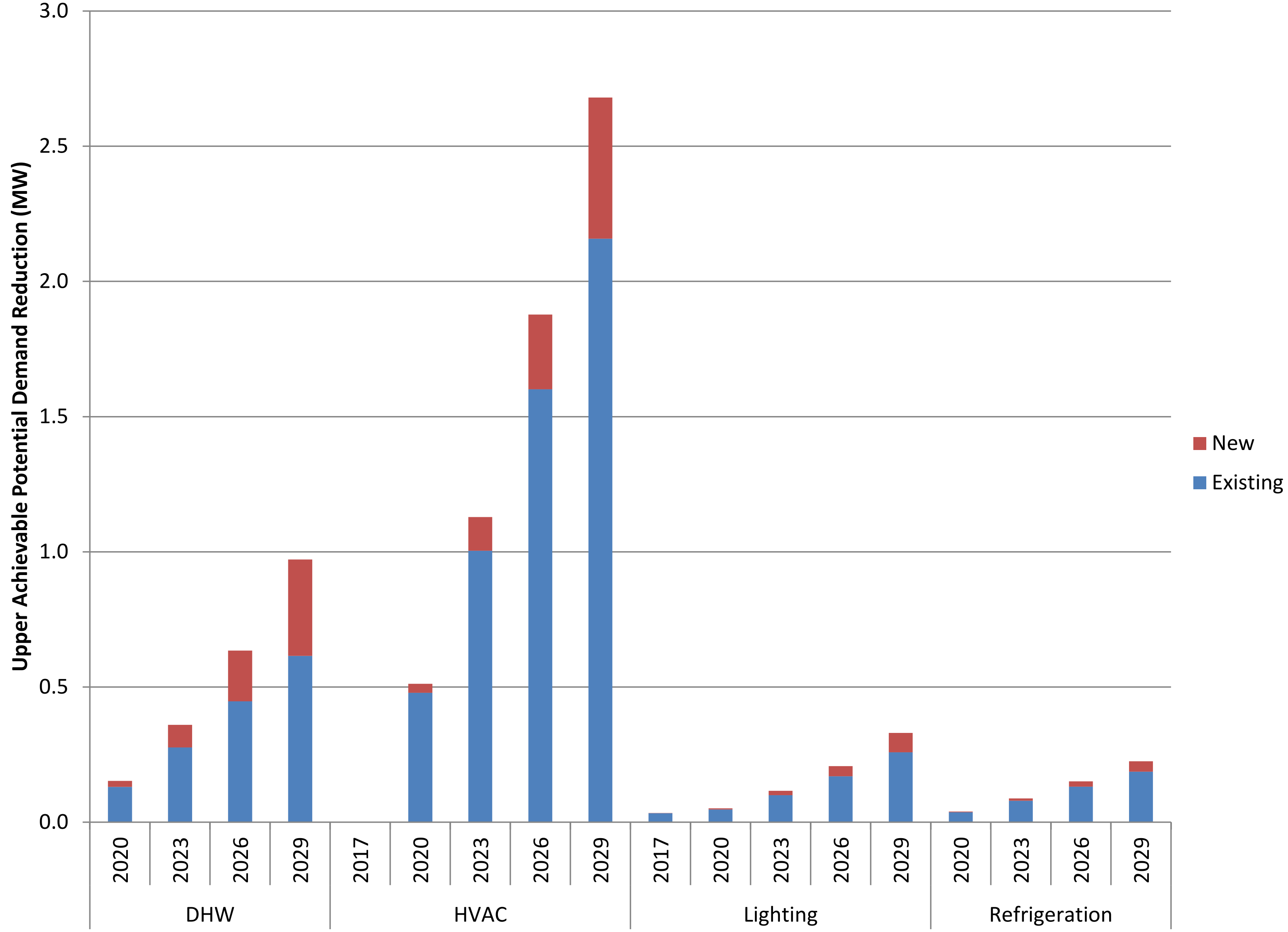


Exhibit 88 Upper Achievable Potential Peak Load Reduction by Major End Use, Year and Vintage (MW)



9.7.2 Interpretation of Results

Highlights of the results presented in the preceding exhibits are summarized below:

Peak Demand Reduction by Milestone Year
The Lower Achievable Potential peak load reductions increase from 0.01 MW in 2017 to 1.18 MW in 2029. The Upper Achievable Potential peak load reductions increase from 0.03 MW in 2017 to 4.21 MW in 2029.

Peak Demand Reduction by Sub sector
The hospitality sector accounts for the largest peak load reduction potential with 23% of the peak load reduction from this sector. Of this, 13% of the achievable peak load reduction savings are from the large accommodations sub sector as a result of the higher achievable savings for DHW and HVAC in these facilities. Office buildings account for 19% of the potential peak load reductions; this reflects their large market share and their generally high level of electrical intensity. Peak load reductions in the retail facilities and other buildings each account for 17% of the potential savings; and educational facilities account for 14% of the potential savings. Healthcare facilities account for 9% of the peak load reductions. The other sub sectors each account for less than 1% of the potential peak load reductions.

Peak Demand Reduction by Region
The Island Interconnected region accounts for 91% of the potential peak load reductions. The Labrador Interconnected region accounts for 8% of the potential peak load reductions, and the Isolated region accounts for less than 1% of the potential peak load reductions.

Peak Demand Reduction by Existing Buildings versus New Construction
Peak load reductions in existing buildings account for almost all of the reduction potential at the beginning of the study period; as new homes are constructed, the load reduction potential associated with them occupies a progressively larger portion of the total. By 2029, peak load reductions from new construction accounts for 24% of the total potential.

Peak Demand Reduction by End Use
HVAC measures account for 68% of the total load reductions in the Upper Achievable Potential Forecast in 2020, not including load reductions from energy efficiency measures; this decreases by to 64% by 2029. HVAC measures account for just over 74% of the total load reductions in the Lower Achievable Potential Forecast in 2020, not including load reductions from energy efficiency measures. With less than 1% of a decrease, the load reduction from HVAC remains at almost 74% by 2029. Of the 64% of 2029 reductions that come from HVAC in the Upper Achievable Potential scenario, approximately 56% of it is from the HVAC Demand Controls measure and almost 8% is from the Heating Controls measure.

DHW measures account for approximately 20% of the total load reductions in the Upper Achievable Potential Forecast in 2020, not including load reductions from energy efficiency measures; this rises to 23% of the total by 2029. DHW measures account for approximately 12% of the total load reductions in the Lower Achievable Potential Forecast in 2020, not including load reductions from energy efficiency measures; this rises to 14% of the total by 2029. All of the potential savings come from the DHW controls measure.

Lighting and Refrigeration makes up a smaller portion of the total load reduction opportunity with Lighting demand controls accounting for 8% of the total 2029 upper achievable potential savings and refrigeration demand controls accounting for 5% of the 2029 upper achievable potential savings.

9.8 Sensitivity of the Results to Changes in Avoided Cost

The avoided costs used in the Achievable Potential model are varied by region and by milestone year. As with any forecast, the projected avoided costs are subject to uncertainty. Accordingly, the model has been re-run with avoided costs varied within a reasonable range. The lower end of this range is considered to be 10% below the current projection, for both energy cost and demand cost. The upper end of the range is considered to be 30% above the current projections for energy cost and 20% above the current projections for demand cost.

Exhibit 89 shows that the lower Achievable Potential results are sensitive to this range of avoided costs. By 2029, the exhibits show the following changes in achievable potential:

- The lower range of reasonableness produces lower Achievable Potential energy savings that are 1% higher in the Island Interconnected region, 5% lower in the Labrador region, and almost unchanged in the Isolated region.
- The lower range of reasonableness produces lower Achievable Potential peak demand reductions that are almost unchanged in the Island Interconnected and Isolated regions and 4% lower in the Labrador region.
- The upper range of reasonableness produces lower Achievable Potential energy savings that are 2% higher in both the Island Interconnected region and Labrador region and almost unchanged in the Isolated region.
- The upper range of reasonableness produces lower Achievable Potential peak demand reductions that are 4% higher in the Island Interconnected region, 2% higher in the Labrador region and almost unchanged in the Isolated region.

Exhibit 89 Sensitivity of the Lower Achievable Potential Energy Savings and Peak Demand Reduction to Avoided Cost

Region	Year	Lower Range of Reasonableness		Base Scenario		Upper Range of Reasonableness	
		Energy Savings (MWh/yr.)	Peak Demand Reduction (MW)	Energy Savings (MWh/yr.)	Peak Demand Reduction (MW)	Energy Savings (MWh/yr.)	Peak Demand Reduction (MW)
Island Interconnected	2017	7,466	1	7,528	1	7,665	1
	2020	29,627	5	29,913	5	30,932	5
	2023	67,673	11	68,110	11	71,079	11
	2026	120,163	19	126,145	20	127,373	20
	2029	193,198	30	191,279	30	194,392	31
Labrador Interconnected	2017	416	0	433	0	507	0
	2020	1,979	0	2,109	0	2,580	0
	2023	4,967	1	5,117	1	6,418	1
	2026	9,969	2	10,676	2	11,532	2
	2029	16,462	3	17,359	3	17,740	3
Isolated	2017	14	0	14	0	14	0
	2020	77	0	77	0	77	0
	2023	172	0	172	0	172	0
	2026	311	0	311	0	311	0
	2029	498	0	498	0	498	0

Exhibit 90 shows that the upper Achievable Potential results are sensitive to this range of avoided costs. By 2029, the exhibits show the following changes in achievable potential:

- The lower range of reasonableness produces lower Achievable Potential energy savings that are almost unchanged in the Island Interconnected region, 4% lower in the Labrador region, and 1% lower in the Isolated region.
- The lower range of reasonableness produces lower Achievable Potential peak demand reductions that are almost 1% lower in the Island Interconnected region, 4% lower in the Labrador region and 2% lower in the Isolated region.
- The upper range of reasonableness produces lower Achievable Potential energy savings that are 2% higher in the Island Interconnected region, 1% higher in the Labrador region and almost unchanged in the Isolated region.
- The upper range of reasonableness produces lower Achievable Potential peak demand reductions that are 3% higher in the Island Interconnected region, 1% higher in the Labrador region and almost unchanged in the Isolated region.

Exhibit 90 Sensitivity of the Upper Achievable Potential Energy Savings and Peak Demand Reduction to Avoided Cost

Region	Year	Lower Range of Reasonableness		Base Scenario		Upper Range of Reasonableness	
		Energy Savings (MWh/yr.)	Peak Demand Reduction (MW)	Energy Savings (MWh/yr.)	Peak Demand Reduction (MW)	Energy Savings (MWh/yr.)	Peak Demand Reduction (MW)
Island Interconnected	2017	52,454	8	52,821	8	53,297	9
	2020	136,874	24	137,859	24	141,796	25
	2023	254,170	47	255,655	48	265,788	50
	2026	396,303	75	407,167	77	415,059	79
	2029	563,888	107	566,388	108	577,793	112
Labrador Interconnected	2017	2,616	0	2,763	0	3,438	1
	2020	9,342	2	10,142	2	13,357	3
	2023	22,055	4	22,594	4	30,071	6
	2026	43,418	9	45,474	9	49,237	10
	2029	67,045	13	70,163	14	70,976	14
Isolated	2017	626	0	634	0	639	0
	2020	1,362	0	1,384	0	1,392	0
	2023	2,146	0	2,185	0	2,195	0
	2026	2,973	0	3,027	0	3,037	0
	2029	3,837	1	3,890	1	3,901	1

9.9 Net-to-Gross

Net-to-gross ratios are used to estimate the free-ridership occurring in CDM programs. Free riders are program participants who would have undertaken an efficiency or demand management measure naturally, even without the influence of the utility's program. A net-to-gross ratio is a factor that represents the net program impact divided by the gross program impact. The net impact can be found by multiplying the gross impact by the net-to-gross ratio.

Net-to-gross ratios have been estimated for many of the utility programs conducted in NL over the past several years. Though net-to-gross ratios are dependent on many factors, the estimates from previous programs were assumed to provide a reasonable approximation for the ratios in the near future. Where measures in the present study were not included in past programs, the net-to-gross ratio for the most similar program was used.

Sources

The following sources were used to estimate the measure net-to-gross ratios shown in the following exhibits:

- Net-to-gross ratios provided by Newfoundland Power, from evaluations of the CDM programs that have been run in the province.
- Ontario Energy Board TRC Guide recommendations.[36]
- Performance Plus Impact and Process Evaluation, 2012, from the Efficiency Nova Scotia Corporation.[37]
- Emera Maine Heat Pump Pilot Program Final Report, 2014.[38]

Caveat

The estimates produced by the models in this study are not purely gross achievable potential estimates, because the reference case includes some naturally occurring savings. In order to calibrate the model's reference case to the Utilities' load forecast, it was essential to make reasonable assumptions about what efficiency improvements customers would make during the study period, in the absence of new utility programs. The economic, upper achievable, and lower achievable potentials were all calculated from this reference baseline that includes some naturally occurring savings. If the results are then adjusted for net-to-gross ratios, the following adjustments are both being made in the model:

- Naturally occurring savings, from customers who would adopt the efficiency measures in the absence of new utility programs, are being accounted for in the reference case
- Free-ridership, from customers who participate in a program but would have adopted the efficiency measures without its influence, are being accounted for in the net-to-gross ratio

It appears likely that there is some double-counting between naturally occurring savings and free-ridership: some of the customers who would have adopted the measures naturally and some of the customers who would be free-riders in a program are actually the same people. Therefore, the exhibits shown below with net upper and lower achievable potential, are likely underestimates of the true net potential.

[36] Ontario Energy Board, *Total Resource Cost Guide.* October, 2006.
[37] Efficiency Nova Scotia Corporation, *Performance Plus Impact and Process Evaluation, 2012*. March, 2013.
[38] Emera Maine, *Heat Pump Pilot Program Final Report*. November, 2014.

Results

The net and gross achievable potential results are presented in the following four exhibits:

- Exhibit 91 shows the gross and net upper achievable potential for energy efficiency, by measure and region for the year 2029, along with the net-to-gross ratios used
- Exhibit 92 shows the gross and net lower achievable potential for energy efficiency, by measure and region for the year 2029, along with the net-to-gross ratios used
- Exhibit 93 shows the gross and net upper achievable potential for demand reduction, by measure and region for the year 2029, along with the net-to-gross ratios used
- Exhibit 94 shows the gross and net lower achievable potential for demand reduction, by measure and region for the year 2029, along with the net-to-gross ratios used

At this time, net-to-gross ratios were not available for demand reduction programs in NL. Because these measures offer no financial advantages to the customer where time of use rates are not in use, free-ridership is assumed to be zero for these measures. The net-to-gross ratios are therefore assumed to be 1.0, and the net potential is equal to the gross potential.

Exhibit 91 Gross Versus Net Upper Achievable EE Potential by Measure and Region, 2029

Measure	Assumed Net-to-Gross Ratio	Island Interconnected		Labrador Interconnected		Isolated	
		Gross Upper Achievable Potential (MWh/yr.)	Net Upper Achievable Potential (MWh/yr.)	Gross Upper Achievable Potential (MWh/yr.)	Net Upper Achievable Potential (MWh/yr.)	Gross Upper Achievable Potential (MWh/yr.)	Net Upper Achievable Potential (MWh/yr.)
Building Recommissioning	0.70	103,530	72,471	21,748	15,223	1,046	732
Ductless Mini-Split Heat Pump	0.88	57,531	50,628	8,381	7,376	109	96
Advanced Building Automation Systems	0.85	36,414	30,952	313	266	0	0
High-Efficiency Air Source Heat Pumps	0.88	34,680	30,518	4,913	4,323	8	7
Programmable Thermostats	0.85	32,186	27,358	7,457	6,338	63	53
Occupancy Sensors (Lighting)	0.80	28,764	23,011	2,646	2,117	244	195
New Construction (25% More Efficient)	0.76	27,945	21,238	1,158	880	427	325
LED Tubular Lamps	0.95	25,296	24,032	0	0	398	378
Demand Control Ventilation (DCV)	0.85	21,370	18,165	4,675	3,974	0	0
VFDs on HVAC Motors	0.75	18,170	13,628	1,136	852	8	6
High Performance Glazing Systems	0.50	17,405	8,703	4,686	2,343	18	9
LED Outdoor Fixtures	0.90	14,742	13,268	1,747	1,572	316	285
LED Street Lighting	0.90	14,491	13,042	0	0	0	0
Ventilation Heat Recovery	0.85	14,225	12,091	2,238	1,902	14	12
LED Screw-In Lamps	0.90	13,152	11,837	1,188	1,070	134	121
High Performance T8 Fixtures	0.80	12,391	9,912	694	555	175	140
Low-Flow Faucet Aerators	0.70	12,338	8,637	2,188	1,532	17	12
New Construction (40% More Efficient)	0.76	11,165	8,485	11	8	184	140
LED Screw-In Lamps	0.90	10,124	9,112	1,093	984	274	247
Refrigerated Cases with Doors	0.70	8,480	5,936	0	0	0	0
High Efficiency Compressors (Refrigeration)	0.90	7,497	6,747	320	288	0	0
Refrigerated Vending Machine Controllers	0.85	5,533	4,703	580	493	96	82
Activate PC Power Management	0.70	5,294	3,706	234	164	70	49
ECM Motors and Evaporator Fan Motor Controllers	0.75	5,221	3,916	304	228	13	10
Lighting Controls (Outdoor)	0.80	4,674	3,739	654	523	50	40
LED Tubular Lamps	0.95	4,515	4,289	9	9	74	71
LED High Bay Fixtures	0.70	4,091	2,864	30	21	22	15

Exhibit 91 Gross Versus Net Upper Achievable EE Potential by Measure and Region, 2029 (cont'd…)

Measure	Assumed Net-to-Gross Ratio	Island Interconnected		Labrador Interconnected		Isolated	
		Gross Upper Achievable Potential (MWh/yr.)	Net Upper Achievable Potential (MWh/yr.)	Gross Upper Achievable Potential (MWh/yr.)	Net Upper Achievable Potential (MWh/yr.)	Gross Upper Achievable Potential (MWh/yr.)	Net Upper Achievable Potential (MWh/yr.)
Low-Flow Showerheads	0.70	3,596	2,517	490	343	2	1
Wall Insulation	0.80	3,583	2,866	176	141	30	24
Ground Source Heat Pumps	0.88	2,859	2,516	0	0	3	2
Cooler Night Covers	0.70	2,739	1,917	121	85	34	24
Heat Pump Water Heaters	0.88	2,558	2,251	416	366	5	5
Refrigeration Controls	0.85	2,426	2,062	105	89	0	0
High Performance T8 Fixtures	0.80	2,034	1,627	256	205	33	26
T5HO Fixtures	0.60	1,930	1,158	123	74	9	5
Radiant Infrared Heaters	0.70	1,837	1,286	252	176	0	0
Roof Insulation	0.80	1,800	1,440	60	48	28	22
ENERGY STAR Dishwashers	0.70	1,338	937	104	73	0	0
ENERGY STAR Computers	0.70	1,316	921	84	58	15	11
Premium Efficiency Motors	0.75	1,283	963	109	82	4	3
LED High Bay Fixtures	0.70	1,099	770	50	35	7	5
Demand Control Kitchen Ventilation (DCKV)	0.85	1,059	900	85	73	0	0
Hotel Occupancy Sensors	0.80	1,030	824	158	126	0	0
Low-Flow Pre-Rinse Spray Valves	0.70	823	576	99	69	1	1
Drainwater Heat Recovery	0.85	709	602	64	54	0	0
T5HO Fixtures	0.60	624	374	45	27	3	2
Make Use of Daylighting	0.70	523	366	20	14	18	13
Refrigeration Heat Recovery	0.85	429	365	0	0	0	0
High-Efficiency Cooking Equipment	0.70	362	253	27	19	0	0
Automatic Door Closers (Walk-In Coolers & Freezers)	0.70	354	248	39	28	0	0
Use Task Light Instead of Ambient	0.70	251	176	3	2	0	0
Reduce Number of Fridges	0.70	205	144	2	1	0	0
Energy-Efficient Server Technologies	0.70	150	105	3	2	0	0

Exhibit 91 Gross Versus Net Upper Achievable EE Potential by Measure and Region, 2029 (cont'd…)

Measure	Assumed Net-to-Gross Ratio	Island Interconnected		Labrador Interconnected		Isolated	
		Gross Upper Achievable Potential (MWh/yr.)	Net Upper Achievable Potential (MWh/yr.)	Gross Upper Achievable Potential (MWh/yr.)	Net Upper Achievable Potential (MWh/yr.)	Gross Upper Achievable Potential (MWh/yr.)	Net Upper Achievable Potential (MWh/yr.)
LED Exit Signs	0.75	144	108	27	20	2	1
Use Shades/Blinds (Winter)	0.70	143	100	2	1	0	0
ENERGY STAR Office Equipment	0.70	118	82	6	4	1	1
Keep Doors Closed (Winter)	0.70	70	49	11	7	0	0
CEE-Rated Refrigerators and Freezers	0.70	46	32	0	0	111	78
LED Refrigerated Display Case Lighting	0.95	32	31	0	0	49	47
Use Shades/Blinds (Summer)	0.70	19	13	0	0	0	0
Use Natural Ventilation (Summer)	0.70	10	7	0	0	0	0
Keep Doors Closed (Summer)	0.70	4	3	0	0	0	0
High Efficiency Chillers	0.90	0	0	0	0	0	0
LED Troffers	1.00	0	0	0	0	66	59
Dimming Control (Daylighting)	1.00	0	0	0	0	62	50
Freezer Defrost Controllers	1.00	0	0	0	0	3	3
Grand Total	0.80	588,731	471,578	71,336	55,262	4,251	3,408

Exhibit 92 Gross Versus Net Lower Achievable EE Potential by Measure and Region, 2029

Measure	Assumed Net-to-Gross Ratio	Island Interconnected		Labrador Interconnected		Isolated	
		Gross Lower Achievable Potential (MWh/yr.)	Net Lower Achievable Potential (MWh/yr.)	Gross Lower Achievable Potential (MWh/yr.)	Net Lower Achievable Potential (MWh/yr.)	Gross Lower Achievable Potential (MWh/yr.)	Net Lower Achievable Potential (MWh/yr.)
Ductless Mini-Split Heat Pump	0.88	20,295	17,860	2,961	2,605	0	0
LED Tubular Lamps	0.95	17,149	16,291	0	0	357	339
Building Recommissioning	0.70	16,308	11,416	3,393	2,375	0	0
New Construction (25% More Efficient)	0.76	15,011	11,409	624	475	225	171
LED Street Lighting	0.90	12,808	11,527	0	0	0	0
High-Efficiency Air Source Heat Pumps	0.88	12,785	11,251	1,750	1,540	3	3
Advanced Building Automation Systems	0.85	12,503	10,627	103	88	0	0
LED Screw-In Lamps	0.90	11,943	10,749	1,042	938	0	0
Programmable Thermostats	0.85	11,075	9,413	2,409	2,048	0	0
High Performance T8 Fixtures	0.80	10,842	8,673	608	486	0	0
LED Screw-In Lamps	0.90	9,321	8,389	958	862	0	0
Occupancy Sensors (Lighting)	0.80	8,472	6,777	762	610	0	0
New Construction (40% More Efficient)	0.76	6,134	4,662	6	4	0	0
LED Outdoor Fixtures	0.90	5,475	4,928	660	594	0	0
LED Tubular Lamps	0.95	3,980	3,781	3	2	0	0
LED High Bay Fixtures	0.70	3,676	2,573	10	7	0	0
Refrigerated Cases with Doors	0.70	2,650	1,855	0	0	0	0
High Efficiency Compressors (Refrigeration)	0.90	2,505	2,255	100	90	0	0
Lighting Controls (Outdoor)	0.80	2,005	1,604	263	210	0	0
Demand Control Ventilation (DCV)	0.85	1,863	1,584	382	324	0	0
High Performance T8 Fixtures	0.80	1,780	1,424	224	179	0	0
ECM Motors and Evaporator Fan Motor Controllers	0.75	1,708	1,281	95	71	4	3
T5HO Fixtures	0.60	1,689	1,013	108	65	0	0
Refrigerated Vending Machine Controllers	0.85	1,585	1,347	166	141	0	0
High Performance Glazing Systems	0.50	1,422	711	557	278	1	1
VFDs on HVAC Motors	0.75	1,298	973	81	61	1	0

Exhibit 92 Gross Versus Net Lower Achievable EE Potential by Measure and Region, 2029 (cont'd…)

Measure	Assumed Net-to-Gross Ratio	Island Interconnected		Labrador Interconnected		Isolated	
		Gross Lower Achievable Potential (MWh/yr.)	Net Lower Achievable Potential (MWh/yr.)	Gross Lower Achievable Potential (MWh/yr.)	Net Lower Achievable Potential (MWh/yr.)	Gross Lower Achievable Potential (MWh/yr.)	Net Lower Achievable Potential (MWh/yr.)
Ground Source Heat Pumps	0.88	1,281	1,127	0	0	0	0
Heat Pump Water Heaters	0.88	1,117	983	170	149	0	0
LED High Bay Fixtures	0.70	1,089	762	44	30	0	0
Activate PC Power Management	0.70	1,069	748	47	33	14	10
Cooler Night Covers	0.70	1,034	724	42	30	0	0
Ventilation Heat Recovery	0.85	1,016	864	160	136	0	0
Low-Flow Faucet Aerators	0.70	927	649	157	110	0	0
Refrigeration Controls	0.85	893	759	36	30	0	0
Radiant Infrared Heaters	0.70	618	433	84	59	0	0
T5HO Fixtures	0.60	546	328	40	24	0	0
Hotel Occupancy Sensors	0.80	379	303	57	46	0	0
Low-Flow Showerheads	0.70	293	205	36	25	0	0
ENERGY STAR Computers	0.70	263	184	17	12	0	0
Wall Insulation	0.80	243	194	16	13	0	0
Make Use of Daylighting	0.70	134	94	5	3	0	0
LED Exit Signs	0.75	127	95	23	18	0	0
Automatic Door Closers (Walk-In Coolers & Freezers)	0.70	121	85	13	9	0	0
High-Efficiency Cooking Equipment	0.70	121	84	9	6	0	0
Roof Insulation	0.80	108	86	5	4	0	0
Demand Control Kitchen Ventilation (DCKV)	0.85	98	83	8	6	0	0
ENERGY STAR Dishwashers	0.70	96	67	7	5	0	0
Premium Efficiency Motors	0.75	95	71	8	6	0	0
Use Task Light Instead of Ambient	0.70	66	46	1	0	0	0
Low-Flow Pre-Rinse Spray Valves	0.70	62	43	7	5	0	0
Drainwater Heat Recovery	0.85	51	43	5	4	0	0

Exhibit 92 Gross Versus Net Lower Achievable EE Potential by Measure and Region, 2029 (cont'd…)

Measure	Assumed Net-to-Gross Ratio	Island Interconnected		Labrador Interconnected		Isolated	
		Gross Lower Achievable Potential (MWh/yr.)	Net Lower Achievable Potential (MWh/yr.)	Gross Lower Achievable Potential (MWh/yr.)	Net Lower Achievable Potential (MWh/yr.)	Gross Lower Achievable Potential (MWh/yr.)	Net Lower Achievable Potential (MWh/yr.)
Use Shades/Blinds (Winter)	0.70	42	29	0	0	0	0
Reduce Number of Fridges	0.70	41	29	0	0	0	0
Refrigeration Heat Recovery	0.85	31	26	0	0	0	0
Energy-Efficient Server Technologies	0.70	30	21	1	0	0	0
ENERGY STAR Office Equipment	0.70	24	16	1	1	0	0
Keep Doors Closed (Winter)	0.70	19	13	3	2	0	0
CEE-Rated Refrigerators and Freezers	0.70	14	10	0	0	0	0
LED Refrigerated Display Case Lighting	0.95	10	10	0	0	0	0
Use Shades/Blinds (Summer)	0.70	4	3	0	0	0	0
Use Natural Ventilation (Summer)	0.70	2	2	0	0	0	0
Keep Doors Closed (Summer)	0.70	1	1	0	0	0	0
High Efficiency Chillers	0.90	0	0	0	0	0	0
Grand Total	0.83	208,345	173,595	18,264	14,821	605	527

Exhibit 93 Gross Versus Net Upper Achievable Demand Reduction Potential by Measure and Region, 2029

Measure	Assumed Net-to-Gross Ratio	Island Interconnected		Labrador Interconnected		Isolated	
		Gross Upper Achievable Potential (MW)	Net Upper Achievable Potential (MW)	Gross Upper Achievable Potential (MW)	Net Upper Achievable Potential (MW)	Gross Upper Achievable Potential (MW)	Net Upper Achievable Potential (MW)
DHW Controls	1.00	0.9	0.9	0.1	0.1	0.0	0.0
Heating Controls	1.00	0.3	0.3	0.0	0.0	0.0	0.0
HVAC Demand Controls	1.00	2.1	2.1	0.2	0.2	0.0	0.0
Lighting Demand Controls	1.00	0.3	0.3	0.1	0.1	0.0	0.0
Refrigeration Demand Controls	1.00	0.2	0.2	0.0	0.0	0.0	0.0
Grand Total	1.00	3.8	3.8	0.3	0.3	0.0	0.0

Exhibit 94 Gross Versus Net Lower Achievable Demand Reduction Potential by Measure and Region, 2029

Measure	Assumed Net-to-Gross Ratio	Island Interconnected		Labrador Interconnected		Isolated	
		Gross Lower Achievable Potential (MW)	Net Lower Achievable Potential (MW)	Gross Lower Achievable Potential (MW)	Net Lower Achievable Potential (MW)	Gross Lower Achievable Potential (MW)	Net Lower Achievable Potential (MW)
DHW Controls	1.00	0.2	0.2	0.0	0.0	0.0	0.0
Heating Controls	1.00	0.1	0.1	0.0	0.0	0.0	0.0
HVAC Demand Controls	1.00	0.7	0.7	0.1	0.1	0.0	0.0
Lighting Demand Controls	1.00	0.1	0.1	0.0	0.0	0.0	0.0
Refrigeration Demand Controls	1.00	0.1	0.1	0.0	0.0	0.0	0.0
Grand Total	1.00	1.1	1.1	0.1	0.1	0.0	0.0

10 References

The sources listed below include references used in preparation of this report and additional resources likely to be helpful for research on energy consumption patterns and efficient technologies. Additional references on specific technologies may be found in the TRC Analysis Workbooks, supplied as an accompanying deliverable with this report.

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11 Glossary

Achievable Potential:
The portion of the economic conservation potential that is achievable through utility interventions and programs given institutional, economic and market barriers.

Avoided Cost:
By reducing electricity consumption and capacity requirements through the implementation of conservation and demand management programs, the NL utilities avoid the cost of having to buy electricity on the open market, contract for long term supply, and/or build and run new generation facilities. This avoided cost is used to develop a benchmark against which the cost of energy efficiency measures can be compared.

Base Year:
The base year for the 2015 CDM potential assessment is the 2014 sales for the two utilities. This number is derived from 2014 sales and forecast 2014 electric energy and capacity requirements as is explained in each report.

Benchmark for Economic Analysis:
The study established benchmarks for the economic cut-off for new avoided electrical supply on each of the different supply systems in NL. These values were selected to provide the CDM potential assessment with a reasonably useful time horizon (life) to allow planners to examine options that may become more cost-effective over time. The following values were used:

Year	Avoided Cost per kWh		
	Island Interconnected	Labrador Interconnected	Isolated
2014	$0.11	$0.04	$0.21
2017	$0.13	$0.04	$0.23
2020	$0.05	$0.05	$0.26
2023	$0.06	$0.05	$0.29
2026	$0.07	$0.06	$0.34
2029	$0.08	$0.07	$0.37

Cost of Conserved Energy (CCE):
The CCE is calculated for each energy-efficiency measure. The CCE is the annualized incremental capital and operating and maintenance (O&M) cost of the upgrade measure divided by the annual energy savings achieved, excluding any administrative or program costs. The CCE represents the cost of conserving one kWh of electricity; it can be compared directly to the cost of supplying one new kWh of electricity.

Cost of Electric Peak Reduction (CEPR):
The CEPR for a peak load reduction measure is defined as the annualized incremental capital and O&M cost of the measure divided by the annual peak reduction achieved, excluding any administrative or program costs. The CEPR represents the cost of reducing one kW of electricity during a peak period; it can be compared to the cost of supplying one new kW of electric capacity during the same period.

Conservation and Demand Management (CDM):
CDM is the influencing of customers' electricity use to obtain desirable and quantifiable changes in that use. For example, CDM comprises such cooperative joint customer and utility initiatives as peak

clipping, valley filling, load shifting, strategic conservation, strategic load growth, flexible load shape, customer on-site generation and other similar activities.

Economic Potential:
The Economic Potential is the savings in electricity consumption due to energy efficient measures whose Cost of Conserved Energy (CCE) is less than or equal to the Benchmark for Economic Analysis.

Effective Measure Life (EML):
The estimated median number of years that the measures installed under a program are still in place and operable. EML incorporates: field conditions, obsolescence, building remodelling, renovation, demolition, and occupancy changes.

Electricity Audit:
An on-site inspection and cataloguing of electricity-using equipment/buildings, electricity consumption and the related end uses. The purpose is to provide information to the customer and the utility. Audits are useful for load research, for CDM program design, and identifying specific energy savings projects.

Electric Capacity:
The maximum electric power that a device or network is capable of producing or transferring.

Electricity Conservation:
Activities by utilities or electricity users that result in a reduction of electric energy use without adversely affecting the level or quality of energy service provided. Electricity conservation measures include substitution of high-efficiency motors for standard efficiency ones, occupancy sensors in office buildings, insulation in residences, etc.

Electricity Efficiency:
The ratio of the useful energy delivered by a dynamic system to the amount of electric energy supplied to it.

Electric Energy:
Energy in the form of electricity. Energy is the ability to perform work. Electric energy is different from electric power. Electric energy is measured in kilowatt-hours, megawatt-hours or gigawatt-hours.

Electricity Intensity:
Electric energy use measured per application or end use. Examples would include kilowatt-hours per square meter of lit office space per day, kilowatt-hours per tonne of pulp produced, and kilowatt-hours per year per residential refrigerator. Electricity intensity increases as electricity efficiency decreases.

Electric Power:
The rate at which electric energy is produced or transferred, usually measured in watts, kilowatts and megawatts.

End use:
The services of economic value to the users of energy. For example, office lighting is an end use, whereas electricity sold to the office tenant is of no value without the equipment (light fixtures, wiring, etc.) necessary to convert the electricity into visible light. End use is often used interchangeably with energy service.

Energy Service:
An amenity or service supplied jointly by energy and other components such as buildings, motors and lights. Examples of energy services include residential space heating, commercial refrigeration, paper production, and lighting. The same energy service can frequently be supplied with different mixes of equipment and energy.

Financial Incentive:
Certain financial features in the utility's conservation and demand management programs designed to motivate customer participation. These may include features designed to reduce a customer's net cash outlay, pay-back period or cost of finance to participate in a specific conservation and demand management measure or technology.

Flexible Load Shape:
This is utility action to present customers with variations in service quality in exchange for incentives. Programs involved may be variations of interruptible or curtailable load, concepts of pooled, integrated energy management systems, or individual customer load control devices offering service constraints.

Gigawatt-hour (GWh):
One gigawatt-hour is one million kilowatt-hours.

Integrated Planning or Integrated Resource Planning (IRP):
See Supply Planning.

Integrated Electricity Planning (IEP):
See Supply Planning.

Kilowatt (kW):
One thousand watts; the basic unit of measurement of electric energy. One kilowatt-hour represents the power of one thousand watts (one kilowatt) for a period of one hour. A typical non-electrically heated detached home in NL uses about 10,700 kWh per year. A four foot fluorescent lamp in an office might use about 100-200 kWh per year and a large coal-fired plant might produce about three billion kWh per year.

Levelized Cost of Conservation (LCC):
The LCC is calculated for each energy efficiency measure. The LCC is the annualized incremental capital and O&M cost of the measure divided by the annual energy conserved, excluding any administrative or program costs. The LCC represents the cost of generating or conserving one kWh of electricity; it can be compared directly to the cost of supplying one new kWh of electricity. In the context of commercial energy efficiency measures, it is essentially the same as the cost of conserved energy (CCE), which is the term used in this report.

Load Forecast:
This is a forecast of electricity demand over a specified time period. Long-term load forecasts usually pertain to a 10 to 20-year period. In the case of NL, the load forecast assumes a specific set of rates or prices for electricity and competing energy forms, as well as many other economic variables. In addition, forecasts of electricity conserved through CDM programs are incorporated into the Supply Planning process.

Load Research:
Research to disaggregate and analyze patterns of electricity consumption by various sub sectors and end uses is defined as load research. Load research supports the development of the load forecast and the design of conservation and demand management programs.

Load Shape:
The time pattern and magnitude of a utility's electrical demand.

Load Shifting:
Utility program activity to shift demand from peak to off-peak periods is defined as load shifting.

Measure Total Resource Cost (TRC):
The measure TRC calculates the net present value of energy savings that result from an investment in an energy-efficiency measure. The measure TRC is equal to its full or incremental capital cost (depending on application) plus any change (positive or negative) in the combined annual energy and O&M costs. This calculation includes, among others, the following inputs: the avoided electricity supply costs, the life of the technology, and the selected discount rate, which in this analysis has been set at 7%.

A measure with a positive measure TRC value is included in subsequent stages of the analysis, which consists of the Economic and Achievable Potential scenarios. A measure with a negative TRC value is not economically attractive and is therefore not included in subsequent stages of the analysis.

Megawatt (MW):
One thousand kilowatts.

Natural Change in Electricity Intensity:
The future change in electricity intensity in a given end use that is expected to occur in the absence of conservation and demand management programs. In developing an estimate of natural change in electricity intensity it is necessary to make an explicit assumption about the future prices of electricity and competing fuels.

Peak Clipping:
Utility program activity to reduce peak demand without reducing demand at other times of the day or year.

Peak Demand:
Peak demand is the maximum electric power required by a customer or electric system during a short time period, typically one hour. The peak is the time (usually of day or year) at which peak demand occurs. The peak period of interest in NL is from 7 a.m. to noon and 4 p.m. to 8 p.m. on the four coldest days of the winter, for a total of 36 hours.

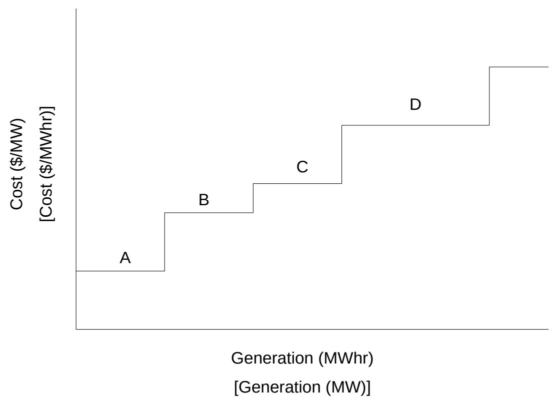
Rate Structure:
The formulas used to calculate charges for the use of electricity. For example, the present rate structures for both NL utilities for most commercial customers consists of a fixed monthly charge and charges for both electric energy usage and monthly peak demand usage.

Reference Case:
Provides a forecast of electricity sales that includes natural conservation (that which would occur in the absence of CDM programs) but no impacts of utility CDM programs. The reference case for the study is based on the 2014 base year and the Utilities’ Load Forecast.

Sector:
A group of customers having a common type of economic activity. This CDM potential assessment includes the Residential, Commercial, and Industrial sectors.

Sub sectors:
A classification of customers within a sector by common features. Residential sub sectors are by type of home (single-family dwelling or apartment). Commercial sub sectors are generally by type of commercial service (retail and wholesale trade).

Supply Curves:
A graph that depicts the volume of energy at the appropriate screened price in ascending order of cost. Steps A through D below represent programs options, or technologies arranged as a supply curve.



Supply Planning:
The process of long-term planning of electricity generation and associated transmission facilities, in combination with supply reductions made possible through conservation and demand management, in order to meet forecast demands. Supply Planning in NL is done in a framework that recognizes economic, financial, environmental and social costs, risks, and impacts.

Technical Efficiency:
Efficiency of a system, process, or device in achieving a certain purpose, measured in terms of the physical inputs required to produce a given output. In the context of electricity conservation the relevant input is electric energy.

Technology-Based Potential:
Energy and or capacity/demand savings realized through the implementation of energy-efficiency technologies.

Watt:
The basic unit of measurement of electric power.

Appendix A Background-Section 3: Base Year Electricity Use

Introduction

This appendix provides additional detailed information related to the generation of the Commercial sector Base Year profile. The appendix discusses the following:

- Sub sector descriptions
- Sales data analysis
- Detailed Results
- CEEAM archetype summaries – existing buildings

A.1 Sub Sector Descriptions

Exhibit 95 presents brief descriptions of the Commercial sub sectors. Detailed building archetype profiles for each sub sector are provided in Sections A.4 (Existing buildings) and C.4 (New buildings) of Appendices A and C, respectively.

Exhibit 95 Sub sector Descriptions

Sub Sector	Definition	Examples of Building Types
Large Office	Buildings used for office or public administration, demand greater than 100 kW	Municipal office, government office building, private office buildings
Small Office	Buildings used for office or public administration, demand less than 100 kW	Municipal office, government office building, private office buildings
Food Retail	Retail store that primarily sells food items and has a significant refrigeration load	Supermarket
Large Non-Food Retail	Retail store which primarily sells non-food items, demand greater than 100 kW	"Big box" store, strip mall, enclosed mall unit
Small Non-Food Retail	Retail store which primarily sells non-food items, demand less than 100 kW	Convenience store, independent retailer
Large Accomodation	Large accomodations with common areas, food preparation, and amenities, demand greater than 100 kW	Hotel
Small Accomodation	Small accommodations with very few amenities, demand less than 100 kW	Motel, bed and breakfast
Healthcare	Buildings used for providing multiple accommodations for short- or long-term care residents	Hospital, nursing home, nursing station
Schools	Buildings whose primary function is education. Typically characterized by seasonably variable occupancy.	Elementary or secondary schools
Universities and Colleges	Buildings that make up a campus related to post-secondary education	University campus
Warehouse / Wholesale	Typically metal-clad building with high ceilings and predominantly high-bay lighting	
Restaurant	Full service or quick service restaurant	Family restaurant, franchise restaurant, diner
Large Other Building	Commercial, institutional, manufacturing or light industrial buildings which do not fit the above categories, demand greater than 100 kW	Municipal workshop, prisons, light manufacturing

Exhibit 95 Sub sector Descriptions (cont'd…)

Sub Sector	Definition	Examples of Building Types
Small Other Building	Commercial, institutional, manufacturing or light industrial buildings which do not fit the above categories, demand less than 100 kW	Service garages, religious buildings, theaters, light manufacturing
Other Institutional	Buildings that form Canadian Forces Base Goose Bay	Barracks, mess halls, hangers, warehouses
Non-Building	Structures for which electricity is primarily used by unique equipment	Telephone exchange, microwave repeater station
Street Lighting	Street lighting	N/A
Island Isolated C/I Buildings	Buildings located in isolated regions on the Island of Newfoundland	Restaurants, schools, variety stores, medical clinics, multi-purpose garages and sheds
Labrador Isolated C/I Buildings	Buildings located in isolated regions in Labrador, including Lanse-Aux-Loup	Restaurants, schools, variety stores, medical clinics, multi-purpose garages and sheds

A.2 Sales Data Analysis

This section outlines the methodology for the allocation of the sales data provided by NLH and NLP to the Commercial sub sectors identified above.

Both NLH and NLP provided sales data to ICF. This data included monthly consumption for accounts grouped by sector, sub sector, and rate class. The sales data was aggregated into the sub sector categories defined by ICF, with the distinction between small and large sub sector building types being made at the 100 kW demand level. Because the three diesel regions of Island Isolated, Labrador Isolated, and Lanse-Aux-Loup have relatively few commercial accounts, it was agreed that instead of reporting at the sub sector level, data and results would be reported in the following aggregate categories: Island Isolated C/I Buildings, Labrador Isolated C/I Buildings, and Street Lighting.

Exhibit 96 Sales Data Subsector Assignments

Sub Sector	Description	CDM Potential Subsector Assignment
Accommodations	Other	Small/Large Accommodation
Accommodations	Restaurants	Restaurants
Education	Colleges and Universities	Universities and Colleges
Education	Other	Schools
Health Care	Hospitals	Health Care
Health Care	Other	Health Care
Non-Buildings		Non-Buildings
Office		Small/Large Office
Other Buildings		Small/Large Other Buildings
Other Buildings	DND	Other Institutional
Retail Trade	Food Stores	Food Retail
Retail Trade	Other	Small/Large Non-Food Retail
Wholesalers & Warehouse		Warehouse/Wholesale

Exhibit 96, above, describes how utility sub sectors were mapped to the sub sector definitions given above.

A.3 Detailed Results

This section of the appendix presents the base year electricity consumption for all three regions.

Exhibit 97 Commercial Sector Base Year (2014) Consumption, Island Interconnected, by Sub Sector and End Use (MWh/yr.)*

Sub Sector	Space Heating	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Refrigeration	Secondary Lighting	Domestic Hot Water	Computer Equipment	Food Service Equipment	Other Plug Loads	Outdoor Lighting	Space Cooling	Street Lighting	Computer Servers	Elevator	Block Heaters	Grand Total
Large Office	94,614	53,893	46,186	2,666	1,067	15,973	5,999	24,326	1,067	7,386	4,524	10,209	-	4,319	1,033	-	273,262
Small Office	74,726	39,734	19,864	2,170	868	5,902	5,155	19,802	-	6,012	3,682	7,866	-	3,516	-	-	189,299
Large Non-food Retail	27,391	33,975	27,191	985	5,725	3,596	1,685	1,886	3,817	2,456	3,344	3,168	-	435	-	-	115,655
Small Non-food Retail	39,263	41,215	28,604	1,428	-	4,845	2,577	2,733	-	3,559	4,845	4,863	-	631	-	-	134,563
Food Retail	18,821	19,666	11,213	729	87,439	3,103	3,279	2,199	8,744	2,369	2,473	1,584	-	322	-	-	161,939
Large Accomodation	17,745	6,841	5,480	631	1,892	7,169	14,755	1,104	3,090	1,205	1,070	1,153	-	232	244	-	62,610
Small Accomodation	9,485	3,690	1,397	300	450	2,047	7,022	525	750	574	509	402	-	110	-	-	27,262
Healthcare	54,806	4,604	27,075	1,042	1,562	21,812	8,124	3,645	8,332	7,008	3,534	2,338	-	844	807	-	145,533
Schools	76,730	42,801	8,422	1,053	1,053	9,582	5,337	7,376	1,404	1,486	5,957	267	-	1,293	-	-	162,762
Universities and Colleges	11,328	39,550	35,395	1,908	3,816	4,996	1,193	9,870	2,862	4,804	3,237	1,316	-	702	739	-	121,717
Warehouse/Wholesale	24,251	19,171	4,292	1,310	7,861	3,812	1,958	1,742	-	4,212	2,223	108	-	579	-	-	71,518
Restaurants	11,925	2,352	3,434	256	16,672	7,540	18,743	410	33,431	545	435	989	-	113	-	-	96,846
Labrador Isolated C/I Buildings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Island Isolated C/I Buildings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Large Other Buildings	42,605	28,123	21,288	1,335	16,038	9,791	7,707	6,633	7,918	3,972	3,382	2,667	-	1,116	356	-	152,930
Small Other Buildings	40,739	26,977	17,711	1,293	15,178	8,068	6,768	6,124	7,039	3,876	3,410	2,502	-	1,028	196	-	140,908
Other Institutional	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-Buildings	-	-	-	199,788	-	-	-	-	-	-	-	-	-	-	-	-	199,788
Street Lighting	-	-	-	-	-	-	-	-	-	-	-	-	34,828	-	-	-	34,828
Grand Total	544,430	362,591	257,551	216,895	159,621	108,235	90,302	88,376	78,454	49,463	42,624	39,433	34,828	15,241	3,375	-	2,091,418

*Results are measured at the customer's point-of-use and do not include line losses. Any differences in totals are due to rounding.

Exhibit 98 Commercial Sector Base Year (2014) Consumption, Labrador Interconnected, by Sub Sector and End Use (MW)*

Sub Sector	Space Heating	General Lighting	HVAC Fans & Pumps	Secondary Lighting	Refrigeration	Domestic Hot Water	Food Service Equipment	Other Plug Loads	Miscellaneous Equipment	Computer Equipment	Outdoor Lighting	Street Lighting	Block Heaters	Space Cooling	Computer Servers	Elevator	Grand Total
Large Office	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Small Office	1,793	793	189	118	-	108	-	120	22	395	74	-	22	62	70	-	3,766
Large Non-food Retail	2,699	2,234	1,154	248	410	134	273	176	35	135	239	-	35	56	31	-	7,860
Small Non-food Retail	6,716	4,295	1,163	478	-	258	-	338	68	260	460	-	68	121	60	-	14,283
Food Retail	4,669	1,031	309	133	4,105	205	493	133	21	124	139	-	21	25	5	-	11,414
Large Accomodation	2,803	585	466	687	181	1,572	302	116	30	90	103	-	30	57	22	-	7,044
Small Accomodation	438	98	38	55	12	208	20	15	4	12	14	-	4	9	3	-	929
Healthcare	3,057	654	3,671	3,099	222	1,924	1,184	996	74	518	502	-	222	108	120	57	16,408
Schools	6,374	2,331	933	481	21	363	76	81	29	402	324	-	29	12	70	-	11,527
Universities and Colleges	1,410	631	372	80	61	76	46	77	15	157	52	-	15	25	11	-	3,028
Warehouse/Wholesale	4,074	1,396	461	278	572	178	-	307	48	127	162	-	48	6	42	-	7,698
Restaurants	1,136	212	140	606	1,501	1,776	3,071	54	12	37	39	-	12	18	10	-	8,622
Labrador Isolated C/I Buildings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Island Isolated C/I Buildings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Large Other Buildings	22,842	7,904	6,537	4,889	6,162	5,426	4,743	1,689	229	1,384	1,359	-	358	269	272	50	64,115
Small Other Buildings	16,047	6,188	3,936	2,881	3,513	2,757	2,645	1,147	157	1,099	955	-	238	209	212	31	42,015
Other Institutional	10,017	12,713	8,247	4,559	1,763	2,407	537	2,075	412	1,212	1,406	-	412	219	-	-	45,979
Non-Buildings	-	-	-	-	-	-	-	-	5,068	-	-	-	-	-	-	-	5,068
Street Lighting	-	-	-	-	-	-	-	-	-	-	-	1,756	-	-	-	-	1,756
Grand Total	84,075	41,065	27,616	18,592	18,523	17,392	13,390	7,323	6,224	5,951	5,828	1,756	1,512	1,197	929	138	251,513

*Results are measured at the customer's point-of-use and do not include line losses. Any differences in totals are due to rounding.

Exhibit 99 Commercial Sector Base Year (2014) Consumption, Isolated, by Sub Sector and End Use (MW)*

Sub Sector	General Lighting	Refrigeration	Secondary Lighting	HVAC Fans & Pumps	Computer Equipment	Outdoor Lighting	Other Plug Loads	Space Heating	Street Lighting	Food Service Equipment	Block Heaters	Domestic Hot Water	Miscellaneous Equipment	Elevator	Space Cooling	Computer Servers	Grand Total
Labrador Isolated C/I Buildings	6,909	3,416	1,608	1,132	1,051	739	677	580	-	496	305	149	-	-	-	-	17,062
Island Isolated C/I Buildings	649	321	151	106	99	69	64	-	-	47	-	-	-	-	-	-	1,505
Street Lighting	-	-	-	-	-	-	-	-	544	-	-	-	-	-	-	-	544
Grand Total	7,558	3,737	1,759	1,238	1,150	808	740	580	544	542	305	149	-	-	-	-	19,112

*Results are measured at the customer's point-of-use and do not include line losses. Any differences in totals are due to rounding.

A.4 CEEAM Archetype Summaries – Existing Buildings

This section includes summary profiles of the twenty four existing building archetypes constructed for this study. Exhibit 100 presents a table of contents for the CEEAM building profiles that follow. A glossary of terms and acronyms used in the building profiles is included at the end of this appendix.

Exhibit 100 Table of Contents - Existing CEEAM Building Profiles

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Large Office Baseline
SIZE: > 100 kW
VINTAGE:
REGION: Island Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.71	W/m².°C	0.12	Btu/hr.ft² .°F	Typical Building Size	3,717 m²	40,000	ft²
Roof U value (W/m².°C)	0.48	W/m².°C	0.09	Btu/hr.ft² .°F	Typical Footprint (m²)	1,239 m²	13,333	ft²
Glazing U value (W/m².°C)	3.97	W/m².°C	0.70	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1		
					Percent Conditioned Space	100%		
					Percent Conditioned Space Defined as Exterior Zone	45%		
Window/Wall Ratio (WIWAR) (%)	0.40				Typical # Stories	3		
Shading Coefficient (SC)	0.58				Floor to Floor Height (m)	3.7 m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	75%				25%				100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	26	m²/person	274	ft²/person	%OA 22.09%
Occupancy Schedule Occ. Period	90%				
Occupancy Schedule Unocc. Period					
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person	

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right:
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | L/s.m² | CFM/ft² | operation (%)

Sizing Factor	1.3			
Total Air Circulation or Design Air Flow	3.55	L/s.m²	0.70	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)	L/s.m²	CFM/ft²
Operation occupied period	50%	
Operation unoccupied period	50%	

Economizer

	Enthalpy Based		Dry-Bulb Based	Total
Incidence of Use			100%	100%
Switchover Point		KJ/kg.	18 °C	
		Btu/lbm	64.4 °F	

Summary of Design Parameters		
Peak Design Cooling Load	1,067,682	
Peak Zone Sensible Load	462,384	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	21,510	
Total air circulation or Design air	3.55	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				98%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW		Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	550	Lux	51.1	ft-candles
Floor Fraction (GLFF)	0.90			
Connected Load	14.8	W/m²	1.4	W/ft²

Occ. Period(Hrs./yr.)	3300
Unocc. Period(Hrs./yr.)	5460
Usage During Occupied Period	95%
Usage During Unoccupied Period	20%

Light Level (Lux)	450	550	650					Total
% Distribution	10%	80%	10%					100%
Weighted Average								**550**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			20.0%	80.0%				100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice	Group	Spot

EUI		
	kWh/ft².yr	5.2
	MJ/m².yr	202

ARCHITECTURAL LIGHTING

Light Level	350	Lux	32.5	ft-candles
Floor Fraction (ALFF)	0.10			
Connected Load	31.0	W/m²	2.9	W/ft²

Occ. Period(Hrs./yr.)	3400
Unocc. Period(Hrs./yr.)	5360
Usage During Occupied Period	95%
Usage During Unoccupied Period	40%

Light Level (Lux)	200	300	400	500				Total
% Distribution	10%	40%	40%	10%				100%
Weighted Average								**350**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	45%	45%			5%		5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	84	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice	Group	Spot

EUI = Load X Hrs. X SF X GLFF

EUI		
	kWh/ft².yr	1.5
	MJ/m².yr	60

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice	Group	Spot

EUI		
	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 16.38 W/m²

EUI TOTAL		
	kWh/ft².yr	7
	MJ/m².yr	262

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.9	0.9	0.15	0.1	0.06	
Connected Load	1.9 W/m²	1.8 W/m²	0.6 W/m²	0.8 W/m²	0.5 W/m²	1.5 W/m²
	0.2 W/ft²	0.2 W/ft²	0.05 W/ft²	0.07 W/ft²	0.05 W/ft²	0.14 W/ft²
Diversity Occupied Period	80%	80%	80%	80%	100%	80%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	2500
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	6260

Total end-use load (occupied period)	5.8 W/m²	0.5 W/ft²
Total end-use load (unocc. period)	3.8 W/m²	0.4 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	66%	

Computer Servers	EUI	kWh/ft².yr	0.42
		MJ/m².yr	16.20
Computer Equipment	EUI	kWh/ft².yr	2.36
		MJ/m².yr	91.24
Plug Loads	EUI	kWh/ft².yr	0.72
		MJ/m².yr	27.70

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Sh | Electricity Fuel Share: 100.0%

Lunch room/cafeteria/restaurant

	Fuel Oil / Propane EUI		All Electric EUI	
EUI	kWh/ft².yr	0.2	kWh/ft².yr	0.1
	MJ/m².yr	6.0	MJ/m².yr	4.0

REFRIGERATION

Provide description below:

Lunch room/cafeteria/restaurant

EUI		
	kWh/ft².yr	0.1
	MJ/m².yr	4.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Large Office Baseline
SIZE: > 100 kW
VINTAGE:
REGION: Island Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				Total
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)	15%						85%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	62.0	W/m²	19.7	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	417	MJ/m².yr	10.8	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 85.0% Fuel Oil / Propane Fuel Sh 15.0% Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	kWh/ft².yr	10.8
	MJ/m².yr	417
Fuel Oil / Propane EUI	kWh/ft².yr	15.4
	MJ/m².yr	596
Market Composite EUI	kWh/ft².yr	11.5
	MJ/m².yr	444

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		WSHP	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE		Open	DX	W. H.	CW	
System Present (%)	20.0%				80.0%			100.0%
COP	4.7	5.4	3.5	3.5	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.29	0.29	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load	84	W/m²	27	Btu/hr.ft²	450	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	109.0	MJ/m².yr	2.8	kWh/ft².yr		

Sizing Factor 1.00 Operation (occ. period) 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 85.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Sh

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	kWh/ft².yr	1.2
	MJ/m².yr	45
Fuel Oil / Propane EUI	kWh/ft².yr	
	MJ/m².yr	
Market Composite EUI	kWh/ft².yr	1.2
	MJ/m².yr	45

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Tank				Boiler
System Present (%)					10%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	10%		90%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 22.8

Wetting Use Percentage 90%

All Electric EUI	kWh/ft².yr	0.6
	MJ/m².yr	25
Fuel Oil / Propane EUI	kWh/ft².yr	0.8
	MJ/m².yr	30
Market Composite EUI	kWh/ft².yr	0.7
	MJ/m².yr	25.5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW		Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.6	L/s.m²	0.70	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	1.00			
Fan Design Load CAV	6.0	W/m²	0.56	W/ft²
Fan Design Load VAV	6.0	W/m²	0.56	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	75%	25%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	90%	10%	90%	10%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.03	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.05	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	40%			
Fan Motor Efficiency	80%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.65	W/m²	0.15	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.004	L/s.m²	0.007	U.S. gpm/ft²
Pump Head Pressure	90	kPa	30	ft
Pump Efficiency	55%			
Pump Motor Efficiency	90%			
Sizing Factor	1.0			
Pump Connected Load	0.81	W/m²	0.08	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0053	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	150	kPa	50	ft		
Pump Efficiency	55%					
Pump Motor Efficiency	90%					
Sizing Factor	0.5					
Pump Connected Load	0.5	W/m²	0.05	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	45.1	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.7	kWh/m².yr
Condenser Pump Energy Consumption	0.4	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.6	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption	0.4	kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	4.5
	MJ/m².yr	173.2

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Large Office	**> 100 kW**		**Island Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **26.5** kWh/ft².yr **1,024.9** MJ/m².yr **Fuel Oil / Propane:** **2.4** kWh/ft².yr **92.5** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	5.2	202.1
ARCHITECTURAL LIGHTING	1.5	59.9
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.7	27.7
HVAC FANS & PUMPS	4.5	173.2
REFRIGERATION	0.1	4.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	2.4	91.2
COMPUTER SERVERS	0.4	16.2
ELEVATORS	0.1	3.9
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	9.2	354.9	2.3	89.5
SPACE COOLING	1.0	38.3		
DOMESTIC HOT WATER	0.6	22.5	0.1	3.0
FOOD SERVICE EQUIPMENT	0.1	4.0		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW		Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Building Size	1,859	m²	20,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	929	m²	10,000	ft²
Glazing U value (W/m².°C)	3.97	W/m².°C	0.70	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.30								
Shading Coefficient (SC)	0.58				Typical # Stories	2			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	26	m²/person	274	ft²/person	%OA 23.47%
Occupancy Schedule Occ. Period	90%				
Occupancy Schedule Unocc. Period					
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person	

Fresh Air Control Type *(enter a 1, 2 or 3) (1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air): 1

If Fresh Air Control Type = "2" enter % FA. to the right:

If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: L/s.m² CFM/ft² operation (%)

Sizing Factor	1.3			
Total Air Circulation or Design Air Flow	3.34	L/s.m²	0.66	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA) L/s.m² CFM/ft²

Operation occupied period 50%

Operation unoccupied period 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	520,257	
Peak Zone Sensible Load	217,608	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	10,123	
Total air circulation or Design air	3.34	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				98%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Small Office	**< 100 kW**		**Island Interconnected**
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	550	Lux	51.1	ft-candles
Floor Fraction (GLFF)	0.95			
Connected Load	14.8	W/m²	1.4	W/ft²

Occ. Period(Hrs./yr.)	2500
Unocc. Period(Hrs./yr.)	6260
Usage During Occupied Period	95%
Usage During Unoccupied Period	20%

Light Level (Lux)	450	550	650					Total
% Distribution	10%	80%	10%					100%
Weighted Average								**550**
	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			20.0%	80.0%				100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval ___ years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	4.7
	MJ/m².yr	183

ARCHITECTURAL LIGHTING

Light Level	350	Lux	32.5	ft-candles
Floor Fraction (ALFF)	0.05			
Connected Load	31.0	W/m²	2.9	W/ft²

Occ. Period(Hrs./yr.)	2500
Unocc. Period(Hrs./yr.)	6260
Usage During Occupied Period	95%
Usage During Unoccupied Period	40%

Light Level (Lux)	200	300	400	500				Total
% Distribution	10%	40%	40%	10%				100%
Weighted Average								**350**
	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	45%	45%			5%		5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	84	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval ___ years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.7
	MJ/m².yr	27

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	2500
Unocc. Period(Hrs./yr.)	6260
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								
	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval ___ years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 15.57 W/m²

EUI TOTAL	kWh/ft².yr	5
	MJ/m².yr	210

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.9	0.9	0.15	0.1	0.06	
Connected Load	1.9 W/m²	1.8 W/m²	0.6 W/m²	0.8 W/m²	0.5 W/m²	1.5 W/m²
	0.2 W/ft²	0.2 W/ft²	0.05 W/ft²	0.07 W/ft²	0.05 W/ft²	0.14 W/ft²
Diversity Occupied Period	80%	80%	80%	80%	100%	80%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	2500
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	6260

Total end-use load (occupied period)	5.8	W/m²	0.5	W/ft²
Total end-use load (unocc. period)	3.8	W/m²	0.4	W/ft²

Usage during occupied period	100%
Usage during unoccupied period	66%

Computer Servers	EUI	kWh/ft².yr	0.42
		MJ/m².yr	16.20
Computer Equipment	EUI	kWh/ft².yr	2.36
		MJ/m².yr	91.24
Plug Loads	EUI	kWh/ft².yr	0.72
		MJ/m².yr	27.70

FOOD SERVICE EQUIPMENT

Provide description below:

Fuel Oil / Propane Fuel Sh | Electricity Fuel Share: 100.0%

	Fuel Oil / Propane EUI			All Electric EUI	
EUI	kWh/ft².yr	0.1	EUI	kWh/ft².yr	
	MJ/m².yr	5.0		MJ/m².yr	

REFRIGERATION

Provide description below:

Lunch room/cafeteria/restaurant

EUI	kWh/ft².yr	0.1
	MJ/m².yr	4.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Small Office Baseline
SIZE: < 100 kW
VINTAGE:
REGION: Island Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane Boilers Stan.	Fuel Oil / Propane Boilers High	Fuel Oil / Propane Packaged Unit	Electric A/A HP	Electric W. S. HP	Electric H/R Chiller	Electric Resistance	Total
System Present (%)	10%						90%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	49.9 W/m²	15.8 Btu/hr.ft²	
Seasonal Heating Load (Tertiary Load)	383 MJ/m².yr	9.9 kWh/ft².yr	
Sizing Factor	1.00		
Electric Fuel Share	90.0%	Fuel Oil / Propane Fuel Sh 10.0%	Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	9.9	14.1	10.3
MJ/m².yr	383	547	399

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	WSHP	Reciprocating Chillers Open	Reciprocating Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)					100.0%			100.0%
COP	4.7	5.4	3.5	3.5	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.29	0.29	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7 °C	44.6 °F
Condenser Water	30 °C	86 °F
Supply Air	14.0 °C	57.2 °F

Peak Cooling Load	82 W/m²	26 Btu/hr.ft²	461 ft²/Ton
Seasonal Cooling Load (Tertiary Load)	111.0 MJ/m².yr	2.9 kWh/ft².yr	

Sizing Factor 1.00 Operation (occ. period) 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 75.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Sh

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	1.2		1.2
MJ/m².yr	48		48

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Tank				Boiler
System Present (%)					10%
Eff./COP	0.65				0.75

	Fossil	Elec. Res.
Fuel Share	5%	95%
Blended Efficiency	1.50	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 22.8

Wetting Use Percentage 90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.6	0.4	0.6
MJ/m².yr	25	15	24.5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Small Office Baseline
SIZE: < 100 kW
VINTAGE:
REGION: Island Interconnected

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.3	L/s.m²	0.66	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	0.50			
Fan Design Load CAV	2.8	W/m²	0.26	W/ft²
Fan Design Load VAV	2.8	W/m²	0.26	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	90%	10%	90%	10%

Comments:

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.04	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.06	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	40%			
Fan Motor Efficiency	80%			
Sizing Factor	0.5			
Exhaust Fan Connected Load	0.1	W/m²	0.01	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.61	W/m²	0.15	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.004	L/s.m²	0.006	U.S. gpm/ft²
Pump Head Pressure	90	kPa	30	ft
Pump Efficiency	55%			
Pump Motor Efficiency	90%			
Sizing Factor	0.5			
Pump Connected Load	0.40	W/m²	0.04	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0052	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	150	kPa	50	ft		
Pump Efficiency	55%					
Pump Motor Efficiency	90%					
Sizing Factor	0.5					
Pump Connected Load	0.5	W/m²	0.05	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	23.3	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.0	kWh/m².yr
Condenser Pump Energy Consumption	0.2	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.6	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption	0.3	kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	2.4
	MJ/m².yr	91.5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW		Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	22.5 kWh/ft².yr	872.2 MJ/m².yr	Fuel Oil / Propane:	1.4 kWh/ft².yr	55.4 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	4.7	183.1
ARCHITECTURAL LIGHTING	0.7	27.2
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.7	27.7
HVAC FANS & PUMPS	2.4	91.5
REFRIGERATION	0.1	4.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	2.4	91.2
COMPUTER SERVERS	0.4	16.2
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	8.9	344.3	1.4	54.7
SPACE COOLING	0.9	36.2		
DOMESTIC HOT WATER	0.6	23.8	0.0	0.8
FOOD SERVICE EQUIPMENT				

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: **Food Retail** **Baseline**
SIZE: **All**
VINTAGE:
REGION: **Island Interconnected**

CONSTRUCTION

Wall U value (W/m².°C)	0.55	W/m².°C	0.10	Btu/hr.ft².°F	Typical Building Size	2,788	m²	30,000	ft²
Roof U value (W/m².°C)	0.40	W/m².°C	0.07	Btu/hr.ft².°F	Typical Footprint (m²)	2,788	m²	30,000	ft²
Glazing U value (W/m².°C)	4.17	W/m².°C	0.73	Btu/hr.ft².°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.06								
Shading Coefficient (SC)	0.69				Typical # Stories	1			
					Floor to Floor Height (m)	4.6	m	15.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	30	m²/person	323	ft²/person
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person

%OA 22.97%

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)
If Fresh Air Control Type = "2" enter % FA. to the right:
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation 0.5 L/s.m² 0.10 CFM/ft²
50% operation (%)

Sizing Factor	1.5			
Total Air Circulation or Design Air Flow	2.90	L/s.m²	0.57	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA) L/s.m² CFM/ft²
Operation occupied period 50%
Operation unoccupied period 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	631,563	
Peak Zone Sensible Load	245,685	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	11,429	
Total air circulation or Design air	2.90	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	22	°C	71.6	°F	16	°C	60.8	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All		Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.90			
Connected Load	14.5	W/m²	1.3	W/ft²

Occ. Period(Hrs./yr.)	5000
Unocc. Period(Hrs./yr.)	3760
Usage During Occupied Period	100%
Usage During Unoccupied Period	20%

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	3%	2%	15%	75%	5%	0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	7.0
	MJ/m².yr	270

ARCHITECTURAL LIGHTING (CORRIDORS)

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.10			
Connected Load	13.5	W/m²	1.3	W/ft²

Occ. Period(Hrs./yr.)	5000
Unocc. Period(Hrs./yr.)	3760
Usage During Occupied Period	100%
Usage During Unoccupied Period	100%

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			15%	75%	8%	2%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	1.1
	MJ/m².yr	43

EUI = Load X Hrs. X SF X GLFF

SPECIAL PURPOSE LIGHTING

Light Level	300.00	Lux	27.9	ft-candles
Floor Fraction (HBLFF)				
Connected Load	14.0	W/m²	1.3	W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING Overall LP 14.38 W/m²

EUI TOTAL	kWh/ft².yr	8
	MJ/m².yr	312

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.43		0.43		0.01		0.01		0.02			
Connected Load	0.8	W/m²	0.7	W/m²	0.0	W/m²	0.1	W/m²	0.1	W/m²	1.5	W/m²
	0.1	W/ft²	0.1	W/ft²	0.00	W/ft²	0.01	W/ft²	0.01	W/ft²	0.14	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		90%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		50%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2600		4100	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6160		4660	

Total end-use load (occupied period)	2.9	W/m²	0.3	W/ft²
Total end-use load (unocc. period)	1.7	W/m²	0.2	W/ft²

to see notes (cells with red indicator in upper right corner, type "SHIFT F2" Computer Servers

Usage during occupied period	100%		
Usage during unoccupied period	58%		

	EUI		
Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.78
		MJ/m².yr	30.2
Plug Loads	EUI	kWh/ft².yr	0.84
		MJ/m².yr	32.5

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

	Fuel Oil / Propane EUI		All Electric EUI	
EUI	kWh/ft².yr	2.6	kWh/ft².yr	3.1
	MJ/m².yr	100.0	MJ/m².yr	120.0

REFRIGERATION

Provide description below:
Commercial refrigeration display cases

EUI	kWh/ft².yr	31.0
	MJ/m².yr	1200.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: **Food Retail** **Baseline**
SIZE: **All**
VINTAGE:
REGION: **Island Interconnected**

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers Stan.	High	Packaged Rooftop	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)	15%						85%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load 36.2 W/m² 11.5 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load) 304 MJ/m².yr 7.8 kWh/ft².yr
Sizing Factor 1.00

Electric Fuel Share 85.0% Fuel Oil / Propane Fuel Share 15.0% Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	kWh/ft².yr	7.8
	MJ/m².yr	304
Fuel Oil / Propane EUI	kWh/ft².yr	11.2
	MJ/m².yr	434
Market Composite EUI	kWh/ft².yr	8.3
	MJ/m².yr	323

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	HE	Screw Chillers	Reciprocating Chillers Open	DX	Absorption Chillers W. H.	CW	Total
System Present (%)				10.0%	90.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load 66 W/m² 21 Btu/hr.ft² 570 ft²/Ton
Seasonal Cooling Load (Tertiary Load) 75.2 MJ/m².yr 1.9 kWh/ft².yr

Sizing Factor 1.00 Operation (occ. period) 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 65.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	kWh/ft².yr	0.9
	MJ/m².yr	33
Fuel Oil / Propane EUI	kWh/ft².yr	
	MJ/m².yr	
Market Composite EUI	kWh/ft².yr	0.9
	MJ/m².yr	33

SERVICE HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					30%
Eff./COP	65.00				0.75

	Fossil		Elec. Res.
Fuel Share	10%		90%
Blended Efficiency	2.25		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 45.5

Wetting Use Percentage 90%

All Electric EUI	kWh/ft².yr	1.3
	MJ/m².yr	50
Fuel Oil / Propane EUI	kWh/ft².yr	0.5
	MJ/m².yr	20
Market Composite EUI	kWh/ft².yr	1.2
	MJ/m².yr	47.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All		Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	2.9	L/s.m²	0.57	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	4.5	W/m²	0.42	W/ft²
Fan Design Load VAV	4.5	W/m²	0.42	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	100%		100%	
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.03	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.33	W/m²	0.12	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.004	L/s.m²	0.005	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0042	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	50	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.6	W/m²	0.05	W/ft²		

Supply Fan Occ. Period	5000	hrs./year
Supply Fan Unocc. Period	3760	hrs./year
Supply Fan Energy Consumption	39.7	kWh/m².yr
Exhaust Fan Occ. Period	5000	hrs./year
Exhaust Fan Unocc. Period	3760	hrs./year
Exhaust Fan Energy Consumption	2.0	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption	0.6	kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	4.0
	MJ/m².yr	153.9

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All		Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **57.4** kWh/ft².yr **2,222.4** MJ/m².yr **Fuel Oil / Propane:** **1.7** kWh/ft².yr **67.1** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	7.0	269.9
ARCHITECTURAL LIGHTING (COR	1.1	42.6
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.8	32.5
HVAC FANS & PUMPS	4.0	153.9
REFRIGERATION	31.0	1,200.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.8	30.2
COMPUTER SERVERS	0.1	4.4
ELEVATORS		
OUTDOOR LIGHTING	0.9	33.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	6.7	258.3	1.7	65.1
SPACE COOLING	0.6	21.7		
SERVICE HOT WATER	1.2	45.0	0.1	2.0
FOOD SERVICE EQUIPMENT	3.1	120.0		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW		Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.55	W/m².°C	0.10	Btu/hr.ft² .°F	Typical Building Size	1,859	m²	20,000	ft²
Roof U value (W/m².°C)	0.40	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Footprint (m²)	1,859	m²	20,000	ft²
Glazing U value (W/m².°C)	4.17	W/m².°C	0.73	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	5			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.10								
Shading Coefficient (SC)	0.75				Typical # Stories	1			
					Floor to Floor Height (m)	5.0	m	16.5	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	25	m²/person	269	ft²/person	%OA 12.88%
Occupancy Schedule Occ. Period	90%				
Occupancy Schedule Unocc. Period					
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person	

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right: | 34%
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | 0.5 L/s.m² | 0.10 CFM/ft²
50% operation (%)

Sizing Factor	2			
Total Air Circulation or Design Air Flow	6.21	L/s.m²	1.22	CFM/ft²
Infiltration Rate		L/s.m²		CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	571,544	
Peak Zone Sensible Load	262,842	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	12,227	
Total air circulation or Design air	6.21	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	21	°C	69.8	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW		Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.95			
Connected Load	20.5	W/m²	1.9	W/ft²
Occ. Period(Hrs./yr.)	4500			
Unocc. Period(Hrs./yr.)	4260			
Usage During Occupied Period	95%			
Usage During Unoccupied Period	15%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	400	500	600	1000				Total
% Distribution	25%	50%	25%					100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	10%	10%	20%	55%	5%	0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	8.9
	MJ/m².yr	345

ARCHITECTURAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.05			
Connected Load	31.7	W/m²	2.9	W/ft²
Occ. Period(Hrs./yr.)	4500			
Unocc. Period(Hrs./yr.)	4260			
Usage During Occupied Period	95%			
Usage During Unoccupied Period	50%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution	30%	40%	30%					100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	30%	5%	10%	50%		0%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.9
	MJ/m².yr	36

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 21.07 W/m²

EUI TOTAL	kWh/ft².yr	10
	MJ/m².yr	381

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.22		0.22		0.01		0.01		0.02			
Connected Load	0.5	W/m²	0.4	W/m²	0.0	W/m²	0.1	W/m²	0.1	W/m²	1.15	W/m²
	0.0	W/ft²	0.0	W/ft²	0.00	W/ft²	0.01	W/ft²	0.01	W/ft²	0.11	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		90%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		50%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2000		4100	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6760		4660	

Total end-use load (occupied period)	2.1	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	1.2	W/m²	0.1	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	59%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2"

Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.14
Plug Loads	EUI	kWh/ft².yr	0.64
		MJ/m².yr	24.92

FOOD SERVICE EQUIPMENT

5

Provide description below:

Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr		EUI	kWh/ft².yr	1.0
	MJ/m².yr			MJ/m².yr	38.7

REFRIGERATION

Provide description below:

EUI	kWh/ft².yr	1.5
	MJ/m².yr	58.1

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.3
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: **Large Non-Food Retail** **Baseline**

SIZE: **> 100 kW**

VINTAGE:

REGION: **Island Interconnected**

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Rooftop					
System Present (%)	15%						85%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	54.5 W/m²	17.3 Btu/hr.ft²	
Seasonal Heating Load (Tertiary Load)	327 MJ/m².yr	8.4 kWh/ft².yr	
Sizing Factor	1.00		
Electric Fuel Share	85.0%	Fuel Oil / Propane Fuel Share 15.0%	Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	8.4
MJ/m².yr	327

Fuel Oil / Propane EUI	
kWh/ft².yr	12.1
MJ/m².yr	467

Market Composite EUI	
kWh/ft².yr	9.0
MJ/m².yr	348

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)	10.0%			5.0%	85.0%			100.0%
COP	4.8	5.4	4.4	3.7	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.27	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7 °C	44.6 °F
Condenser Water	30 °C	86 °F
Supply Air	14.0 °C	57.2 °F

Peak Cooling Load	90 W/m²	29 Btu/hr.ft²	420 ft²/Ton
Seasonal Cooling Load (Tertiary Load)	106.8 MJ/m².yr	2.8 kWh/ft².yr	
Sizing Factor	1.00		
A/C Saturation (Incidence of A/C)	75.0%		
Electric Fuel Share	100.0%	Fuel Oil / Propane Fuel Share	

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	1.1
MJ/m².yr	43

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	1.1
MJ/m².yr	43

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank			Boiler
System Present (%)				10%
Eff./COP	0.65			0.75

	Fossil		Elec. Res.
Fuel Share	10%		90%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load)	17.3
Wetting Use Percentage	90%

All Electric EUI	
kWh/ft².yr	0.5
MJ/m².yr	19

Fuel Oil / Propane EUI	
kWh/ft².yr	0.6
MJ/m².yr	23

Market Composite EUI	
kWh/ft².yr	0.5
MJ/m².yr	19.4

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Large Non-Food Retail Baseline
SIZE: > 100 kW
VINTAGE:
REGION: Island Interconnected

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	6.2	L/s.m²	1.22	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	88%			
Sizing Factor	1.00			
Fan Design Load CAV	8.8	W/m²	0.82	W/ft²
Fan Design Load VAV	8.8	W/m²	0.82	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	90%	10%	90%	10%

Comments:

EXHAUST FANS

Washroom Exhaust	50	L/s.washroom	106	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.03	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.80	W/m²	0.17	W/ft²

Condenser Pump

Pump Design Flow		L/s.KW		U.S. gpm/Ton
Pump Design Flow per unit floor area		L/s.m²		U.S. gpm/ft²
Pump Head Pressure	45	kPa	15	ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0057	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure		kPa		ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load		W/m²		W/ft²		

Supply Fan Occ. Period	5500	hrs./year
Supply Fan Unocc. Period	3260	hrs./year
Supply Fan Energy Consumption	74.4	kWh/m².yr
Exhaust Fan Occ. Period	5500	hrs./year
Exhaust Fan Unocc. Period	3260	hrs./year
Exhaust Fan Energy Consumption	1.7	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.5	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	7.1
	MJ/m².yr	275.9

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: **Large Non-Food Retail** **Baseline**

SIZE: **> 100 kW**

VINTAGE:

REGION: **Island Interconnected**

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **30.3** kWh/ft².yr **1,173.7** MJ/m².yr **Fuel Oil / Propane:** **1.9** kWh/ft².yr **72.4** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	8.9	344.8
ARCHITECTURAL LIGHTING	0.9	36.5
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.6	24.9
HVAC FANS & PUMPS	7.1	275.9
REFRIGERATION	1.5	58.1
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.5	19.1
COMPUTER SERVERS	0.1	4.4
ELEVATORS/ESCALATORS		
OUTDOOR LIGHTING	0.9	33.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	7.2	278.0	1.8	70.1
SPACE COOLING	0.8	32.2		
DOMESTIC HOT WATER	0.4	17.1	0.1	2.3
FOOD SERVICE EQUIPMENT	1.0	38.7		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Non-Food Retail Baseline | **SIZE:** < 100 kW | **VINTAGE:** | **REGION:** Island Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.43	W/m².°C	0.07	Btu/hr.ft² .°F
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F
Glazing U value (W/m².°C)	4.17	W/m².°C	0.73	Btu/hr.ft² .°F
Window/Wall Ratio (WIWAR) (%)	0.10			
Shading Coefficient (SC)	0.75			

Typical Building Size	929	m²	10,000	ft²
Typical Footprint (m²)	929	m²	10,000	ft²
Footprint Aspect Ratio (L:W)	5			
Percent Conditioned Space	100%			
Percent Conditioned Space Defined as Exterior Zone	45%			
Typical # Stories	1			
Floor to Floor Height (m)	5.0	m	16.5	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	25	m²/person	269	ft²/person
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person

%OA 18.18%

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 34%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation 0.5 L/s.m² 0.10 CFM/ft² 50% operation (%)

Sizing Factor	1.25			
Total Air Circulation or Design Air Flow	4.40	L/s.m²	0.87	CFM/ft²
Infiltration Rate	0.42	L/s.m²	0.08	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	303,354	
Peak Zone Sensible Load	149,003	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	6,932	
Total air circulation or Design air	4.40	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	21	°C	69.8	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Non-Food Retail Baseline | **SIZE:** < 100 kW | **VINTAGE:** | **REGION:** Island Interconnected

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.95			
Connected Load	20.5	W/m²	1.9	W/ft²
Occ. Period(Hrs./yr.)	3500			
Unocc. Period(Hrs./yr.)	5260			
Usage During Occupied Period	95%			
Usage During Unoccupied Period	15%			
Fixture Cleaning: Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	400	500	600	1000				Total
% Distribution	25%	50%	25%					100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	10%	10%	20%	55%	5%	0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI kWh/ft².yr 7.5
MJ/m².yr 289

ARCHITECTURAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.05			
Connected Load	31.7	W/m²	2.9	W/ft²
Occ. Period(Hrs./yr.)	3500			
Unocc. Period(Hrs./yr.)	5260			
Usage During Occupied Period	95%			
Usage During Unoccupied Period	50%			
Fixture Cleaning: Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution	30%	40%	30%					100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	30%	5%	10%	50%		0%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI kWh/ft².yr 0.9
MJ/m².yr 34

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	3500			
Unocc. Period(Hrs./yr.)	5260			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning: Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI kWh/ft².yr
MJ/m².yr

TOTAL LIGHTING Overall LP 21.07 W/m²

EUI TOTAL kWh/ft².yr 8
MJ/m².yr 323

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.22		0.22		0.01		0.01		0.02			
Connected Load	0.5	W/m²	0.4	W/m²	0.0	W/m²	0.1	W/m²	0.1	W/m²	1.15	W/m²
	0.0	W/ft²	0.0	W/ft²	0.00	W/ft²	0.01	W/ft²	0.01	W/ft²	0.11	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		90%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		50%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2000		4100	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6760		4660	

Total end-use load (occupied period)	2.1	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	1.2	W/m²	0.1	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	59%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2"

Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.14
Plug Loads	EUI	kWh/ft².yr	0.64
		MJ/m².yr	24.92

FOOD SERVICE EQUIPMENT

5

Provide description below: Fuel Oil / Propane Fuel Sh | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI: EUI kWh/ft².yr; MJ/m².yr
All Electric EUI: EUI kWh/ft².yr; MJ/m².yr

REFRIGERATION

Provide description below:

EUI kWh/ft².yr
MJ/m².yr

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.3
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Non-Food Retail	**< 100 kW**		**Island Interconnected**
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane Boilers Stan.	Fuel Oil / Propane Boilers High	Fuel Oil / Propane Packaged Rooftop	Electric A/A HP	Electric W. S. HP	Electric H/R Chiller	Electric Resistance	Total
System Present (%)	15%						85%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	53.9 W/m²	17.1 Btu/hr.ft²	
Seasonal Heating Load (Tertiary Load)	324 MJ/m².yr	8.4 kWh/ft².yr	
Sizing Factor	1.00		
Electric Fuel Share	85.0%	Fuel Oil / Propane Fuel Share 15.0%	Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	8.4
MJ/m².yr	324

Fuel Oil / Propane EUI	
kWh/ft².yr	11.9
MJ/m².yr	462

Market Composite EUI	
kWh/ft².yr	8.9
MJ/m².yr	344

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Reciprocating Chillers Open	Reciprocating Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)					100.0%			100.0%
COP	4.8	5.4	4.4	3.7	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.27	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7 °C	44.6 °F
Condenser Water	30 °C	86 °F
Supply Air	14.0 °C	57.2 °F

Peak Cooling Load	96 W/m²	30 Btu/hr.ft²	396 ft²/Ton
Seasonal Cooling Load (Tertiary Load)	120.2 MJ/m².yr	3.1 kWh/ft².yr	
Sizing Factor	1.00		
A/C Saturation (Incidence of A/C)	70.0%		
Electric Fuel Share	100.0%	Fuel Oil / Propane Fuel Share	

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	1.3
MJ/m².yr	49

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	1.3
MJ/m².yr	49

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					10%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	5%		95%
Blended Efficiency	1.50		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load)	17.3
Wetting Use Percentage	90%

All Electric EUI	
kWh/ft².yr	0.5
MJ/m².yr	19

Fuel Oil / Propane EUI	
kWh/ft².yr	0.3
MJ/m².yr	12

Market Composite EUI	
kWh/ft².yr	0.5
MJ/m².yr	18.6

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Non-Food Retail Baseline | **SIZE:** < 100 kW | **VINTAGE:** | **REGION:** Island Interconnected

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	4.4	L/s.m²	0.87	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	88%			
Sizing Factor	1.00			
Fan Design Load CAV	6.2	W/m²	0.58	W/ft²
Fan Design Load VAV	6.2	W/m²	0.58	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	90%	10%	90%	10%

Comments:

EXHAUST FANS

Washroom Exhaust	50	L/s.washroom	106	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.02	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.04	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.3	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.91	W/m²	0.18	W/ft²

Condenser Pump

Pump Design Flow		L/s.KW		U.S. gpm/Ton
Pump Design Flow per unit floor area		L/s.m²		U.S. gpm/ft²
Pump Head Pressure	45	kPa	15	ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0061	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure		kPa		ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load		W/m²		W/ft²		

Supply Fan Occ. Period	5500	hrs./year
Supply Fan Unocc. Period	3260	hrs./year
Supply Fan Energy Consumption	52.7	kWh/m².yr
Exhaust Fan Occ. Period	5500	hrs./year
Exhaust Fan Unocc. Period	3260	hrs./year
Exhaust Fan Energy Consumption	2.3	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.6	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	5.2
	MJ/m².yr	200.3

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Non-Food Retail	< 100 kW		Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	24.3 kWh/ft².yr	942.4 MJ/m².yr	Fuel Oil / Propane:	1.8 kWh/ft².yr	69.9 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	7.5	288.7
ARCHITECTURAL LIGHTING	0.9	33.9
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.6	24.9
HVAC FANS & PUMPS	5.2	200.3
REFRIGERATION		
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.5	19.1
COMPUTER SERVERS	0.1	4.4
ELEVATORS/ESCALATORS		
OUTDOOR LIGHTING	0.9	33.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	7.1	275.0	1.8	69.3
SPACE COOLING	0.9	34.1		
DOMESTIC HOT WATER	0.5	18.1	0.0	0.6
FOOD SERVICE EQUIPMENT				

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Large Accommodation Baseline
SIZE: > 100 kW
VINTAGE:
REGION: Island Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft².°F	Typical Building Size	3,717	m²	40,000	ft²
Roof U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft².°F	Typical Footprint (m²)	1,239	m²	13,333	ft²
Glazing U value (W/m².°C)	3.84	W/m².°C	0.68	Btu/hr.ft².°F	Footprint Aspect Ratio (L:W)	4			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.28								
Shading Coefficient (SC)	0.57				Typical # Stories	3			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	90%				10%				100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	46 m²/person	495 ft²/person	%OA	5.42%
Occupancy Schedule Occ. Period	50%			
Occupancy Schedule Unocc. Period	80%			
Fresh Air Requirements or Outside Air	8 L/s.person	16 CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3): 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)
If Fresh Air Control Type = "2" enter % FA. to the right: 15%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor: 1.4
Total Air Circulation or Design Air Flow: 3.01 L/s.m² | 0.59 CFM/ft²

Separate Make-up air unit (100% OA): L/s.m² | CFM/ft²
Operation occupied period: 50%
Operation unoccupied period: 50%

Infiltration Rate: 1.00 L/s.m² | 0.20 CFM/ft²
(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	492,851	
Peak Zone Sensible Load	363,672	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	16,918	
Total air circulation or Design air	3.01	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	18	°C	64.4	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Large Accommodation	**> 100 kW**		**Island Interconnected**
Baseline			

LIGHTING

GENERAL LIGHTING (SUITES)

Light Level	125	Lux	11.6	ft-candles
Floor Fraction (GLFF)	0.75			
Connected Load	14.3	W/m²	1.3	W/ft²
Occ. Period(Hrs./yr.)	2500			
Unocc. Period(Hrs./yr.)	6260			
Usage During Occupied Period	50%			
Usage During Unoccupied Period	25%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

								Total
Light Level (Lux)	100	125	150	300				Total
% Distribution	25%	50%	25%					100%
Weighted Average								**125**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	70%	20%	5%	5%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	2.8
	MJ/m².yr	108

LOBBY, BALLROOMS, CORRIDORS, BACK OF HOUSE OTHER

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.25			
Connected Load	23.3	W/m²	2.2	W/ft²
Occ. Period(Hrs./yr.)	3000			
Unocc. Period(Hrs./yr.)	5760			
Usage During Occupied Period	85%			
Usage During Unoccupied Period	50%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

								Total
Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	40%	10%	35%	10%		0%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	2.9
	MJ/m².yr	114

SPECIAL PURPOSE LIGHTING

Light Level	300.00	Lux	27.9	ft-candles
Floor Fraction (HBLFF)				
Connected Load	14.0	W/m²	1.3	W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

								Total
Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING — Overall LP 16.52 W/m²

EUI TOTAL	kWh/ft².yr	6
	MJ/m².yr	222

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.3	0.3	0.05	0.033	0.02	
Connected Load	0.4 W/m²	0.3 W/m²	0.1 W/m²	0.1 W/m²	0.1 W/m²	1.5 W/m²
	0.0 W/ft²	0.0 W/ft²	0.01 W/ft²	0.01 W/ft²	0.01 W/ft²	0.14 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	70%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	25%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2500	3000
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6260	5760

Total end-use load (occupied period)	2.0 W/m²	0.2 W/ft²
Total end-use load (unocc. period)	1.0 W/m²	0.1 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	48%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	0.45
		MJ/m².yr	17.51
Plug Loads	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.12

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Sh 2.0% Electricity Fuel Share: 98.0%

Kitchen services

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	2.6	EUI	kWh/ft².yr	1.3
	MJ/m².yr	100.0		MJ/m².yr	50.0

REFRIGERATION

Provide description below:

Walk-in coolers/freezers, reach-in coolers/freezers, refrigerated buffet cases

EUI	kWh/ft².yr	0.8
	MJ/m².yr	30.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.3
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Large Accommodation Baseline
SIZE: > 100 kW
VINTAGE:
REGION: Island Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)	10%						90%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load 59.8 W/m² 19.0 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load) 313 MJ/m².yr 8.1 kWh/ft².yr
Sizing Factor 1.00

Electric Fuel Share 90.0% Fuel Oil / Propane Fuel Share 10.0% Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	8.1
MJ/m².yr	313

Fuel Oil / Propane EUI	
kWh/ft².yr	11.5
MJ/m².yr	447

Market Composite EUI	
kWh/ft².yr	8.4
MJ/m².yr	326

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Reciprocating Chillers Open	Reciprocating Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)	30.0%				70.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	13.0	55.4

Peak Cooling Load 33 W/m² 10 Btu/hr.ft² 1146 ft²/Ton
Seasonal Cooling Load (Tertiary Load) 66.7 MJ/m².yr 1.7 kWh/ft².yr

Sizing Factor 0.85 Operation (occ. perio 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 75.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.6
MJ/m².yr	24

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.6
MJ/m².yr	24

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					10%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	10%		90%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 236.6

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	6.7
MJ/m².yr	260

Fuel Oil / Propane EUI	
kWh/ft².yr	8.1
MJ/m².yr	315

Market Composite EUI	
kWh/ft².yr	6.9
MJ/m².yr	265.5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Large Accommodation	**> 100 kW**		**Island Interconnected**
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.0	L/s.m²	0.59	CFM/ft²
System Static Pressure CAV	338	Pa	1.4	wg
System Static Pressure VAV	338	Pa	1.4	wg
Fan Efficiency	45%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	2.8	W/m²	0.26	W/ft²
Fan Design Load VAV	2.8	W/m²	0.26	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.03	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.05	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.3	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.024	kW/kW	0.08	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.78	W/m²	0.07	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.002	L/s.m²	0.003	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.001	L/s.m²	0.0021	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.3	W/m²	0.03	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	21.0	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	2.6	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption	0.1	kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	2.2
	MJ/m².yr	86.9

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Accommodation	> 100 kW		Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:				
Electricity:	25.6 kWh/ft².yr	993.0 MJ/m².yr		
Fuel Oil / Propane:	2.0 kWh/ft².yr	78.2 MJ/m².yr		

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING (SUITES)	2.8	108.5
LOBBY, BALLROOMS, CORRIDORS	2.9	113.7
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.5	19.1
HVAC FANS & PUMPS	2.2	86.9
REFRIGERATION	0.8	30.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.5	17.5
COMPUTER SERVERS	0.1	3.7
ELEVATORS	0.1	3.9
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	7.3	281.4	1.2	44.7
SPACE COOLING	0.5	18.3		
DOMESTIC HOT WATER	6.0	234.0	0.8	31.5
FOOD SERVICE EQUIPMENT	1.3	49.0	0.1	2.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Small Accommodation Baseline | **SIZE:** < 100 kW | **VINTAGE:** | **REGION:** Island Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.38 W/m².°C	0.07 Btu/hr.ft² .°F	Typical Building Size	1,859 m²	20,000 ft²
Roof U value (W/m².°C)	0.19 W/m².°C	0.03 Btu/hr.ft² .°F	Typical Footprint (m²)	929 m²	10,000 ft²
Glazing U value (W/m².°C)	3.84 W/m².°C	0.68 Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	4	
			Percent Conditioned Space	100%	
			Percent Conditioned Space Defined as Exterior Zone	45%	
Window/Wall Ratio (WIWAR) (%)	0.28				
Shading Coefficient (SC)	0.57		Typical # Stories	2	
			Floor to Floor Height (m)	3.7 m	12.0 ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	46 m²/person	495 ft²/person	%OA 5.24%
Occupancy Schedule Occ. Period	50%		
Occupancy Schedule Unocc. Period	80%		
Fresh Air Requirements or Outside Air	8 L/s.person	16 CFM/person	

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 15%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation 0.5 L/s.m² 0.10 CFM/ft²
50% operation (%)

Sizing Factor	1.4	
Total Air Circulation or Design Air Flow	3.11 L/s.m²	0.61 CFM/ft²
Infiltration Rate	1.00 L/s.m²	0.20 CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA) L/s.m² CFM/ft²
Operation occupied period 50%
Operation unoccupied period 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	252,853	
Peak Zone Sensible Load	188,263	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	8,758	
Total air circulation or Design air	3.11	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	18	°C	64.4	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW		Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING (SUITES)

Light Level	125	Lux	11.6	ft-candles
Floor Fraction (GLFF)	0.85			
Connected Load	14.3	W/m²	1.3	W/ft²
Occ. Period(Hrs./yr.)	2500			
Unocc. Period(Hrs./yr.)	6260			
Usage During Occupied Period	50%			
Usage During Unoccupied Period	25%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

								Total
Light Level (Lux)	100	125	150	300				Total
% Distribution	25%	50%	25%					100%
Weighted Average								**125**
	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	70%	20%	5%	5%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI		
EUI	kWh/ft².yr	3.2
	MJ/m².yr	123

LOBBY, BALLROOMS, CORRIDORS, BACK OF HOUSE OTHER

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.15			
Connected Load	23.3	W/m²	2.2	W/ft²
Occ. Period(Hrs./yr.)	3000			
Unocc. Period(Hrs./yr.)	5760			
Usage During Occupied Period	85%			
Usage During Unoccupied Period	50%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**
	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	40%	10%	35%	10%		0%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	1.8
	MJ/m².yr	68

SPECIAL PURPOSE LIGHTING

Light Level	300.00	Lux	27.9	ft-candles
Floor Fraction (HBLFF)				
Connected Load	14.0	W/m²	1.3	W/ft²
Occ. Period(Hrs./yr.)	3000			
Unocc. Period(Hrs./yr.)	5760			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**
	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 15.62 W/m²

EUI TOTAL	kWh/ft².yr	5
	MJ/m².yr	191

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.3		0.3		0.05		0.033		0.02			
Connected Load	0.4	W/m²	0.3	W/m²	0.1	W/m²	0.1	W/m²	0.1	W/m²	1.5	W/m²
	0.0	W/ft²	0.0	W/ft²	0.01	W/ft²	0.01	W/ft²	0.01	W/ft²	0.14	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		70%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		25%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2500		3000	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6260		5760	

Total end-use load (occupied period)	2.0	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	1.0	W/m²	0.1	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	48%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2"

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	0.45
		MJ/m².yr	17.51
Plug Loads	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.12

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Kitchen services

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	2.6	EUI	kWh/ft².yr	0.6
	MJ/m².yr	100.0		MJ/m².yr	25.0

REFRIGERATION

Provide description below:

Walk-in coolers/freezers, reach-in coolers/freezers, refrigerated buffet cases

EUI	kWh/ft².yr	0.4
	MJ/m².yr	15.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.3
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Small Accommodation Baseline
SIZE: < 100 kW
VINTAGE:
REGION: Island Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)	10%						90%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load 64.7 W/m² 20.5 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load) 351 MJ/m².yr 9.1 kWh/ft².yr
Sizing Factor 1.00

Electric Fuel Share 90.0% Fuel Oil / Propane Fuel Share 10.0% Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

EUI	kWh/ft².yr	MJ/m².yr
All Electric EUI	9.1	351
Fuel Oil / Propane EUI	13.0	502
Market Composite EUI	9.5	366

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Reciprocating Chillers Open	Reciprocating Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)					100.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	13.0	55.4

Peak Cooling Load 34 W/m² 11 Btu/hr.ft² 1117 ft²/Ton
Seasonal Cooling Load (Tertiary Load) 65.3 MJ/m².yr 1.7 kWh/ft².yr

Sizing Factor 0.85 Operation (occ. perio 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 50.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

EUI	kWh/ft².yr	MJ/m².yr
All Electric EUI	0.7	27
Fuel Oil / Propane EUI		
Market Composite EUI	0.7	27

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					10%
Eff./COP	0.65				0.75

	Fossil	Elec. Res.
Fuel Share	10%	90%
Blended Efficiency	0.75	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 236.6

Wetting Use Percentage 90%

EUI	kWh/ft².yr	MJ/m².yr
All Electric EUI	6.7	260
Fuel Oil / Propane EUI	8.1	315
Market Composite EUI	6.9	265.5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW		Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.1	L/s.m²	0.61	CFM/ft²
System Static Pressure CAV	338	Pa	1.4	wg
System Static Pressure VAV	338	Pa	1.4	wg
Fan Efficiency	45%			
Fan Motor Efficiency	80%			
Sizing Factor	0.50			
Fan Design Load CAV	1.5	W/m²	0.14	W/ft²
Fan Design Load VAV	1.5	W/m²	0.14	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.04	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.06	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	0.5			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.024	kW/kW	0.08	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.80	W/m²	0.07	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.002	L/s.m²	0.003	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	0.5			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.001	L/s.m²	0.0021	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.5					
Pump Connected Load	0.2	W/m²	0.02	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	10.9	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.6	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption	0.1	kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	1.2
	MJ/m².yr	46.5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW		Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **23.5** kWh/ft².yr **908.5** MJ/m².yr **Fuel Oil / Propane:** **2.1** kWh/ft².yr **81.7** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING (SUITES)	3.2	123.0
LOBBY, BALLROOMS, CORRIDORS	1.8	68.2
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.5	19.1
HVAC FANS & PUMPS	1.2	46.5
REFRIGERATION	0.4	15.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.5	17.5
COMPUTER SERVERS	0.1	3.7
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	8.2	316.1	1.3	50.2
SPACE COOLING	0.3	13.4		
DOMESTIC HOT WATER	6.0	234.0	0.8	31.5
FOOD SERVICE EQUIPMENT	0.6	25.0		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Health Care Baseline | **SIZE:** All | **VINTAGE:** | **REGION:** Island Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.38 W/m².°C	0.07 Btu/hr.ft² .°F	Typical Building Size	8,829 m²	95,000 ft²
Roof U value (W/m².°C)	0.38 W/m².°C	0.07 Btu/hr.ft² .°F	Typical Footprint (m²)	1,750 m²	18,830 ft²
Glazing U value (W/m².°C)	3.84 W/m².°C	0.68 Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	2	
			Percent Conditioned Space	100%	
			Percent Conditioned Space Defined as Exterior Zone	45%	
Window/Wall Ratio (WIWAR) (%)	0.15				
Shading Coefficient (SC)	0.65		Typical # Stories	3	
			Floor to Floor Height (m)	3.7 m	12.0 ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	80%				20%				100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	30 m²/person	323 ft²/person	%OA 34.02%
Occupancy Schedule Occ. Period	90%		
Occupancy Schedule Unocc. Period	75%		
Fresh Air Requirements or Outside Air	45 L/s.person	95 CFM/person	

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)
If Fresh Air Control Type = "2" enter % FA. to the right: 15%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation 0.5 L/s.m² 0.10 CFM/ft²
50% operation (%)

Sizing Factor 4
Total Air Circulation or Design Air Flow 4.41 L/s.m² 0.87 CFM/ft²

Separate Make-up air unit (100% OA) L/s.m² CFM/ft²
Operation occupied period 50%
Operation unoccupied period 50%

Infiltration Rate 0.70 L/s.m² 0.14 CFM/ft²
(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Economizer

	Enthalpy Based		Dry-Bulb Based	Total
Incidence of Use			100%	100%
Switchover Point		KJ/kg.	18 °C	
		Btu/lbm	64.4 °F	

Summary of Design Parameters		
Peak Design Cooling Load	#######	
Peak Zone Sensible Load	443,312	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R.H	13.2	ft³/lbm
Design CFM	20,623	
Total air circulation or Design air flo	4.41	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	24	°C	75.2	°F	16.5	°C	61.7	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	24	°C	75.2	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All		Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	250	Lux	23.2	ft-candles
Floor Fraction (GLFF)	0.40			
Connected Load	8.8	W/m²	0.8	W/ft²
Occ. Period(Hrs./yr.)	8760			
Unocc. Period(Hrs./yr.)				
Usage During Occupied Period	40%			
Usage During Unoccupied Period				
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	50	100	200	300				Total
% Distribution			50%	50%				100%
Weighted Average								**250**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	5%	5%	45%	45%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	1.1
	MJ/m².yr	44

SECONDARY LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.60			
Connected Load	17.0	W/m²	1.6	W/ft²
Occ. Period(Hrs./yr.)	8760			
Unocc. Period(Hrs./yr.)				
Usage During Occupied Period	65%			
Usage During Unoccupied Period	20%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	600	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	4%	5%	50%	40%		0%	1%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	5.4
	MJ/m².yr	209

TERTIARY LIGHTING

Light Level	250.00	Lux	23.2	ft-candles
Floor Fraction (HBLFF)				
Connected Load	11.9	W/m²	1.1	W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	200	300	500	700				Total
% Distribution	50%	50%						100%
Weighted Average								**250**

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)	15%	15%	20%	50%			0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	88	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LPD 13.72 W/m²

EUI TOTAL	kWh/ft².yr	7
	MJ/m².yr	254

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	54.55		51		100		200		217			
Density (device/occupant)	0.48		0.48		0.02		0.02		0.04			
Connected Load	0.9	W/m²	0.8	W/m²	0.1	W/m²	0.1	W/m²	0.3	W/m²	3.85	W/m²
	0.1	W/ft²	0.1	W/ft²	0.01	W/ft²	0.01	W/ft²	0.02	W/ft²	0.36	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		90%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		25%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2600		4100	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6160		4660	

Total end-use load (occupied period)	5.4	W/m²	0.5	W/ft²
Total end-use load (unocc. period)	2.2	W/m²	0.2	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	40%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2"

Compter Servers	EUI	kWh/ft².yr	0.2
		MJ/m².yr	8.10
Computer Equipment	EUI	kWh/ft².yr	0.9
		MJ/m².yr	35.0
Plug Loads	EUI	kWh/ft².yr	1.7
		MJ/m².yr	67.3

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Commercial food services

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	3.1	EUI	kWh/ft².yr	2.1
	MJ/m².yr	120.0		MJ/m².yr	80.0

REFRIGERATION

Provide description below:

Walk-in coolers/freezers, reach-in coolers/freezers, refrigerated buffet cases

EUI	kWh/ft².yr	0.4
	MJ/m².yr	15.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.3
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Health Care Baseline | **SIZE:** All | **VINTAGE:** | **REGION:** Island Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)	50%						50%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load: 36.6 W/m² — 11.6 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load): 1052 MJ/m².yr — 27.2 kWh/ft².yr
Sizing Factor: 1.00
Electric Fuel Share: 50.0% — Fuel Oil / Propane Fuel Sh: 50.0% — Oil Fuel Share:

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	27.2	38.8	33.0
MJ/m².yr	1052	1503	1278

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Reciprocating Chillers Open	Reciprocating Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)	70.0%				30.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	14.0	57.2

Peak Cooling Load: 67 W/m² — 21 Btu/hr.ft² — 562 ft²/Ton
Seasonal Cooling Load (Tertiary Load): 110.4 MJ/m².yr — 2.9 kWh/ft².yr
Sizing Factor: 1.00 — Operation (occ. perio: 3000 hrs/year — Note value cannot be less than 2,900 hrs/year)
A/C Saturation (Incidence of A/C): 60.0%
Electric Fuel Share: 100.0% — Fuel Oil / Propane Fuel Share:

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	1.0		1.0
MJ/m².yr	37		37

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					40%
Eff./COP	0.65				0.75

	Fossil	Elec. Res.
Fuel Share	40%	60%
Blended Efficiency	0.75	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 118.3
Wetting Use Percentage: 90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	3.4	4.1	3.6
MJ/m².yr	130	158	141.1

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Health Care	**All**		**Island Interconnected**
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	4.4	L/s.m²	0.87	CFM/ft²
System Static Pressure CAV	875	Pa	3.5	wg
System Static Pressure VAV	875	Pa	3.5	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	1.00			
Fan Design Load CAV	8.7	W/m²	0.81	W/ft²
Fan Design Load VAV	8.7	W/m²	0.81	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	80%	20%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	80%	20%	80%	20%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.02	CFM/ft²
Other Exhaust (Smoking/Conference)	0.5	L/s.m²	0.10	CFM/ft²
Total Building Exhaust	0.6	L/s.m²	0.12	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.8	W/m²	0.08	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.024	kW/kW	0.09	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.63	W/m²	0.15	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.004	L/s.m²	0.005	U.S. gpm/ft²
Pump Head Pressure	100	kPa	33	ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load	0.89	W/m²	0.08	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0043	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.6	W/m²	0.05	W/ft²		

Supply Fan Occ. Period	4000	hrs./year
Supply Fan Unocc. Period	4760	hrs./year
Supply Fan Energy Consumption	62.0	kWh/m².yr
Exhaust Fan Occ. Period	4000	hrs./year
Exhaust Fan Unocc. Period	4760	hrs./year
Exhaust Fan Energy Consumption	6.4	kWh/m².yr
Condenser Pump Energy Consumption	1.1	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.7	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption	2.0	kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI	kWh/ft².yr	6.7
	MJ/m².yr	260.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Health Care	**All**		**Island Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **36.1** kWh/ft².yr **1,397.3** MJ/m².yr **Fuel Oil / Propane:** **21.0** kWh/ft².yr **814.8** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	1.1	44.2
SECONDARY LIGHTING	5.4	209.4
TERTIARY LIGHTING		
OTHER PLUG LOADS	1.7	67.3
HVAC FANS & PUMPS	6.7	260.0
REFRIGERATION	0.4	15.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.9	35.0
COMPUTER SERVERS	0.2	8.1
ELEVATORS	0.2	7.7
OUTDOOR LIGHTING	0.9	33.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	13.6	526.2	19.4	751.7
SPACE COOLING	0.6	22.4		
DOMESTIC HOT WATER	2.0	78.0	1.6	63.1
FOOD SERVICE EQUIPMENT	2.1	80.0		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Schools Baseline | **SIZE:** All | **VINTAGE:** | **REGION:** Island Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Building Size	3,717	m²	40,000	ft²
Roof U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Footprint (m²)	3,717	m²	40,000	ft²
Glazing U value (W/m².°C)	3.84	W/m².°C	0.68	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	5			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	50%			
Window/Wall Ratio (WIWAR) (%)	0.13								
Shading Coefficient (SC)	0.65				Typical # Stories	1			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	10	m²/person	108	ft²/person
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	3	L/s.person	6	CFM/person

%OA 10.15%

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 34%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation 0.5 L/s.m² 0.10 CFM/ft²; 50% operation (%)

Sizing Factor	1.3			
Total Air Circulation or Design Air Flow	2.96	L/s.m²	0.58	CFM/ft²
Infiltration Rate	0.42	L/s.m²	0.08	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA) L/s.m² CFM/ft²
Operation occupied period 50%
Operation unoccupied period 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	689,051	
Peak Zone Sensible Load	385,006	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	17,910	
Total air circulation or Design air	2.96	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	21	°C	69.8	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	18.8	°C	65.84	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Schools	**All**		**Island Interconnected**
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.85			
Connected Load	14.7	W/m²	1.4	W/ft²
Occ. Period(Hrs./yr.)	2000			
Unocc. Period(Hrs./yr.)	6760			
Usage During Occupied Period	85%			
Usage During Unoccupied Period	15%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			70%	30%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	3.1
	MJ/m².yr	122

ARCHITECTURAL LIGHTING

Light Level	400	Lux	37.2	ft-candles
Floor Fraction (ALFF)	0.15			
Connected Load	18.0	W/m²	1.7	W/ft²
Occ. Period(Hrs./yr.)	2000			
Unocc. Period(Hrs./yr.)	6760			
Usage During Occupied Period	90%			
Usage During Unoccupied Period	15%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	400	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**400**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	12%	10%	15%	10%	40%	10%	3%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.7
	MJ/m².yr	27

SPECIAL PURPOSE LIGHTING

Light Level	300.00	Lux	27.9	ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	3000			
Unocc. Period(Hrs./yr.)	5760			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	10%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING — Overall LP 15.17 W/m²

EUI TOTAL	kWh/ft².yr	4
	MJ/m².yr	149

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.05	0.05	0.02	0.02	0.01	
Connected Load	0.3 W/m²	0.3 W/m²	0.2 W/m²	0.4 W/m²	0.1 W/m²	0.2 W/m²
	0.0 W/ft²	0.0 W/ft²	0.02 W/ft²	0.04 W/ft²	0.01 W/ft²	0.02 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	100%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	3000
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	5760

Total end-use load (occupied period)	1.3 W/m²	0.1 W/ft²
Total end-use load (unocc. period)	0.8 W/m²	0.1 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	59%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2"

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	0.54
		MJ/m².yr	21.01
Plug Loads	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.23

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	0.2	EUI	kWh/ft².yr	0.1
	MJ/m².yr	8.0		MJ/m².yr	4.0

]

REFRIGERATION

Provide description below:

EUI	kWh/ft².yr	0.1
	MJ/m².yr	3.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	3

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Schools Baseline
SIZE: All
VINTAGE:
REGION: Island Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)	25%						75%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load: 55.8 W/m² — 17.7 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load): 291 MJ/m².yr — 7.5 kWh/ft².yr
Sizing Factor: 1.00

Electric Fuel Share: 75.0% Fuel Oil / Propane Fuel Share: 25.0% Oil Fuel Share:

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

EUI	kWh/ft².yr	MJ/m².yr
All Electric EUI	7.5	291
Fuel Oil / Propane EUI	10.7	416
Market Composite EUI	8.3	323

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Recprocting Chillers Open	Recprocting Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)					100.0%			100.0%
COP	2.5	5.4	4.4	3.6	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.40	0.19	0.23	0.28	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	13.0	55.4

Peak Cooling Load: 54 W/m² — 17 Btu/hr.ft² — 697 ft²/Ton
Seasonal Cooling Load (Tertiary Load): 79.4 MJ/m².yr — 2.0 kWh/ft².yr

Sizing Factor: 1.00 Operation (occ. perio 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C): 2.0%

Electric Fuel Share: 100.0% Fuel Oil / Propane Fuel Sh

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

EUI	kWh/ft².yr	MJ/m².yr
All Electric EUI	1.0	38
Fuel Oil / Propane EUI		
Market Composite EUI	1.0	38

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					20%
Eff./COP	0.65				0.75

	Fossil	Elec. Res.
Fuel Share	20%	80%
Blended Efficiency	0.75	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 17.3

Wetting Use Percentage: 90%

EUI	kWh/ft².yr	MJ/m².yr
All Electric EUI	0.5	19
Fuel Oil / Propane EUI	0.6	23
Market Composite EUI	0.5	19.8

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Schools	All		Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.0	L/s.m²	0.58	CFM/ft²
System Static Pressure CAV	250	Pa	1.0	wg
System Static Pressure VAV	250	Pa	1.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	88%			
Sizing Factor	1.00			
Fan Design Load CAV	1.4	W/m²	0.13	W/ft²
Fan Design Load VAV	1.4	W/m²	0.13	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	25%	75%	25%	75%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.03	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.09	W/m²	0.10	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.003	L/s.m²	0.004	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.002	L/s.m²	0.0034	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.5	W/m²	0.04	W/ft²		

Supply Fan Occ. Period	2000	hrs./year
Supply Fan Unocc. Period	6760	hrs./year
Supply Fan Energy Consumption	5.2	kWh/m².yr
Exhaust Fan Occ. Period	2000	hrs./year
Exhaust Fan Unocc. Period	6760	hrs./year
Exhaust Fan Energy Consumption	0.8	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.5	kWh/m².yr
Circulating Pump Yearly Operation	2000	hrs./year
Circulating Pump Energy Consumption	0.2	kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	0.6
	MJ/m².yr	24.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Schools	**All**		**Island Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	**Electricity:**	**12.0**	kWh/ft².yr	**463.6**	MJ/m².yr	**Fuel Oil / Propane:**	**2.8** kWh/ft².yr	**108.7** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr	**END USE:**	Electricity kWh/ft².yr	Electricity MJ/m².yr	Fuel Oil / Propane kWh/ft².yr	Fuel Oil / Propane MJ/m².yr
GENERAL LIGHTING	3.1	121.9					
ARCHITECTURAL LIGHTING	0.7	27.3	SPACE HEATING	5.6	218.5	2.7	104.1
SPECIAL PURPOSE LIGHTING			SPACE COOLING	0.0	0.8		
OTHER PLUG LOADS	0.1	4.2	DOMESTIC HOT WATER	0.4	15.2	0.1	4.6
HVAC FANS & PUMPS	0.6	24.0	FOOD SERVICE EQUIPMENT	0.1	4.0		
REFRIGERATION	0.1	3.0					
MISCELLANEOUS	0.1	3.0					
BLOCK HEATERS							
COMPUTER EQUIPMENT	0.5	21.0					
COMPUTER SERVERS	0.1	3.7					
ELEVATORS							
OUTDOOR LIGHTING	0.4	17.0					

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: University/College Baseline | **SIZE:** All | **VINTAGE:** | **REGION:** Island Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Building Size	6,506	m²	70,000	ft²
Roof U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Footprint (m²)	3,253	m²	35,000	ft²
Glazing U value (W/m².°C)	3.58	W/m².°C	0.63	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	7			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	50%			
Window/Wall Ratio (WIWAR) (%)	0.30								
Shading Coefficient (SC)	0.65				Typical # Stories	2			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	90%				10%				100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	14	m²/person	151	ft²/person
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	10	L/s.person	21	CFM/person

%OA 17.57%

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 34%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² 0.10 CFM/ft²; 50% operation (%)

Sizing Factor	1.6			
Total Air Circulation or Design Air Flow	4.06	L/s.m²	0.80	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	#######	
Peak Zone Sensible Load	752,785	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	35,020	
Total air circulation or Design air	4.06	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	22	°C	71.6	°F	16	°C	60.8	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
University/College	**All**		**Island Interconnected**
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500 Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.90		
Connected Load	14.1 W/m²	1.3	W/ft²
Occ. Period(Hrs./yr.)	4000		
Unocc. Period(Hrs./yr.)	4760		
Usage During Occupied Period	90%		
Usage During Unoccupied Period	20%		
Fixture Cleaning:			
Incidence of Practice			
Interval	years		
Relamping Strategy & Incidence of Practice	Group	Spot	

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			60%	35%	5%	0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI		
	kWh/ft².yr	5.4
	MJ/m².yr	207

ARCHITECTURAL LIGHTING CORRIDORS

Light Level	300 Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.10		
Connected Load	11.4 W/m²	1.1	W/ft²
Occ. Period(Hrs./yr.)	4000		
Unocc. Period(Hrs./yr.)	4760		
Usage During Occupied Period	100%		
Usage During Unoccupied Period	50%		
Fixture Cleaning:			
Incidence of Practice			
Interval	years		
Relamping Strategy & Incidence of Practice	Group	Spot	

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	8%	10%	15%	65%		0%	2%	100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI		
	kWh/ft².yr	0.7
	MJ/m².yr	26

SPECIAL PURPOSE LIGHTING

Light Level	300.00 Lux	27.9	ft-candles
Floor Fraction (HBLFF)			
Connected Load	14.0 W/m²	1.3	W/ft²
Occ. Period(Hrs./yr.)	4000		
Unocc. Period(Hrs./yr.)	4760		
Usage During Occupied Period	0%		
Usage During Unoccupied Period	100%		
Fixture Cleaning:			
Incidence of Practice			
Interval	years		
Relamping Strategy & Incidence of Practice	Group	Spot	

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI		
	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING Overall LP 13.79 W/m²

EUI TOTAL		
	kWh/ft².yr	6
	MJ/m².yr	233

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	54.55	51	100	200	217	
Density (device/occupant)	0.31	0.31	0.02	0.02	0.01	
Connected Load	1.2 W/m²	1.1 W/m²	0.1 W/m²	0.3 W/m²	0.1 W/m²	1.3 W/m²
	0.1 W/ft²	0.1 W/ft²	0.01 W/ft²	0.03 W/ft²	0.01 W/ft²	0.12 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	100%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2600	2000
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6160	6760

Total end-use load (occupied period)	3.9 W/m²	0.4 W/ft²
Total end-use load (unocc. period)	2.2 W/m²	0.2 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	55%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	1.34
		MJ/m².yr	51.73
Plug Loads	EUI	kWh/ft².yr	0.65
		MJ/m².yr	25.18

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	0.5	EUI	kWh/ft².yr	0.4
	MJ/m².yr	20.0		MJ/m².yr	15.0

REFRIGERATION

Provide description below:

EUI		
	kWh/ft².yr	0.5
	MJ/m².yr	20.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: University/College Baseline
SIZE: All
VINTAGE:
REGION: Island Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)	80%						20%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load: 52.3 W/m² — 16.6 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load): 297 MJ/m².yr — 7.7 kWh/ft².yr
Sizing Factor: 1.00

Electric Fuel Share: 20.0% — Fuel Oil / Propane Fuel Share: 80.0% — Oil Fuel Share:

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	7.7
MJ/m².yr	297

Fuel Oil / Propane EUI	
kWh/ft².yr	10.9
MJ/m².yr	424

Market Composite EUI	
kWh/ft².yr	10.3
MJ/m².yr	399

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Reciprocating Chillers Open	Reciprocating Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)	50.0%				50.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	13.0	55.4

Peak Cooling Load: 80 W/m² — 25 Btu/hr.ft² — 474 ft²/Ton
Seasonal Cooling Load (Tertiary Load): 111.4 MJ/m².yr — 2.9 kWh/ft².yr

Sizing Factor: 1.00 — Operation (occ. perio 3000 hrs/year — Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C): 15.0%

Electric Fuel Share: 100.0% — Fuel Oil / Propane Fuel Share:

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	1.2
MJ/m².yr	46

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	1.2
MJ/m².yr	46

SERVICE HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					75%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	75%		25%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 22.8

Wetting Use Percentage: 90%

All Electric EUI	
kWh/ft².yr	0.6
MJ/m².yr	25

Fuel Oil / Propane EUI	
kWh/ft².yr	0.8
MJ/m².yr	30

Market Composite EUI	
kWh/ft².yr	0.7
MJ/m².yr	29.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: University/College Baseline | **SIZE:** All | **VINTAGE:** | **REGION:** Island Interconnected

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	4.1	L/s.m²	0.80	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	6.4	W/m²	0.59	W/ft²
Fan Design Load VAV	6.4	W/m²	0.59	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	90%	10%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%

Comments:

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.03	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.024	kW/kW	0.08	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.87	W/m²	0.17	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.004	L/s.m²	0.006	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0051	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	50	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.7	W/m²	0.06	W/ft²		

Supply Fan Occ. Period	4000	hrs./year
Supply Fan Unocc. Period	4760	hrs./year
Supply Fan Energy Consumption	45.9	kWh/m².yr
Exhaust Fan Occ. Period	4000	hrs./year
Exhaust Fan Unocc. Period	4760	hrs./year
Exhaust Fan Energy Consumption	1.6	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.7	kWh/m².yr
Circulating Pump Yearly Operation	6000	hrs./year
Circulating Pump Energy Consumption	3.3	kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	4.8
	MJ/m².yr	185.5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
University/College	**All**		**Island Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	**Electricity:**	**16.5**	kWh/ft².yr	**637.9**	MJ/m².yr	**Fuel Oil / Propane:**	**9.3** kWh/ft².yr	**362.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	5.4	207.3
ARCHITECTURAL LIGHTING CORI	0.7	26.2
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.7	25.2
HVAC FANS & PUMPS	4.8	185.5
REFRIGERATION	0.5	20.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	1.3	51.7
COMPUTER SERVERS	0.1	3.7
ELEVATORS	0.1	3.9
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	1.5	59.4	8.8	339.2
SPACE COOLING	0.2	6.9		
SERVICE HOT WATER	0.2	6.3	0.6	22.8
FOOD SERVICE EQUIPMENT	0.4	15.0		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All		Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Building Size	5,576	m²	60,000	ft²
Roof U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Footprint (m²)	5,576	m²	60,000	ft²
Glazing U value (W/m².°C)	3.84	W/m².°C	0.68	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.05								
Shading Coefficient (SC)	0.80				Typical # Stories	1			
					Floor to Floor Height (m)	6.1	m	19.9	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	100	m²/person	1076	ft²/person	%OA	6.56%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	10	L/s.person	21	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right:
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	1			
Total Air Circulation or Design Air Flow	1.53	L/s.m²	0.30	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)	L/s.m²	CFM/ft²
Operation occupied period	50%	
Operation unoccupied period	50%	

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	509,519	
Peak Zone Sensible Load	387,357	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	18,020	
Total air circulation or Design air	1.53	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	16	°C	60.8	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All		Island Interconnected
Baseline			

LIGHTING

HIGH BAY LIGHTING

Light Level	400	Lux	37.2	ft-candles
Floor Fraction (GLFF)	0.90			
Connected Load	10.5	W/m²	1.0	W/ft²
Occ. Period(Hrs./yr.)	3500			
Unocc. Period(Hrs./yr.)	5260			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	15%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution	50%	50%						100%
Weighted Average								**400**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			20%	10%	60%	10%		100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI		
	kWh/ft².yr	3.8
	MJ/m².yr	146

OTHER, OFFICE LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.10			
Connected Load	20.9	W/m²	1.9	W/ft²
Occ. Period(Hrs./yr.)	3000			
Unocc. Period(Hrs./yr.)	5760			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	15%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	10%	5%	60%	25%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI		
	kWh/ft².yr	0.8
	MJ/m².yr	29

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%					0%	0.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI		
	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 11.57 W/m²

EUI TOTAL		
	kWh/ft².yr	4.5
	MJ/m².yr	175

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	54.55		51		100		200		217			
Density (device/occupant)	0.59		0.59		0.03		0.03		0.06			
Connected Load	0.3	W/m²	0.3	W/m²	0.0	W/m²	0.1	W/m²	0.1	W/m²	2	W/m²
	0.0	W/ft²	0.0	W/ft²	0.00	W/ft²	0.01	W/ft²	0.01	W/ft²	0.19	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		90%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		25%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2000		3500	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6760		5260	

Total end-use load (occupied period)	2.6	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	1.0	W/m²	0.1	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	39%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.34
		MJ/m².yr	13.30
Plug Loads	EUI	kWh/ft².yr	0.83
		MJ/m².yr	32.15

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr		EUI	kWh/ft².yr	
	MJ/m².yr			MJ/m².yr	

REFRIGERATION

Provide description below:

Process

EUI		
	kWh/ft².yr	1.5
	MJ/m².yr	60.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Warehouse/Wholesale	**All**		**Island Interconnected**
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boiler	Unit Heater	Packaged Rooftop	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)	25%						75%	100%
Eff./COP	70%	70%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.43	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	40.6	W/m²	12.9	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	247	MJ/m².yr	6.4	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share	75.0%	Fuel Oil / Propane Fuel Share	25.0%	Oil Fuel Share	

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	6.4
MJ/m².yr	247

Fuel Oil / Propane EUI	
kWh/ft².yr	9.1
MJ/m².yr	353

Market Composite EUI	
kWh/ft².yr	7.1
MJ/m².yr	273

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	27	W/m²	8	Btu/hr.ft²	1413	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	39.0	MJ/m².yr	1.0	kWh/ft².yr		

Sizing Factor 1.00 — Operation (occ. perio 3000 hrs/year — Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 5.0%

Electric Fuel Share 100.0% — Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

All Electric EUI	
kWh/ft².yr	0.4
MJ/m².yr	16

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.4
MJ/m².yr	16

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					20%
Eff./COP	0.65				0.75

	Fossil	Elec. Res.
Fuel Share	20%	80%
Blended Efficiency	0.75	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 17.0

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	0.5
MJ/m².yr	19

Fuel Oil / Propane EUI	
kWh/ft².yr	0.6
MJ/m².yr	23

Market Composite EUI	
kWh/ft².yr	0.5
MJ/m².yr	19.5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Warehouse/Wholesale	**All**		**Island Interconnected**
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	1.5	L/s.m²	0.30	CFM/ft²
System Static Pressure CAV	300	Pa	1.2	wg
System Static Pressure VAV	300	Pa	1.2	wg
Fan Efficiency	60%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	1.0	W/m²	0.09	W/ft²
Fan Design Load VAV	1.0	W/m²	0.09	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	80%	20%	80%	20%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.0	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.1	L/s.m²	0.03	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.54	W/m²	0.05	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.001	L/s.m²	0.002	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.001	L/s.m²	0.0017	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	50	kPa	17	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.1	W/m²	0.01	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	7.3	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.4	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.2	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption	0.1	kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI	kWh/ft².yr	0.8
	MJ/m².yr	32.8

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Warehouse/Wholesale	**All**		**Island Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	**Electricity:**	**14.1** kWh/ft².yr	**545.9** MJ/m².yr	**Fuel Oil / Propane:**	**2.4** kWh/ft².yr	**92.7** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
HIGH BAY LIGHTING	3.8	146.3
OTHER, OFFICE LIGHTING	0.8	29.1
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.8	32.1
HVAC FANS & PUMPS	0.8	32.8
REFRIGERATION	1.5	60.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.3	13.3
COMPUTER SERVERS	0.1	4.4
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	4.8	185.1	2.3	88.1
SPACE COOLING	0.0	0.8		
DOMESTIC HOT WATER	0.4	14.9	0.1	4.5
FOOD SERVICE EQUIPMENT				

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All		Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Building Size	929	m²	10,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	929	m²	10,000	ft²
Glazing U value (W/m².°C)	3.97	W/m².°C	0.70	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.36								
Shading Coefficient (SC)	0.58				Typical # Stories	1			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	60%							40%	100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	20	m²/person	215	ft²/person	%OA	24.92%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right:

(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | L/s.m² | CFM/ft² | operation (%)

Sizing Factor	1.3			
Total Air Circulation or Design Air Flow	4.01	L/s.m²	0.79	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²	CFM/ft²
Operation occupied period	50%		
Operation unoccupied period	50%		

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	323,602	
Peak Zone Sensible Load	130,664	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	6,078	
Total air circulation or Design air	4.01	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				98%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All		Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	400	Lux	37.2	ft-candles
Floor Fraction (GLFF)	0.50			
Connected Load	10.7	W/m²	1.0	W/ft²
Occ. Period(Hrs./yr.)	4300			
Unocc. Period(Hrs./yr.)	4460			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	10%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	450	550	650		Total
% Distribution	10%	80%	10%		100%
Weighted Average					**550**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			20.0%	80.0%				100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI kWh/ft².yr 2.4; MJ/m².yr 92

ARCHITECTURAL LIGHTING

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.50			
Connected Load	34.4	W/m²	3.2	W/ft²
Occ. Period(Hrs./yr.)	4300			
Unocc. Period(Hrs./yr.)	4460			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	10%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	200	300	400	500	Total
% Distribution	10%	40%	40%	10%	100%
Weighted Average					**350**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	70%	25%					5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	84	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI kWh/ft².yr 7.6; MJ/m².yr 294

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	2500			
Unocc. Period(Hrs./yr.)	6260			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 — 1.00

Light Level (Lux)	300	500	700	1000	Total
% Distribution					
Weighted Average					

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI kWh/ft².yr; MJ/m².yr

TOTAL LIGHTING — Overall LP 22.57 W/m² — EUI TOTAL kWh/ft².yr 10; MJ/m².yr 386

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.16	0.16	0.01		0.03	
Connected Load (W/m²)	0.4	0.4	0.1		0.1	1.15
Connected Load (W/ft²)	0.0	0.0	0.00		0.01	0.11
Diversity Occupied Period	80%	80%	80%	80%	100%	80%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	2500
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	6260

Total end-use load (occupied period)	1.8	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	1.2	W/m²	0.1	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	65%			

		kWh/ft².yr	MJ/m².yr
Computer Servers	EUI	0.11	4.42
Computer Equipment	EUI	0.41	16.00
Plug Loads	EUI	0.55	21.24

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: 2.0% Electricity Fuel Share: 98.0%

Lunch room/cafeteria/restaurant

		kWh/ft².yr	MJ/m².yr
Fuel Oil / Propane EUI	EUI	0.1	5.0
All Electric EUI	EUI	34.3	1330.0

REFRIGERATION

Provide description below:

Lunch room/cafeteria/restaurant

EUI kWh/ft².yr 16.8; MJ/m².yr 650.0

BLOCK HEATERS & MISCELLANEOUS

		kWh/ft².yr	MJ/m².yr
Block Heaters	EUI		
Miscellaneous	EUI	0.3	10

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All		Island Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High						
System Present (%)	10%						90%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	63.6	W/m²	20.2	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	517	MJ/m².yr	13.3	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 90.0% Fuel Oil / Propane Fuel Share 10.0% Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	kWh/ft².yr	13.3
	MJ/m².yr	517
Fuel Oil / Propane EUI	kWh/ft².yr	19.1
	MJ/m².yr	738
Market Composite EUI	kWh/ft².yr	13.9
	MJ/m².yr	539

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		WSHP	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE		Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	3.5	3.5	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.29	0.29	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load	102	W/m²	32	Btu/hr.ft²	371	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	126.1	MJ/m².yr	3.3	kWh/ft².yr		

Sizing Factor 1.00 Operation (occ. period) 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 70.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	kWh/ft².yr	1.4
	MJ/m².yr	55
Fuel Oil / Propane EUI	kWh/ft².yr	
	MJ/m².yr	
Market Composite EUI	kWh/ft².yr	1.4
	MJ/m².yr	55

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Tank				Boiler
System Present (%)					10%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	5%		95%
Blended Efficiency	1.50		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 700.0

Wetting Use Percentage 90%

All Electric EUI		Fuel Oil / Propane EUI		Market Composite EUI	
kWh/ft².yr	19.9	kWh/ft².yr	12.0	kWh/ft².yr	19.5
MJ/m².yr	769	MJ/m².yr	467	MJ/m².yr	754.1

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All		Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	4.0	L/s.m²	0.79	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	1.00			
Fan Design Load CAV	6.8	W/m²	0.63	W/ft²
Fan Design Load VAV	6.8	W/m²	0.63	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	60%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	90%	10%	90%	10%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.04	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.06	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	40%			
Fan Motor Efficiency	80%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	2.00	W/m²	0.19	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.005	L/s.m²	0.008	U.S. gpm/ft²
Pump Head Pressure	90	kPa	30	ft
Pump Efficiency	55%			
Pump Motor Efficiency	90%			
Sizing Factor	1.0			
Pump Connected Load	0.98	W/m²	0.09	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0065	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	150	kPa	50	ft		
Pump Efficiency	55%					
Pump Motor Efficiency	90%					
Sizing Factor	0.5					
Pump Connected Load	0.7	W/m²	0.06	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	33.6	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	2.0	kWh/m².yr
Condenser Pump Energy Consumption	0.5	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.7	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption	0.3	kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	3.5
	MJ/m².yr	133.9

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Restaurant	**All**		**Island Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	**Electricity:**	**97.5** kWh/ft².yr	**3,775.8** MJ/m².yr	**Fuel Oil / Propane:**	**2.5** kWh/ft².yr	**97.2** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	2.4	91.7
ARCHITECTURAL LIGHTING	7.6	294.0
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.5	21.2
HVAC FANS & PUMPS	3.5	133.9
REFRIGERATION	16.8	650.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.4	16.0
COMPUTER SERVERS	0.1	4.4
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	12.0	464.9	1.9	73.8
SPACE COOLING	1.0	38.5		
DOMESTIC HOT WATER	18.9	730.8	0.6	23.3
FOOD SERVICE EQUIPMENT	33.6	1,303.4	0.0	0.1

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Large Office Baseline | **SIZE:** > 100 kW | **VINTAGE:** Existing | **REGION:** Labrador Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.33	W/m².°C	0.06	Btu/hr.ft² .°F	Typical Building Size	929 m²	10,000	ft²
Roof U value (W/m².°C)	0.24	W/m².°C	0.04	Btu/hr.ft² .°F	Typical Footprint (m²)	929 m²	10,000	ft²
Glazing U value (W/m².°C)	3.52	W/m².°C	0.62	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1		
					Percent Conditioned Space	100%		
					Percent Conditioned Space Defined as Exterior Zone	45%		
Window/Wall Ratio (WIWAR) (%)	0.40							
Shading Coefficient (SC)	0.58				Typical # Stories	1		
					Floor to Floor Height (m)	3.7 m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	75%				25%				100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	26 m²/person	274 ft²/person	%OA	7.43%
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	8 L/s.person	16 CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) (1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air): 1

If Fresh Air Control Type = "2" enter % FA. to the right:

If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: L/s.m² CFM/ft² operation (%)

Sizing Factor	1.3	
Total Air Circulation or Design Air Flow	3.96 L/s.m²	0.78 CFM/ft²
Infiltration Rate	0.40 L/s.m²	0.08 CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA): L/s.m² CFM/ft²

Operation occupied period: 50%

Operation unoccupied period: 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	190,872	
Peak Zone Sensible Load	128,897	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	5,996	
Total air circulation or Design air	3.96	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				98%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW	Existing	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	550	Lux	51.1	ft-candles
Floor Fraction (GLFF)	0.90			
Connected Load	14.8	W/m²	1.4	W/ft²

Occ. Period(Hrs./yr.)	3300
Unocc. Period(Hrs./yr.)	5460
Usage During Occupied Period	95%
Usage During Unoccupied Period	20%

Light Level (Lux)	450	550	650		Total
% Distribution	10%	80%	10%		100%
Weighted Average					**550**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			20.0%	80.0%				100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	5.2
	MJ/m².yr	202

ARCHITECTURAL LIGHTING

Light Level	350	Lux	32.5	ft-candles
Floor Fraction (ALFF)	0.10			
Connected Load	31.0	W/m²	2.9	W/ft²

Occ. Period(Hrs./yr.)	3400
Unocc. Period(Hrs./yr.)	5360
Usage During Occupied Period	95%
Usage During Unoccupied Period	40%

Light Level (Lux)	200	300	400	500	Total
% Distribution	10%	40%	40%	10%	100%
Weighted Average					**350**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	45%	45%			5%		5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	84	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	1.5
	MJ/m².yr	60

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

Light Level (Lux)	300	500	700	1000	Total
% Distribution					
Weighted Average					

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 16.38 W/m²

EUI TOTAL	kWh/ft².yr	7
	MJ/m².yr	262

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.9		0.9		0.15		0.1		0.06			
Connected Load	1.9	W/m²	1.8	W/m²	0.6	W/m²	0.8	W/m²	0.5	W/m²	1.5	W/m²
	0.2	W/ft²	0.2	W/ft²	0.05	W/ft²	0.07	W/ft²	0.05	W/ft²	0.14	W/ft²
Diversity Occupied Period	80%		80%		80%		80%		100%		80%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		50%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2000		2500	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6760		6260	

Total end-use load (occupied period)	5.8	W/m²	0.5	W/ft²
Total end-use load (unocc. period)	3.8	W/m²	0.4	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	66%			

Computer Servers	EUI	kWh/ft².yr	0.42
		MJ/m².yr	16.20
Computer Equipment	EUI	kWh/ft².yr	2.36
		MJ/m².yr	91.24
Plug Loads	EUI	kWh/ft².yr	0.72
		MJ/m².yr	27.70

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: Electricity Fuel Share: 100.0%

Lunch room/cafeteria/restaurant

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	0.1	EUI	kWh/ft².yr	0.1
	MJ/m².yr	5.0		MJ/m².yr	4.0

REFRIGERATION

Provide description below:

Lunch room/cafeteria/restaurant

EUI	kWh/ft².yr	0.1
	MJ/m².yr	4.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW	Existing	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				Total
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)							100%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load: 64.3 W/m² | 20.4 Btu/hr.ft²

Seasonal Heating Load (Tertiary Load): 538 MJ/m².yr | 13.9 kWh/ft².yr

Sizing Factor: 1.00

Electric Fuel Share: 100.0% Fuel Oil / Propane Fuel Share: Oil Fuel Share:

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	13.9		13.9
MJ/m².yr	538		538

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	WSHP	Reciprocating Chillers Open	Reciprocating Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)	20.0%				80.0%			100.0%
COP	4.7	5.4	3.5	3.5	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.29	0.29	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	14.0	57.2

Peak Cooling Load: 60 W/m² | 19 Btu/hr.ft² | 629 ft²/Ton

Seasonal Cooling Load (Tertiary Load): 70.3 MJ/m².yr | 1.8 kWh/ft².yr

Sizing Factor: 1.00 Operation (occ. period) 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C): 50.0%

Electric Fuel Share: 100.0% Fuel Oil / Propane Fuel Share:

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.7		0.7
MJ/m².yr	29		29

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Tank				Boiler
System Present (%)					0%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 22.8

Wetting Use Percentage: 90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.6	0.8	0.6
MJ/m².yr	25	30	25.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW	Existing	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	4.0	L/s.m²	0.78	CFM/ft²
System Static Pressure CAV	350	Pa	1.4	wg
System Static Pressure VAV	350	Pa	1.4	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	1.00			
Fan Design Load CAV	3.1	W/m²	0.29	W/ft²
Fan Design Load VAV	3.1	W/m²	0.29	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	75%	25%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%

Comments:

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.04	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.06	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	40%			
Fan Motor Efficiency	80%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.18	W/m²	0.11	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.003	L/s.m²	0.005	U.S. gpm/ft²
Pump Head Pressure	90	kPa	30	ft
Pump Efficiency	55%			
Pump Motor Efficiency	90%			
Sizing Factor	1.0			
Pump Connected Load	0.58	W/m²	0.05	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0038	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	150	kPa	50	ft		
Pump Efficiency	55%					
Pump Motor Efficiency	90%					
Sizing Factor	0.5					
Pump Connected Load	0.4	W/m²	0.04	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	21.2	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.8	kWh/m².yr
Condenser Pump Energy Consumption	0.3	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI	kWh/ft².yr	2.2
	MJ/m².yr	85.1

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW	Existing	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	28.3 kWh/ft².yr	1,094.9 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	5.2	202.1
ARCHITECTURAL LIGHTING	1.5	59.9
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.7	27.7
HVAC FANS & PUMPS	2.2	85.1
REFRIGERATION	0.1	4.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	2.4	91.2
COMPUTER SERVERS	0.4	16.2
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	13.9	538.2		
SPACE COOLING	0.4	14.5		
DOMESTIC HOT WATER	0.6	25.0	0.0	0.0
FOOD SERVICE EQUIPMENT	0.1	4.0		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	Existing	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	929	m²	10,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	929	m²	10,000	ft²
Glazing U value (W/m².°C)	3.52	W/m².°C	0.62	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.30								
Shading Coefficient (SC)	0.58				Typical # Stories	1			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	26	m²/person	274	ft²/person	%OA 8.06%
Occupancy Schedule Occ. Period	90%				
Occupancy Schedule Unocc. Period					
Fresh Air Requirements or Outside Air	8	L/s.person	16	CFM/person	

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right:
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | L/s.m² | CFM/ft² | operation (%)

Sizing Factor	1.3			
Total Air Circulation or Design Air Flow	3.65	L/s.m²	0.72	CFM/ft²
Infiltration Rate	0.40	L/s.m²	0.08	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	180,760	
Peak Zone Sensible Load	118,786	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	5,526	
Total air circulation or Design air	3.65	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				98%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	Existing	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	550	Lux	51.1	ft-candles
Floor Fraction (GLFF)	0.95			
Connected Load	14.8	W/m²	1.4	W/ft²
Occ. Period(Hrs./yr.)	2500			
Unocc. Period(Hrs./yr.)	6260			
Usage During Occupied Period	95%			
Usage During Unoccupied Period	20%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	450	550	650					Total
% Distribution	10%	80%	10%					100%
Weighted Average								**550**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			20.0%	80.0%				100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI		
	kWh/ft².yr	4.7
	MJ/m².yr	183

ARCHITECTURAL LIGHTING

Light Level	350	Lux	32.5	ft-candles
Floor Fraction (ALFF)	0.05			
Connected Load	31.0	W/m²	2.9	W/ft²
Occ. Period(Hrs./yr.)	2500			
Unocc. Period(Hrs./yr.)	6260			
Usage During Occupied Period	95%			
Usage During Unoccupied Period	40%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	200	300	400	500				Total
% Distribution	10%	40%	40%	10%				100%
Weighted Average								**350**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	45%	45%			5%		5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	84	65	95	90	

EUI		
	kWh/ft².yr	0.7
	MJ/m².yr	27

EUI = Load X Hrs. X SF X GLFF

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI		
	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 15.57 W/m²

EUI TOTAL		
	kWh/ft².yr	5
	MJ/m².yr	210

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.9		0.9		0.15		0.1		0.06			
Connected Load	1.9	W/m²	1.8	W/m²	0.6	W/m²	0.8	W/m²	0.5	W/m²	1.5	W/m²
	0.2	W/ft²	0.2	W/ft²	0.05	W/ft²	0.07	W/ft²	0.05	W/ft²	0.14	W/ft²
Diversity Occupied Period	80%		80%		80%		80%		100%		80%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		50%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2000		2500	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6760		6260	

Total end-use load (occupied period)	5.8	W/m²	0.5	W/ft²
Total end-use load (unocc. period)	3.8	W/m²	0.4	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	66%			

Computer Servers	EUI	kWh/ft².yr	0.42
		MJ/m².yr	16.20
Computer Equipment	EUI	kWh/ft².yr	2.36
		MJ/m².yr	91.24
Plug Loads	EUI	kWh/ft².yr	0.72
		MJ/m².yr	27.70

FOOD SERVICE EQUIPMENT

Provide description below:

Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr		EUI	kWh/ft².yr	
	MJ/m².yr			MJ/m².yr	

REFRIGERATION

Provide description below:

EUI		
	kWh/ft².yr	
	MJ/m².yr	

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	Existing	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				Total
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load 51.3 W/m² 16.3 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load) 414 MJ/m².yr 10.7 kWh/ft².yr
Sizing Factor 1.00

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	10.7
MJ/m².yr	414

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	10.7
MJ/m².yr	414

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		WSHP	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE		Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	3.5	3.5	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.29	0.29	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load 57 W/m² 18 Btu/hr.ft² 664 ft²/Ton
Seasonal Cooling Load (Tertiary Load) 67.3 MJ/m².yr 1.7 kWh/ft².yr

Sizing Factor 1.00 Operation (occ. period) 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 50.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.7
MJ/m².yr	29

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.7
MJ/m².yr	29

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Tank				Boiler
System Present (%)					0%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 22.8

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	0.6
MJ/m².yr	25

Fuel Oil / Propane EUI	
kWh/ft².yr	0.8
MJ/m².yr	30

Market Composite EUI	
kWh/ft².yr	0.6
MJ/m².yr	25.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	Existing	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.6	L/s.m²	0.72	CFM/ft²
System Static Pressure CAV	350	Pa	1.4	wg
System Static Pressure VAV	350	Pa	1.4	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	0.50			
Fan Design Load CAV	1.4	W/m²	0.13	W/ft²
Fan Design Load VAV	1.4	W/m²	0.13	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.04	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.06	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	40%			
Fan Motor Efficiency	80%			
Sizing Factor	0.5			
Exhaust Fan Connected Load	0.1	W/m²	0.01	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.12	W/m²	0.10	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.003	L/s.m²	0.004	U.S. gpm/ft²
Pump Head Pressure	90	kPa	30	ft
Pump Efficiency	55%			
Pump Motor Efficiency	90%			
Sizing Factor	0.5			
Pump Connected Load	0.27	W/m²	0.03	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.002	L/s.m²	0.0036	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	150	kPa	50	ft		
Pump Efficiency	55%					
Pump Motor Efficiency	90%					
Sizing Factor	0.5					
Pump Connected Load	0.4	W/m²	0.03	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	10.8	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	0.9	kWh/m².yr
Condenser Pump Energy Consumption	0.1	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	1.1
	MJ/m².yr	43.7

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Small Office	**< 100 kW**	**Existing**	**Labrador Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	**Electricity:**	**22.4**	kWh/ft².yr	**869.4**	MJ/m².yr	**Fuel Oil / Propane:**	**0.0**	kWh/ft².yr	**0.0**	MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	4.7	183.1
ARCHITECTURAL LIGHTING	0.7	27.2
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.7	27.7
HVAC FANS & PUMPS	1.1	43.7
REFRIGERATION		
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	2.4	91.2
COMPUTER SERVERS	0.4	16.2
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	10.7	413.9		
SPACE COOLING	0.4	14.3		
DOMESTIC HOT WATER	0.6	25.0	0.0	0.0
FOOD SERVICE EQUIPMENT				

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Food Retail Baseline
SIZE: All
VINTAGE: Existing
REGION: Labrador Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Building Size	929	m²	10,000	ft²
Roof U value (W/m².°C)	0.33	W/m².°C	0.06	Btu/hr.ft² .°F	Typical Footprint (m²)	929	m²	10,000	ft²
Glazing U value (W/m².°C)	3.52	W/m².°C	0.62	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.06								
Shading Coefficient (SC)	0.69				Typical # Stories	1			
					Floor to Floor Height (m)	4.3	m	14.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	30	m²/person	323	ft²/person	%OA	37.75%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	30	L/s.person	64	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3): 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)
If Fresh Air Control Type = "2" enter % FA. to the right:
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² 0.10 CFM/ft²; 50% operation (%)

Sizing Factor	1			
Total Air Circulation or Design Air Flow	2.65	L/s.m²	0.52	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA): L/s.m² CFM/ft²
Operation occupied period: 50%
Operation unoccupied period: 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	301,505	
Peak Zone Sensible Load	112,121	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	5,216	
Total air circulation or Design air	2.65	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	22	°C	71.6	°F	16	°C	60.8	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Food Retail	**All**	**Existing**	**Labrador Interconnected**
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.90			
Connected Load	14.5	W/m²	1.3	W/ft²

Occ. Period(Hrs./yr.)	4500
Unocc. Period(Hrs./yr.)	4260
Usage During Occupied Period	100%
Usage During Unoccupied Period	20%

								Total
Light Level (Lux)	300	500	700	1000				
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	3%	2%	15%	75%	5%	0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	6.5
	MJ/m².yr	251

ARCHITECTURAL LIGHTING (CORRIDORS)

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.10			
Connected Load	13.6	W/m²	1.3	W/ft²

Occ. Period(Hrs./yr.)	4500
Unocc. Period(Hrs./yr.)	4260
Usage During Occupied Period	100%
Usage During Unoccupied Period	50%

								Total
Light Level (Lux)	300	500	700	1000				
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			15%	75%	10%	0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.8
	MJ/m².yr	32

SPECIAL PURPOSE LIGHTING

Light Level	300.00	Lux	27.9	ft-candles
Floor Fraction (HBLFF)				
Connected Load	14.0	W/m²	1.3	W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

								Total
Light Level (Lux)	300	500	700	1000				
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 14.39 W/m²

EUI TOTAL	kWh/ft².yr	7
	MJ/m².yr	284

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.43		0.43		0.01		0.01		0.02			
Connected Load	0.8	W/m²	0.7	W/m²	0.0	W/m²	0.1	W/m²	0.1	W/m²	1.5	W/m²
	0.1	W/ft²	0.1	W/ft²	0.00	W/ft²	0.01	W/ft²	0.01	W/ft²	0.14	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		90%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		50%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2600		4100	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6160		4660	

Total end-use load (occupied period)	2.9	W/m²	0.3	W/ft²
Total end-use load (unocc. period)	1.7	W/m²	0.2	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	58%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2"

Computer Servers	EUI	kWh/ft².yr	0.03
		MJ/m².yr	1.24
Computer Equipment	EUI	kWh/ft².yr	0.78
		MJ/m².yr	30.2
Plug Loads	EUI	kWh/ft².yr	0.84
		MJ/m².yr	32.5

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

	Fuel Oil / Propane EUI			All Electric EUI	
EUI	kWh/ft².yr	2.6	EUI	kWh/ft².yr	3.1
	MJ/m².yr	100.0		MJ/m².yr	120.0

REFRIGERATION

Provide description below:
Commercial refrigeration display cases

EUI	kWh/ft².yr	25.8
	MJ/m².yr	1000.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All	Existing	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Rooftop					
System Present (%)							100%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load: 35.8 W/m² — 11.4 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load): 1137 MJ/m².yr — 29.4 kWh/ft².yr
Sizing Factor: 1.00

Electric Fuel Share: 100.0% Fuel Oil / Propane Fuel Share: Oil Fuel Share:

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	29.4
MJ/m².yr	1137
Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	
Market Composite EUI	
kWh/ft².yr	29.4
MJ/m².yr	1137

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	13.0	55.4

Peak Cooling Load: 95 W/m² — 30 Btu/hr.ft² — 398 ft²/Ton
Seasonal Cooling Load (Tertiary Load): 54.1 MJ/m².yr — 1.4 kWh/ft².yr

Sizing Factor: 1.00 Operation (occ. period 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C): 25.0%

Electric Fuel Share: 100.0% Fuel Oil / Propane Fuel Share:

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.6
MJ/m².yr	25
Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	
Market Composite EUI	
kWh/ft².yr	0.6
MJ/m².yr	25

SERVICE HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					0%
Eff./COP	65.00				0.75

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 45.5

Wetting Use Percentage: 90%

All Electric EUI		Fuel Oil / Propane EUI		Market Composite EUI	
kWh/ft².yr	1.3	kWh/ft².yr	1.6	kWh/ft².yr	1.3
MJ/m².yr	50	MJ/m².yr	61	MJ/m².yr	50.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All	Existing	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	2.6	L/s.m²	0.52	CFM/ft²
System Static Pressure CAV	350	Pa	1.4	wg
System Static Pressure VAV	350	Pa	1.4	wg
Fan Efficiency	60%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	1.9	W/m²	0.18	W/ft²
Fan Design Load VAV	1.9	W/m²	0.18	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	100%		100%	
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.04	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.06	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.4	W/m²	0.04	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.90	W/m²	0.18	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.005	L/s.m²	0.007	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0060	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	50	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.8	W/m²	0.08	W/ft²		

Supply Fan Occ. Period	5000	hrs./year
Supply Fan Unocc. Period	3760	hrs./year
Supply Fan Energy Consumption	16.9	kWh/m².yr
Exhaust Fan Occ. Period	5000	hrs./year
Exhaust Fan Unocc. Period	3760	hrs./year
Exhaust Fan Energy Consumption	3.7	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.3	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	1.9
	MJ/m².yr	75.2

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All	Existing	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	71.8 kWh/ft².yr	2,780.1 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	6.5	251.1
ARCHITECTURAL LIGHTING (COR	0.8	32.5
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.8	32.5
HVAC FANS & PUMPS	1.9	75.2
REFRIGERATION	25.8	1,000.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.8	30.2
COMPUTER SERVERS	0.0	1.2
ELEVATORS		
OUTDOOR LIGHTING	0.9	33.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	29.4	1,137.3		
SPACE COOLING	0.2	6.1		
SERVICE HOT WATER	1.3	50.0	0.0	0.0
FOOD SERVICE EQUIPMENT	3.1	120.0		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	Existing	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Building Size	929	m²	10,000	ft²
Roof U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Footprint (m²)	929	m²	10,000	ft²
Glazing U value (W/m².°C)	3.52	W/m².°C	0.62	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	5			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.10								
Shading Coefficient (SC)	0.75				Typical # Stories	1			
					Floor to Floor Height (m)	4.3	m	14.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	25	m²/person	269	ft²/person	%OA	9.43%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	18	L/s.person	38	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right: | 34%

(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	2			
Total Air Circulation or Design Air Flow	7.64	L/s.m²	1.50	CFM/ft²

Separate Make-up air unit (100% OA) | | L/s.m² | | CFM/ft²

Operation occupied period | 50%

Operation unoccupied period | 50%

Infiltration Rate | | L/s.m² | | CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	301,435	
Peak Zone Sensible Load	161,666	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	7,521	
Total air circulation or Design air	7.64	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	21	°C	69.8	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	Existing	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.95			
Connected Load	20.5	W/m²	1.9	W/ft²

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	95%
Usage During Unoccupied Period	15%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	400	500	600	1000				Total
% Distribution	25%	50%	25%					100%
Weighted Average								**500**
	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	10%	10%	20%	55%	5%	0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI		
	kWh/ft².yr	8.2
	MJ/m².yr	317

ARCHITECTURAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.05			
Connected Load	31.7	W/m²	2.9	W/ft²

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	95%
Usage During Unoccupied Period	50%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	300	500	700	1000				Total
% Distribution	30%	40%	30%					100%
Weighted Average								**500**
	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	30%	5%	10%	50%		0%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI		
	kWh/ft².yr	0.9
	MJ/m².yr	35

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								
	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI		
	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 21.07 W/m²

EUI TOTAL		
	kWh/ft².yr	9
	MJ/m².yr	352

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.22	0.22	0.01	0.01	0.02	
Connected Load	0.5 W/m²	0.4 W/m²	0.0 W/m²	0.1 W/m²	0.1 W/m²	1.15 W/m²
	0.0 W/ft²	0.0 W/ft²	0.00 W/ft²	0.01 W/ft²	0.01 W/ft²	0.11 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	90%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	4100
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	4660

Total end-use load (occupied period)	2.1 W/m²	0.2 W/ft²
Total end-use load (unocc. period)	1.2 W/m²	0.1 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	59%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

	EUI		
Computer Servers	EUI	kWh/ft².yr	0.1
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.5
		MJ/m².yr	19.1
Plug Loads	EUI	kWh/ft².yr	0.6
		MJ/m².yr	24.9

FOOD SERVICE EQUIPMENT

5

Provide description below:

Fuel Oil / Propane Fuel Share:

Electricity Fuel Share: 100.0%

	Fuel Oil / Propane EUI		All Electric EUI	
kWh/ft².yr				1.0
MJ/m².yr				38.7

REFRIGERATION

Provide description below:

EUI		
	kWh/ft².yr	1.5
	MJ/m².yr	58.1

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	Existing	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Rooftop					
System Present (%)							100%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	45.5	W/m²	14.4	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	383	MJ/m².yr	9.9	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	9.9
MJ/m².yr	383
Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	
Market Composite EUI	
kWh/ft².yr	9.9
MJ/m².yr	383

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.8	5.4	4.4	3.7	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.27	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load	95	W/m²	30	Btu/hr.ft²	398	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	77.4	MJ/m².yr	2.0	kWh/ft².yr		

Sizing Factor 1.00

A/C Saturation (Incidence of A/C) 25.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.8
MJ/m².yr	32
Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	
Market Composite EUI	
kWh/ft².yr	0.8
MJ/m².yr	32

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank			Boiler
System Present (%)				0%
Eff./COP	0.65			0.75

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 17.3

Wetting Use Percentage 90%

All Electric EUI		Fuel Oil / Propane EUI		Market Composite EUI	
kWh/ft².yr	0.5	kWh/ft².yr	0.6	kWh/ft².yr	0.5
MJ/m².yr	19	MJ/m².yr	23	MJ/m².yr	19.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	Existing	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	7.6	L/s.m²	1.50	CFM/ft²
System Static Pressure CAV	350	Pa	1.4	wg
System Static Pressure VAV	350	Pa	1.4	wg
Fan Efficiency	60%			
Fan Motor Efficiency	88%			
Sizing Factor	1.00			
Fan Design Load CAV	5.1	W/m²	0.47	W/ft²
Fan Design Load VAV	5.1	W/m²	0.47	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	90%	10%	90%	10%
Comments:				

EXHAUST FANS

Washroom Exhaust	50	L/s.washroom	106	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.02	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.04	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.3	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.90	W/m²	0.18	W/ft²

Condenser Pump

Pump Design Flow		L/s.KW		U.S. gpm/Ton
Pump Design Flow per unit floor area		L/s.m²		U.S. gpm/ft²
Pump Head Pressure	45	kPa	15	ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0060	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure		kPa		ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load		W/m²		W/ft²		

Supply Fan Occ. Period	5500	hrs./year
Supply Fan Unocc. Period	3260	hrs./year
Supply Fan Energy Consumption	42.7	kWh/m².yr
Exhaust Fan Occ. Period	5500	hrs./year
Exhaust Fan Unocc. Period	3260	hrs./year
Exhaust Fan Energy Consumption	2.3	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	4.2
	MJ/m².yr	163.5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	Existing	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	28.8 kWh/ft².yr	1,114.2 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	8.2	316.7
ARCHITECTURAL LIGHTING	0.9	35.2
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.6	24.9
HVAC FANS & PUMPS	4.2	163.5
REFRIGERATION	1.5	58.1
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.5	19.1
COMPUTER SERVERS	0.1	4.4
ELEVATORS/ESCALATORS		
OUTDOOR LIGHTING	0.9	33.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	9.9	382.6		
SPACE COOLING	0.2	7.9		
DOMESTIC HOT WATER	0.5	19.0	0.0	0.0
FOOD SERVICE EQUIPMENT	1.0	38.7		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Small Non-Food Retail Baseline | **SIZE:** < 100 kW | **VINTAGE:** Existing | **REGION:** Labrador Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.28 W/m².°C	0.05 Btu/hr.ft² .°F	Typical Building Size	929 m²	10,000 ft²
Roof U value (W/m².°C)	0.19 W/m².°C	0.03 Btu/hr.ft² .°F	Typical Footprint (m²)	929 m²	10,000 ft²
Glazing U value (W/m².°C)	3.52 W/m².°C	0.62 Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	5	
			Percent Conditioned Space	100%	
			Percent Conditioned Space Defined as Exterior Zone	45%	
Window/Wall Ratio (WIWAR) (%)	0.10				
Shading Coefficient (SC)	0.75		Typical # Stories	1	
			Floor to Floor Height (m)	4.3 m	14.0 ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	25 m²/person	269 ft²/person	%OA	19.11%
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	18 L/s.person	38 CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3): 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 34%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	1	
Total Air Circulation or Design Air Flow	3.77 L/s.m²	0.74 CFM/ft²
Infiltration Rate	0.42 L/s.m²	0.08 CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)	L/s.m²	CFM/ft²
Operation occupied period	50%	
Operation unoccupied period	50%	

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	299,238	
Peak Zone Sensible Load	159,469	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	7,418	
Total air circulation or Design air	3.77	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	21	°C	69.8	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Non-Food Retail	< 100 kW	Existing	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.95			
Connected Load	20.5	W/m²	1.9	W/ft²

Occ. Period(Hrs./yr.)	4000	
Unocc. Period(Hrs./yr.)	4760	
Usage During Occupied Period	95%	
Usage During Unoccupied Period	15%	
Fixture Cleaning:		
Incidence of Practice		
Interval		years
Relamping Strategy & Incidence of Practice	Group	Spot

Light Level (Lux)	400	500	600	1000				Total
% Distribution	25%	50%	25%					100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	10%	10%	20%	55%	5%	0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	8.2
	MJ/m².yr	317

ARCHITECTURAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.05			
Connected Load	31.7	W/m²	2.9	W/ft²

Occ. Period(Hrs./yr.)	4000	
Unocc. Period(Hrs./yr.)	4760	
Usage During Occupied Period	95%	
Usage During Unoccupied Period	50%	
Fixture Cleaning:		
Incidence of Practice		
Interval		years
Relamping Strategy & Incidence of Practice	Group	Spot

Light Level (Lux)	300	500	700	1000				Total
% Distribution	30%	40%	30%					100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	30%	5%	10%	50%		0%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.9
	MJ/m².yr	35

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000	
Unocc. Period(Hrs./yr.)	4760	
Usage During Occupied Period	0%	
Usage During Unoccupied Period	100%	
Fixture Cleaning:		
Incidence of Practice		
Interval		years
Relamping Strategy & Incidence of Practice	Group	Spot

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 21.07 W/m²

EUI TOTAL	kWh/ft².yr	9
	MJ/m².yr	352

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.22	0.22	0.01	0.01	0.02	
Connected Load	0.5 W/m²	0.4 W/m²	0.0 W/m²	0.1 W/m²	0.1 W/m²	1.15 W/m²
	0.0 W/ft²	0.0 W/ft²	0.00 W/ft²	0.01 W/ft²	0.01 W/ft²	0.11 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	90%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	4100
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	4660

Total end-use load (occupied period)	2.1 W/m²	0.2 W/ft²
Total end-use load (unocc. period)	1.2 W/m²	0.1 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	59%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.1
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.5
		MJ/m².yr	19.1
Plug Loads	EUI	kWh/ft².yr	0.6
		MJ/m².yr	24.9

FOOD SERVICE EQUIPMENT

5

Provide description below:

Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr		EUI	kWh/ft².yr	
	MJ/m².yr			MJ/m².yr	

REFRIGERATION

Provide description below:

EUI	kWh/ft².yr	
	MJ/m².yr	

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Non-Food Retail	< 100 kW	Existing	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Rooftop					
System Present (%)							100%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	39.0	W/m²	12.4	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	495	MJ/m².yr	12.8	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	12.8
MJ/m².yr	495

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	12.8
MJ/m².yr	495

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.8	5.4	4.4	3.7	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.27	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load	94	W/m²	30	Btu/hr.ft²	401	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	87.0	MJ/m².yr	2.2	kWh/ft².yr		
Sizing Factor	1.00					
A/C Saturation (Incidence of A/C)	25.0%					

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.9
MJ/m².yr	36

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.9
MJ/m².yr	36

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank			Boiler
System Present (%)				0%
Eff./COP	0.65			0.75

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.75	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 17.3

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	0.5
MJ/m².yr	19

Fuel Oil / Propane EUI	
kWh/ft².yr	0.6
MJ/m².yr	23

Market Composite EUI	
kWh/ft².yr	0.5
MJ/m².yr	19.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Non-Food Retail	< 100 kW	Existing	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.8	L/s.m²	0.74	CFM/ft²
System Static Pressure CAV	350	Pa	1.4	wg
System Static Pressure VAV	350	Pa	1.4	wg
Fan Efficiency	60%			
Fan Motor Efficiency	88%			
Sizing Factor	1.00			
Fan Design Load CAV	2.5	W/m²	0.23	W/ft²
Fan Design Load VAV	2.5	W/m²	0.23	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	90%	10%	90%	10%

Comments:

EXHAUST FANS

Washroom Exhaust	50	L/s.washroom	106	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.02	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.04	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.3	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.89	W/m²	0.18	W/ft²

Condenser Pump

Pump Design Flow		L/s.KW		U.S. gpm/Ton
Pump Design Flow per unit floor area		L/s.m²		U.S. gpm/ft²
Pump Head Pressure	45	kPa	15	ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0060	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure		kPa		ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load		W/m²		W/ft²		

Supply Fan Occ. Period	5500	hrs./year
Supply Fan Unocc. Period	3260	hrs./year
Supply Fan Energy Consumption	21.1	kWh/m².yr
Exhaust Fan Occ. Period	5500	hrs./year
Exhaust Fan Unocc. Period	3260	hrs./year
Exhaust Fan Energy Consumption	2.3	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	2.2
	MJ/m².yr	85.8

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Non-Food Retail	< 100 kW	Existing	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	27.2	kWh/ft².yr	1,053.3	MJ/m².yr	Fuel Oil / Propane:	0.0	kWh/ft².yr	0.0	MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	8.2	316.7
ARCHITECTURAL LIGHTING	0.9	35.2
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.6	24.9
HVAC FANS & PUMPS	2.2	85.8
REFRIGERATION		
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.5	19.1
COMPUTER SERVERS	0.1	4.4
ELEVATORS/ESCALATORS		
OUTDOOR LIGHTING	0.9	33.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	12.8	495.3		
SPACE COOLING	0.2	8.9		
DOMESTIC HOT WATER	0.5	19.0	0.0	0.0
FOOD SERVICE EQUIPMENT				

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Accommodation	> 100 kW	Existing	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	1,394	m²	15,000	ft²
Roof U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Footprint (m²)	1,394	m²	15,000	ft²
Glazing U value (W/m².°C)	3.52	W/m².°C	0.62	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	4			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.28								
Shading Coefficient (SC)	0.57				Typical # Stories	1			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	90%				10%				100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	46	m²/person	495	ft²/person	%OA	5.39%
Occupancy Schedule Occ. Period	50%					
Occupancy Schedule Unocc. Period	80%					
Fresh Air Requirements or Outside Air	8	L/s.person	16	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3): 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right:	15%			
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation	0.5	L/s.m²	0.10	CFM/ft²
	50%	operation (%)		

Sizing Factor	1.3			
Total Air Circulation or Design Air Flow	3.02	L/s.m²	0.60	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	196,081	
Peak Zone Sensible Load	147,639	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	6,868	
Total air circulation or Design air	3.02	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	18	°C	64.4	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Accommodation	> 100 kW	Existing	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING (SUITES)

Light Level	125	Lux	11.6	ft-candles
Floor Fraction (GLFF)	0.75			
Connected Load	12.7	W/m²	1.2	W/ft²

Occ. Period(Hrs./yr.)	2500
Unocc. Period(Hrs./yr.)	6260
Usage During Occupied Period	50%
Usage During Unoccupied Period	25%

Light Level (Lux)	100	125	150	300				Total
% Distribution	25%	50%	25%					100%
Weighted Average								**125**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	60%	20%	5%	5%		0%	10%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	2.5
	MJ/m².yr	97

LOBBY, BALLROOMS, CORRIDORS, BACK OF HOUSE OTHER

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.25			
Connected Load	23.3	W/m²	2.2	W/ft²

Occ. Period(Hrs./yr.)	3000
Unocc. Period(Hrs./yr.)	5760
Usage During Occupied Period	85%
Usage During Unoccupied Period	50%

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	40%	10%	35%	10%		0%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	2.9
	MJ/m².yr	114

SPECIAL PURPOSE LIGHTING

Light Level	300.00	Lux	27.9	ft-candles
Floor Fraction (HBLFF)				
Connected Load	14.0	W/m²	1.3	W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING Overall LP 15.37 W/m²

EUI TOTAL	kWh/ft².yr	5
	MJ/m².yr	210

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.3	0.3	0.05	0.033	0.02	
Connected Load	0.4 W/m²	0.3 W/m²	0.1 W/m²	0.1 W/m²	0.1 W/m²	1.5 W/m²
	0.0 W/ft²	0.0 W/ft²	0.01 W/ft²	0.01 W/ft²	0.01 W/ft²	0.14 W/ft²
Diversity Occupied Period	50%	50%	50%	50%	100%	70%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	25%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2500	3000
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6260	5760

Total end-use load (occupied period)	1.6 W/m²	0.2 W/ft²
Total end-use load (unocc. period)	1.0 W/m²	0.1 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	59%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	0.38
		MJ/m².yr	14.80
Plug Loads	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.12

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: Electricity Fuel Share: 100.0%

Kitchen services

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	1.0	EUI	kWh/ft².yr	1.3
	MJ/m².yr	40.0		MJ/m².yr	50.0

REFRIGERATION

Provide description below:

Walk-in coolers/freezers, reach-in coolers/freezers, refrigerated buffet cases

EUI	kWh/ft².yr	0.8
	MJ/m².yr	30.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Accommodation	> 100 kW	Existing	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	56.8	W/m²	18.0	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	464	MJ/m².yr	12.0	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	12.0
MJ/m².yr	464
Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	
Market Composite EUI	
kWh/ft².yr	12.0
MJ/m².yr	464

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	35	W/m²	11	Btu/hr.ft²	1080	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	46.1	MJ/m².yr	1.2	kWh/ft².yr		

Sizing Factor 0.85 Operation (occ. perio 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 50.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.5
MJ/m².yr	19
Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	
Market Composite EUI	
kWh/ft².yr	0.5
MJ/m².yr	19

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					0%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 236.6

Wetting Use Percentage 90%

All Electric EUI		Fuel Oil / Propane EUI		Market Composite EUI	
kWh/ft².yr	6.7	kWh/ft².yr	8.1	kWh/ft².yr	6.7
MJ/m².yr	260	MJ/m².yr	315	MJ/m².yr	260.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Accommodation	> 100 kW	Existing	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.0	L/s.m²	0.60	CFM/ft²
System Static Pressure CAV	300	Pa	1.2	wg
System Static Pressure VAV	300	Pa	1.2	wg
Fan Efficiency	45%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	2.5	W/m²	0.23	W/ft²
Fan Design Load VAV	2.5	W/m²	0.23	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit are	0.1	L/s.m²	0.03	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.05	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.3	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.70	W/m²	0.07	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.002	L/s.m²	0.003	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.002	L/s.m²	0.0022	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.3	W/m²	0.03	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	18.8	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	2.4	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.2	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	2.0
	MJ/m².yr	77.1

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Large Accommodation	**> 100 kW**	**Existing**	**Labrador Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **30.1** kWh/ft².yr **1,165.2** MJ/m².yr **Fuel Oil / Propane:** **0.0** kWh/ft².yr **0.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING (SUITES)	2.5	96.8
LOBBY, BALLROOMS, CORRIDORS	2.9	113.7
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.5	19.1
HVAC FANS & PUMPS	2.0	77.1
REFRIGERATION	0.8	30.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.4	14.8
COMPUTER SERVERS	0.1	3.7
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	12.0	463.6		
SPACE COOLING	0.2	9.4		
DOMESTIC HOT WATER	6.7	260.0	0.0	0.0
FOOD SERVICE EQUIPMENT	1.3	50.0		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW	Existing	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	697	m²	7,500	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	697	m²	7,500	ft²
Glazing U value (W/m².°C)	3.52	W/m².°C	0.62	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	4			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.28								
Shading Coefficient (SC)	0.57				Typical # Stories	1			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	46	m²/person	495	ft²/person	%OA	4.53%
Occupancy Schedule Occ. Period	50%					
Occupancy Schedule Unocc. Period	80%					
Fresh Air Requirements or Outside Air	8	L/s.person	16	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right: | 15%

(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	1.3			
Total Air Circulation or Design Air Flow	3.60	L/s.m²	0.71	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA) | | L/s.m² | | CFM/ft²

Operation occupied period | 50%

Operation unoccupied period | 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	112,083	
Peak Zone Sensible Load	87,862	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	4,087	
Total air circulation or Design air	3.60	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	18	°C	64.4	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year | |

Incidence of Annual Room Controls Maintenance | |

Incidence of Annual HVAC Controls Maintenance | |

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Small Accommodation	**< 100 kW**	**Existing**	**Labrador Interconnected**
Baseline			

LIGHTING

GENERAL LIGHTING (SUITES)

Light Level	125	Lux	11.6	ft-candles
Floor Fraction (GLFF)	0.85			
Connected Load	14.3	W/m²	1.3	W/ft²
Occ. Period(Hrs./yr.)	2500			
Unocc. Period(Hrs./yr.)	6260			
Usage During Occupied Period	50%			
Usage During Unoccupied Period	25%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	100	125	150	300				Total
% Distribution	25%	50%	25%					100%
Weighted Average								**125**
	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	70%	20%	5%	5%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	3.2
	MJ/m².yr	123

LOBBY, BALLROOMS, CORRIDORS, BACK OF HOUSE OTHER

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.15			
Connected Load	23.3	W/m²	2.2	W/ft²
Occ. Period(Hrs./yr.)	3000			
Unocc. Period(Hrs./yr.)	5760			
Usage During Occupied Period	85%			
Usage During Unoccupied Period	50%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**
	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	40%	10%	35%	10%		0%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	1.8
	MJ/m².yr	68

SPECIAL PURPOSE LIGHTING

Light Level	300.00	Lux	27.9	ft-candles
Floor Fraction (HBLFF)				
Connected Load	14.0	W/m²	1.3	W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**
	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 15.62 W/m²

EUI TOTAL	kWh/ft².yr	5
	MJ/m².yr	191

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.3	0.3	0.05	0.033	0.02	
Connected Load	0.4 W/m²	0.3 W/m²	0.1 W/m²	0.1 W/m²	0.1 W/m²	1.5 W/m²
	0.0 W/ft²	0.0 W/ft²	0.01 W/ft²	0.01 W/ft²	0.01 W/ft²	0.14 W/ft²
Diversity Occupied Period	50%	50%	50%	50%	100%	70%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	25%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2500	3000
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6260	5760

Total end-use load (occupied period)	1.6 W/m²	0.2 W/ft²
Total end-use load (unocc. period)	1.0 W/m²	0.1 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	59%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2"

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	0.38
		MJ/m².yr	14.80
Plug Loads	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.12

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Kitchen services

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	1.0	EUI	kWh/ft².yr	0.6
	MJ/m².yr	40.0		MJ/m².yr	25.0

REFRIGERATION

Provide description below:

Walk-in coolers/freezers, reach-in coolers/freezers, refrigerated buffet cases

EUI	kWh/ft².yr	0.4
	MJ/m².yr	15.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW	Existing	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)							100%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	65.9	W/m²	20.9	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	548	MJ/m².yr	14.1	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	14.1
MJ/m².yr	548

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	14.1
MJ/m².yr	548

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	40	W/m²	13	Btu/hr.ft²	945	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	51.4	MJ/m².yr	1.3	kWh/ft².yr		

Sizing Factor 0.85 Operation (occ. perio 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 50.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

All Electric EUI	
kWh/ft².yr	0.5
MJ/m².yr	21

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.5
MJ/m².yr	21

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					0%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 236.6

Wetting Use Percentage 90%

All Electric EUI		Fuel Oil / Propane EUI		Market Composite EUI	
kWh/ft².yr	6.7	kWh/ft².yr	8.1	kWh/ft².yr	6.7
MJ/m².yr	260	MJ/m².yr	315	MJ/m².yr	260.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW	Existing	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.6	L/s.m²	0.71	CFM/ft²
System Static Pressure CAV	300	Pa	1.2	wg
System Static Pressure VAV	300	Pa	1.2	wg
Fan Efficiency	45%			
Fan Motor Efficiency	80%			
Sizing Factor	0.50			
Fan Design Load CAV	1.5	W/m²	0.14	W/ft²
Fan Design Load VAV	1.5	W/m²	0.14	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.3	L/s.m²	0.06	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.4	L/s.m²	0.08	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	0.5			
Exhaust Fan Connected Load	0.3	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.80	W/m²	0.07	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.002	L/s.m²	0.003	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	0.5			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.002	L/s.m²	0.0025	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.5					
Pump Connected Load	0.2	W/m²	0.02	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	11.2	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.9	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.3	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	1.2
	MJ/m².yr	48.1

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW	Existing	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	30.0	kWh/ft².yr	1,162.4	MJ/m².yr	Fuel Oil / Propane:	0.0	kWh/ft².yr	0.0	MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING (SUITES)	3.2	123.0
LOBBY, BALLROOMS, CORRIDORS	1.8	68.2
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.5	19.1
HVAC FANS & PUMPS	1.2	48.1
REFRIGERATION	0.4	15.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.4	14.8
COMPUTER SERVERS	0.1	3.7
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	14.1	547.9		
SPACE COOLING	0.3	10.6		
DOMESTIC HOT WATER	6.7	260.0	0.0	0.0
FOOD SERVICE EQUIPMENT	0.6	25.0		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	Existing	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.33	W/m².°C	0.06	Btu/hr.ft² .°F	Typical Building Size	8,829	m²	95,000	ft²
Roof U value (W/m².°C)	0.33	W/m².°C	0.06	Btu/hr.ft² .°F	Typical Footprint (m²)	2,943	m²	31,667	ft²
Glazing U value (W/m².°C)	3.52	W/m².°C	0.62	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	2			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.15								
Shading Coefficient (SC)	0.65				Typical # Stories	3			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	80%				20%				100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	30	m²/person	323	ft²/person	%OA 9.76%
Occupancy Schedule Occ. Period	90%				
Occupancy Schedule Unocc. Period	75%				
Fresh Air Requirements or Outside Air	15	L/s.person	32	CFM/person	

Fresh Air Control Type *(enter a 1, 2 or 3): 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 15%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² | 0.10 CFM/ft²
50% operation (%)

Sizing Factor	3			
Total Air Circulation or Design Air Flow	5.12	L/s.m²	1.01	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA) ___ L/s.m² ___ CFM/ft²
Operation occupied period 50%
Operation unoccupied period 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	#######	
Peak Zone Sensible Load	686,735	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R.H	13.2	ft³/lbm
Design CFM	31,947	
Total air circulation or Design air fl	5.12	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	24	°C	75.2	°F	16.5	°C	61.7	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	24	°C	75.2	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	Existing	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	250	Lux	23.2	ft-candles
Floor Fraction (GLFF)	0.40			
Connected Load	8.8	W/m²	0.8	W/ft²
Occ. Period(Hrs./yr.)	8760			
Unocc. Period(Hrs./yr.)				
Usage During Occupied Period	40%			
Usage During Unoccupied Period				
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	50	100	200	300				Total
% Distribution			50%	50%				100%
Weighted Average								**250**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	5%	5%	45%	45%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	1.1
	MJ/m².yr	44

SECONDARY LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.60			
Connected Load	17.0	W/m²	1.6	W/ft²
Occ. Period(Hrs./yr.)	8760			
Unocc. Period(Hrs./yr.)				
Usage During Occupied Period	65%			
Usage During Unoccupied Period	20%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	600	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	4%	5%	50%	40%		0%	1%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	5.4
	MJ/m².yr	209

TERTIARY LIGHTING

Light Level	250.00	Lux	23.2	ft-candles
Floor Fraction (HBLFF)				
Connected Load	11.9	W/m²	1.1	W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	200	300	500	700				Total
% Distribution	50%	50%						100%
Weighted Average								**250**

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)	15%	15%	20%	50%			0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	88	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LPD 13.72 W/m²

EUI TOTAL	kWh/ft².yr	7
	MJ/m².yr	254

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	54.55		51		100		200		217			
Density (device/occupant)	0.48		0.48		0.02		0.02		0.04			
Connected Load	0.9	W/m²	0.8	W/m²	0.1	W/m²	0.1	W/m²	0.3	W/m²	3.85	W/m²
	0.1	W/ft²	0.1	W/ft²	0.01	W/ft²	0.01	W/ft²	0.02	W/ft²	0.36	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		90%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		25%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2600		4100	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6160		4660	

Total end-use load (occupied period)	5.4	W/m²	0.5	W/ft²
Total end-use load (unocc. period)	2.2	W/m²	0.2	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	40%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2"

Computer Servers	EUI	kWh/ft².yr	0.2
		MJ/m².yr	8.10
Computer Equipment	EUI	kWh/ft².yr	0.9
		MJ/m².yr	35.0
Plug Loads	EUI	kWh/ft².yr	1.7
		MJ/m².yr	67.3

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: Electricity Fuel Share: 100.0%

Commercial food services

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	3.1	EUI	kWh/ft².yr	2.1
	MJ/m².yr	120.0		MJ/m².yr	80.0

REFRIGERATION

Provide description below:

Walk-in coolers/freezers, reach-in coolers/freezers, refrigerated buffet cases

EUI	kWh/ft².yr	0.4
	MJ/m².yr	15.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	Existing	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)	10%						90%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	29.1 W/m²	9.2 Btu/hr.ft²	
Seasonal Heating Load (Tertiary Load)	229 MJ/m².yr	5.9 kWh/ft².yr	
Sizing Factor	1.00		
Electric Fuel Share	90.0%	Fuel Oil / Propane Fuel Share 10.0%	Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	kWh/ft².yr	5.9
	MJ/m².yr	229
Fuel Oil / Propane EUI	kWh/ft².yr	8.5
	MJ/m².yr	328
Market Composite EUI	kWh/ft².yr	6.2
	MJ/m².yr	239

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)		50.0%			50.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7 °C	44.6 °F
Condenser Water	30 °C	86 °F
Supply Air	14.0 °C	57.2 °F

Peak Cooling Load	54 W/m²	17 Btu/hr.ft²	704 ft²/Ton
Seasonal Cooling Load (Tertiary Load)	51.5 MJ/m².yr	1.3 kWh/ft².yr	
Sizing Factor	1.00	Operation (occ. perio 3000 hrs/year	Note value cannot be less than 2,900 hrs/year)
A/C Saturation (Incidence of A/C)	35.0%		
Electric Fuel Share	100.0%	Fuel Oil / Propane Fuel Share	

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	kWh/ft².yr	0.5
	MJ/m².yr	21
Fuel Oil / Propane EUI	kWh/ft².yr	
	MJ/m².yr	
Market Composite EUI	kWh/ft².yr	0.5
	MJ/m².yr	21

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					0%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load)	118.3
Wetting Use Percentage	90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	3.4	4.1	3.4
MJ/m².yr	130	158	130.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	Existing	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	5.1	L/s.m²	1.01	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	1.00			
Fan Design Load CAV	8.7	W/m²	0.81	W/ft²
Fan Design Load VAV	8.7	W/m²	0.81	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	80%	20%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	80%	20%	80%	20%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.5	L/s.m²	0.10	CFM/ft²
Total Building Exhaust	0.6	L/s.m²	0.11	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.8	W/m²	0.07	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.017	kW/kW	0.06	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.89	W/m²	0.08	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.003	L/s.m²	0.004	U.S. gpm/ft²
Pump Head Pressure	100	kPa	33	ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load	0.71	W/m²	0.07	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.002	L/s.m²	0.0034	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.5	W/m²	0.04	W/ft²		

Supply Fan Occ. Period	4000	hrs./year
Supply Fan Unocc. Period	4760	hrs./year
Supply Fan Energy Consumption	61.6	kWh/m².yr
Exhaust Fan Occ. Period	4000	hrs./year
Exhaust Fan Unocc. Period	4760	hrs./year
Exhaust Fan Energy Consumption	5.9	kWh/m².yr
Condenser Pump Energy Consumption	0.8	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.2	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption	0.3	kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI	kWh/ft².yr	6.4
	MJ/m².yr	248.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	Existing	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:			
Electricity:	28.6 kWh/ft².yr	1,108.7 MJ/m².yr	
Fuel Oil / Propane:	0.8 kWh/ft².yr	32.8 MJ/m².yr	

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	1.1	44.2
SECONDARY LIGHTING	5.4	209.4
TERTIARY LIGHTING		
OTHER PLUG LOADS	1.7	67.3
HVAC FANS & PUMPS	6.4	248.0
REFRIGERATION	0.4	15.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.4	15.0
COMPUTER EQUIPMENT	0.9	35.0
COMPUTER SERVERS	0.2	8.1
ELEVATORS	0.1	3.9
OUTDOOR LIGHTING	0.9	33.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	5.3	206.5	0.8	32.8
SPACE COOLING	0.2	7.3		
DOMESTIC HOT WATER	3.4	130.0	0.0	0.0
FOOD SERVICE EQUIPMENT	2.1	80.0		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Schools	All		Labrador Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.28 W/m².°C	0.05 Btu/hr.ft² .°F	Typical Building Size	3,717 m²	40,000 ft²
Roof U value (W/m².°C)	0.28 W/m².°C	0.05 Btu/hr.ft² .°F	Typical Footprint (m²)	3,717 m²	40,000 ft²
Glazing U value (W/m².°C)	3.52 W/m².°C	0.62 Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	5	
			Percent Conditioned Space	100%	
			Percent Conditioned Space Defined as Exterior Zone	50%	
Window/Wall Ratio (WIWAR) (%)	0.13				
Shading Coefficient (SC)	0.65		Typical # Stories	1	
			Floor to Floor Height (m)	3.7 m	12.0 ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	10 m²/person	108 ft²/person	%OA 18.16%
Occupancy Schedule Occ. Period	90%		
Occupancy Schedule Unocc. Period			
Fresh Air Requirements or Outside Air	6 L/s.person	13 CFM/person	

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 34%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation 0.5 L/s.m² 0.10 CFM/ft²
50% operation (%)

Sizing Factor	1.3	
Total Air Circulation or Design Air Flow	3.30 L/s.m²	0.65 CFM/ft²
Infiltration Rate	0.42 L/s.m²	0.08 CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA) L/s.m² CFM/ft²
Operation occupied period 50%
Operation unoccupied period 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	947,110	
Peak Zone Sensible Load	424,335	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	19,740	
Total air circulation or Design air	3.30	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	21	°C	69.8	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	18.8	°C	65.84	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Schools	All		Labrador Interconnected

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.85			
Connected Load	14.7	W/m²	1.4	W/ft²
Occ. Period(Hrs./yr.)	2000			
Unocc. Period(Hrs./yr.)	6760			
Usage During Occupied Period	85%			
Usage During Unoccupied Period	15%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

								Total
Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			70%	30%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	3.1
	MJ/m².yr	122

ARCHITECTURAL LIGHTING

Light Level	400	Lux	37.2	ft-candles
Floor Fraction (ALFF)	0.15			
Connected Load	16.6	W/m²	1.5	W/ft²
Occ. Period(Hrs./yr.)	2000			
Unocc. Period(Hrs./yr.)	6760			
Usage During Occupied Period	90%			
Usage During Unoccupied Period	15%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

								Total
Light Level (Lux)	400	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**400**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	10%	10%	15%	10%	30%	20%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.6
	MJ/m².yr	25

SPECIAL PURPOSE LIGHTING

Light Level	300.00	Lux	27.9	ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	3000			
Unocc. Period(Hrs./yr.)	5760			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	10%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

								Total
Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12 ES	T8 Mag	T8 Elec	MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 14.96 W/m²

EUI TOTAL	kWh/ft².yr	4
	MJ/m².yr	147

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.05	0.05	0.02	0.02	0.01	
Connected Load	0.3 W/m²	0.3 W/m²	0.2 W/m²	0.4 W/m²	0.1 W/m²	0.2 W/m²
	0.0 W/ft²	0.0 W/ft²	0.02 W/ft²	0.04 W/ft²	0.01 W/ft²	0.02 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	100%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	3000
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	5760

Total end-use load (occupied period)	1.3 W/m²	0.1 W/ft²
Total end-use load (unocc. period)	0.8 W/m²	0.1 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	59%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	0.54
		MJ/m².yr	21.01
Plug Loads	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.23

FOOD SERVICE EQUIPMENT

Provide description below:

Fuel Oil / Propane Fuel Sh | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	0.2	EUI	kWh/ft².yr	0.1
	MJ/m².yr	8.0		MJ/m².yr	4.0

REFRIGERATION

Provide description below:

EUI	kWh/ft².yr	0.03
	MJ/m².yr	1.1

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.0
		MJ/m².yr	2
Miscellaneous	EUI	kWh/ft².yr	0.0
		MJ/m².yr	2

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Schools	All		Labrador Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane Boilers Stan.	Fuel Oil / Propane Boilers High	Fuel Oil / Propane Packaged Unit	Electric A/A HP	Electric W. S. HP	Electric H/R Chiller	Electric Resistance	Total
System Present (%)	20%						80%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	41.1	W/m²	13.0	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	417	MJ/m².yr	10.8	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share: 80.0% Fuel Oil / Propane Fuel Sh 20.0% Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	kWh/ft².yr	10.8
	MJ/m².yr	417
Fuel Oil / Propane EUI	kWh/ft².yr	15.4
	MJ/m².yr	595
Market Composite EUI	kWh/ft².yr	11.7
	MJ/m².yr	453

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Recprocting Chillers Open	Recprocting Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)					100.0%			100.0%
COP	2.5	5.4	4.4	3.6	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.40	0.19	0.23	0.28	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	75	W/m²	24	Btu/hr.ft²	504	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	68.1	MJ/m².yr	1.8	kWh/ft².yr		

Sizing Factor: 1.00 Operation (occ. perio 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C): 2.0%

Electric Fuel Share: 100.0% Fuel Oil / Propane Fuel Sh

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	kWh/ft².yr	0.8
	MJ/m².yr	32
Fuel Oil / Propane EUI	kWh/ft².yr	
	MJ/m².yr	
Market Composite EUI	kWh/ft².yr	0.8
	MJ/m².yr	32

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					0%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 17.3

Wetting Use Percentage: 90%

All Electric EUI		Fuel Oil / Propane EUI		Market Composite EUI	
kWh/ft².yr	0.5	kWh/ft².yr	0.6	kWh/ft².yr	0.5
MJ/m².yr	19	MJ/m².yr	23	MJ/m².yr	19.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Schools	All		Labrador Interconnected

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.3	L/s.m²	0.65	CFM/ft²
System Static Pressure CAV	350	Pa	1.4	wg
System Static Pressure VAV	350	Pa	1.4	wg
Fan Efficiency	60%			
Fan Motor Efficiency	88%			
Sizing Factor	1.00			
Fan Design Load CAV	2.2	W/m²	0.20	W/ft²
Fan Design Load VAV	2.2	W/m²	0.20	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	50%	50%	50%	50%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.03	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.50	W/m²	0.14	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.004	L/s.m²	0.006	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0048	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.6	W/m²	0.06	W/ft²		

Supply Fan Occ. Period	2000	hrs./year
Supply Fan Unocc. Period	6760	hrs./year
Supply Fan Energy Consumption	11.8	kWh/m².yr
Exhaust Fan Occ. Period	2000	hrs./year
Exhaust Fan Unocc. Period	6760	hrs./year
Exhaust Fan Energy Consumption	1.1	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	2000	hrs./year
Circulating Pump Energy Consumption	0.3	kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	1.3
	MJ/m².yr	48.8

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Schools	All		Labrador Interconnected

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	15.6 kWh/ft².yr	603.0 MJ/m².yr	Fuel Oil / P	3.1 kWh/ft².yr	119.1 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	3.1	121.9
ARCHITECTURAL LIGHTING	0.6	25.2
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.1	4.2
HVAC FANS & PUMPS	1.3	48.8
REFRIGERATION	0.0	1.1
MISCELLANEOUS	0.0	1.5
BLOCK HEATERS	0.0	1.5
COMPUTER EQUIPMENT	0.5	21.0
COMPUTER SERVERS	0.1	3.7
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	8.6	333.4	3.1	119.1
SPACE COOLING	0.0	0.6		
DOMESTIC HOT WATER	0.5	19.0	0.0	0.0
FOOD SERVICE EQUIPMENT	0.1	4.0		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
University/College	All	Existing	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.33	W/m².°C	0.06	Btu/hr.ft² .°F	Typical Building Size	6,506	m²	70,000	ft²
Roof U value (W/m².°C)	0.33	W/m².°C	0.06	Btu/hr.ft² .°F	Typical Footprint (m²)	3,253	m²	35,000	ft²
Glazing U value (W/m².°C)	3.52	W/m².°C	0.62	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	7			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	50%			
Window/Wall Ratio (WIWAR) (%)	0.30								
Shading Coefficient (SC)	0.65				Typical # Stories	2			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	90%				10%				100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	14	m²/person	151	ft²/person	%OA	16.85%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	10	L/s.person	21	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right: | 34%

(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	1.6			
Total Air Circulation or Design Air Flow	4.24	L/s.m²	0.83	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	#######	
Peak Zone Sensible Load	784,929	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	36,515	
Total air circulation or Design air	4.24	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	22	°C	71.6	°F	16	°C	60.8	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning | Changes/Year |

Incidence of Annual Room Controls Maintenance |

Incidence of Annual HVAC Controls Maintenance |

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
University/College	All	Existing	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.90			
Connected Load	14.1	W/m²	1.3	W/ft²

Occ. Period(Hrs./yr.)	4000	Light Level (Lux)	300	500	700	1000				Total
Unocc. Period(Hrs./yr.)	4760	% Distribution		100%						100%
Usage During Occupied Period	90%	Weighted Average								**500**
Usage During Unoccupied Period	20%									
			INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
Fixture Cleaning:		System Present (%)			60%	35%	5%	0%	0%	100.0%
Incidence of Practice		CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
Interval	years	LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
		Efficacy (L/W)	15	50	72	88	65	95	90	
Relamping Strategy & Incidence of Practice	Group / Spot									

EUI kWh/ft².yr 5.4; MJ/m².yr 207

ARCHITECTURAL LIGHTING CORRIDORS

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.10			
Connected Load	11.4	W/m²	1.1	W/ft²

Occ. Period(Hrs./yr.)	4000	Light Level (Lux)	300	500	700	1000				Total
Unocc. Period(Hrs./yr.)	4760	% Distribution	100%							100%
Usage During Occupied Period	100%	Weighted Average								**300**
Usage During Unoccupied Period	50%									
			INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
Fixture Cleaning:		System Present (%)	8%	10%	15%	65%		0%	2%	100.0%
Incidence of Practice		CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
Interval	years	LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
		Efficacy (L/W)	15	50	72	88	65	95	90	
Relamping Strategy & Incidence of Practice	Group / Spot									

EUI = Load X Hrs. X SF X GLFF

EUI kWh/ft².yr 0.7; MJ/m².yr 26

SPECIAL PURPOSE LIGHTING

Light Level	300.00	Lux	27.9	ft-candles
Floor Fraction (HBLFF)				
Connected Load	6.6	W/m²	0.6	W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000	Light Level (Lux)	300	500	700	1000				Total
Unocc. Period(Hrs./yr.)	4760	% Distribution	100%							100%
Usage During Occupied Period	0%	Weighted Average								**300**
Usage During Unoccupied Period	100%									
			INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
Fixture Cleaning:		System Present (%)		0%				100%	0%	100.0%
Incidence of Practice		CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
Interval	years	LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
		Efficacy (L/W)	15	50	72	84	65	95	90	
Relamping Strategy & Incidence of Practice	Group / Spot									

EUI kWh/ft².yr; MJ/m².yr

TOTAL LIGHTING — Overall LP 13.79 W/m² — EUI TOTAL kWh/ft².yr 6; MJ/m².yr 233

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	54.55	51	100	200	217	
Density (device/occupant)	0.31	0.31	0.02	0.02	0.01	
Connected Load	1.2 W/m²	1.1 W/m²	0.1 W/m²	0.3 W/m²	0.1 W/m²	1.3 W/m²
	0.1 W/ft²	0.1 W/ft²	0.01 W/ft²	0.03 W/ft²	0.01 W/ft²	0.12 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	100%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2600	2000
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6160	6760

Total end-use load (occupied period)	3.9 W/m²	0.4 W/ft²
Total end-use load (unocc. period)	2.2 W/m²	0.2 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	55%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	1.34
		MJ/m².yr	51.73
Plug Loads	EUI	kWh/ft².yr	0.65
		MJ/m².yr	25.18

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	0.5	EUI	kWh/ft².yr	0.4
	MJ/m².yr	20.0		MJ/m².yr	15.0

REFRIGERATION

Provide description below:

EUI kWh/ft².yr 0.5; MJ/m².yr 20.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
University/College	All	Existing	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	49.7	W/m²	15.8	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	463	MJ/m².yr	12.0	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	12.0
MJ/m².yr	463

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	12.0
MJ/m².yr	463

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	81	W/m²	26	Btu/hr.ft²	466	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	76.4	MJ/m².yr	2.0	kWh/ft².yr		

Sizing Factor 1.00 Operation (occ. perio 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 25.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.9
MJ/m².yr	33

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.9
MJ/m².yr	33

SERVICE HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					0%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 22.8

Wetting Use Percentage 90%

All Electric EUI		Fuel Oil / Propane EUI		Market Composite EUI	
kWh/ft².yr	0.6	kWh/ft².yr	0.8	kWh/ft².yr	0.6
MJ/m².yr	25	MJ/m².yr	30	MJ/m².yr	25.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
University/College	All	Existing	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	4.2	L/s.m²	0.83	CFM/ft²
System Static Pressure CAV	500	Pa	2.0	wg
System Static Pressure VAV	500	Pa	2.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	4.4	W/m²	0.41	W/ft²
Fan Design Load VAV	4.4	W/m²	0.41	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	90%	10%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.03	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.62	W/m²	0.15	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.004	L/s.m²	0.006	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0052	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	50	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.7	W/m²	0.06	W/ft²		

Supply Fan Occ. Period	4000	hrs./year
Supply Fan Unocc. Period	4760	hrs./year
Supply Fan Energy Consumption	31.9	kWh/m².yr
Exhaust Fan Occ. Period	4000	hrs./year
Exhaust Fan Unocc. Period	4760	hrs./year
Exhaust Fan Energy Consumption	1.6	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	6000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	3.2
	MJ/m².yr	122.1

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
University/College	**All**	**Existing**	**Labrador Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	**Electricity:**	**25.7**	kWh/ft².yr	**994.8**	MJ/m².yr	**Fuel Oil / Propane:**	**0.0** kWh/ft².yr	**0.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	5.4	207.3
ARCHITECTURAL LIGHTING CORI	0.7	26.2
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.7	25.2
HVAC FANS & PUMPS	3.2	122.1
REFRIGERATION	0.5	20.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	1.3	51.7
COMPUTER SERVERS	0.1	3.7
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	12.0	463.4		
SPACE COOLING	0.2	8.3		
SERVICE HOT WATER	0.6	25.0	0.0	0.0
FOOD SERVICE EQUIPMENT	0.4	15.0		

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Warehouse/Wholesale	**All**	**Existing**	**Labrador Interconnected**
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Building Size	1,859	m²	20,000	ft²
Roof U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Footprint (m²)	1,859	m²	20,000	ft²
Glazing U value (W/m².°C)	3.52	W/m².°C	0.62	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.05								
Shading Coefficient (SC)	0.80				Typical # Stories	1			
					Floor to Floor Height (m)	6.1	m	20.1	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	100	m²/person	1076	ft²/person	%OA	6.49%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	15	L/s.person	32	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right:

(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | 0.5 L/s.m² | 0.10 CFM/ft²

50% operation (%)

Sizing Factor	1			
Total Air Circulation or Design Air Flow	2.31	L/s.m²	0.45	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	254,531	
Peak Zone Sensible Load	195,583	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	9,099	
Total air circulation or Design air	2.31	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	16	°C	60.8	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All	Existing	Labrador Interconnected
Baseline			

LIGHTING

HIGH BAY LIGHTING

Light Level	400	Lux	37.2	ft-candles
Floor Fraction (GLFF)	0.90			
Connected Load	10.5	W/m²	1.0	W/ft²
Occ. Period(Hrs./yr.)	3500			
Unocc. Period(Hrs./yr.)	5260			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	15%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution	50%	50%						100%
Weighted Average								**400**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			20%	10%	60%	10%		100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI		
	kWh/ft².yr	3.8
	MJ/m².yr	146

OTHER, OFFICE LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.10			
Connected Load	20.9	W/m²	1.9	W/ft²
Occ. Period(Hrs./yr.)	3000			
Unocc. Period(Hrs./yr.)	5760			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	15%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	10%	5%	60%	25%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI		
	kWh/ft².yr	0.8
	MJ/m².yr	29

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%					0%	0.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI		
	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING Overall LP 11.57 W/m²

EUI TOTAL		
	kWh/ft².yr	4.5
	MJ/m².yr	175

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	54.55		51		100		200		217			
Density (device/occupant)	0.59		0.59		0.03		0.03		0.06			
Connected Load	0.3	W/m²	0.3	W/m²	0.0	W/m²	0.1	W/m²	0.1	W/m²	2	W/m²
	0.0	W/ft²	0.0	W/ft²	0.00	W/ft²	0.01	W/ft²	0.01	W/ft²	0.19	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		90%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		25%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2000		3500	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6760		5260	

Total end-use load (occupied period)	2.6	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	1.0	W/m²	0.1	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	39%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.34
		MJ/m².yr	13.30
Plug Loads	EUI	kWh/ft².yr	0.83
		MJ/m².yr	32.15

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr		EUI	kWh/ft².yr	
	MJ/m².yr			MJ/m².yr	

REFRIGERATION

Provide description below:

Process

EUI		
	kWh/ft².yr	1.5
	MJ/m².yr	60.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Warehouse/Wholesale Baseline | **SIZE:** All | **VINTAGE:** Existing | **REGION:** Labrador Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boiler	Unit Heater	Packaged Rooftop	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)							100%	100%
Eff./COP	70%	70%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.43	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load: 48.0 W/m² — 15.2 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load): 427 MJ/m².yr — 11.0 kWh/ft².yr
Sizing Factor: 1.00

Electric Fuel Share: 100.0% Fuel Oil / Propane Fuel Share: Oil Fuel Share:

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	11.0
MJ/m².yr	427

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	11.0
MJ/m².yr	427

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	13.0	55.4

Peak Cooling Load: 40 W/m² — 13 Btu/hr.ft² — 943 ft²/Ton
Seasonal Cooling Load (Tertiary Load): 30.2 MJ/m².yr — 0.8 kWh/ft².yr

Sizing Factor: 1.00 Operation (occ. perio 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C): 5.0%

Electric Fuel Share: 100.0% Fuel Oil / Propane Fuel Share:

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.3
MJ/m².yr	13

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.3
MJ/m².yr	13

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Avg. Tank				Boiler
System Present (%)					0%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 17.0

Wetting Use Percentage: 90%

All Electric EUI	
kWh/ft².yr	0.5
MJ/m².yr	19

Fuel Oil / Propane EUI	
kWh/ft².yr	0.6
MJ/m².yr	23

Market Composite EUI	
kWh/ft².yr	0.5
MJ/m².yr	18.7

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All	Existing	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	2.3	L/s.m²	0.45	CFM/ft²
System Static Pressure CAV	300	Pa	1.2	wg
System Static Pressure VAV	300	Pa	1.2	wg
Fan Efficiency	60%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	1.4	W/m²	0.13	W/ft²
Fan Design Load VAV	1.4	W/m²	0.13	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	80%	20%	80%	20%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.02	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.04	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.3	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.80	W/m²	0.07	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.002	L/s.m²	0.003	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.002	L/s.m²	0.0025	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	50	kPa	17	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.2	W/m²	0.02	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	11.1	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	2.1	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.2	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	1.2
	MJ/m².yr	48.3

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Warehouse/Wholesale	**All**	**Existing**	**Labrador Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **20.8** kWh/ft².yr **806.9** MJ/m².yr **Fuel Oil / Propane:** **0.0** kWh/ft².yr **0.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
HIGH BAY LIGHTING	3.8	146.3
OTHER, OFFICE LIGHTING	0.8	29.1
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.8	32.1
HVAC FANS & PUMPS	1.2	48.3
REFRIGERATION	1.5	60.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.3	13.3
COMPUTER SERVERS	0.1	4.4
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	11.0	427.0		
SPACE COOLING	0.0	0.6		
DOMESTIC HOT WATER	0.5	18.7	0.0	0.0
FOOD SERVICE EQUIPMENT				

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All	Existing	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	929	m²	10,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	929	m²	10,000	ft²
Glazing U value (W/m².°C)	3.52	W/m².°C	0.62	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.36								
Shading Coefficient (SC)	0.58				Typical # Stories	1			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	60%							40%	100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	20	m²/person	215	ft²/person	%OA	9.29%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	8	L/s.person	16	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right:
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | L/s.m² | CFM/ft² | operation (%)

Sizing Factor	1.3			
Total Air Circulation or Design Air Flow	4.03	L/s.m²	0.79	CFM/ft²
Infiltration Rate	0.40	L/s.m²	0.08	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²	CFM/ft²
Operation occupied period	50%		
Operation unoccupied period	50%		

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	210,389	
Peak Zone Sensible Load	131,371	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	6,111	
Total air circulation or Design air	4.03	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				98%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All	Existing	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	400	Lux	37.2	ft-candles
Floor Fraction (GLFF)	0.50			
Connected Load	10.7	W/m²	1.0	W/ft²

Occ. Period(Hrs./yr.)	4300
Unocc. Period(Hrs./yr.)	4460
Usage During Occupied Period	100%
Usage During Unoccupied Period	10%

Light Level (Lux)	400	550	650			Total
% Distribution	100%					100%
Weighted Average						**400**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)			20.0%	80.0%				100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	2.4
	MJ/m².yr	92

ARCHITECTURAL LIGHTING

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.50			
Connected Load	30.7	W/m²	2.9	W/ft²

Occ. Period(Hrs./yr.)	4300
Unocc. Period(Hrs./yr.)	4460
Usage During Occupied Period	100%
Usage During Unoccupied Period	10%

Light Level (Lux)	200	300	400	500		Total
% Distribution			100%			100%
Weighted Average						**400**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	60%	25%					15%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	84	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	6.8
	MJ/m².yr	262

EUI = Load X Hrs. X SF X GLFF

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

Light Level (Lux)	300	500	700	1000		Total
% Distribution						
Weighted Average						

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 20.72 W/m²

EUI TOTAL	kWh/ft².yr	9
	MJ/m².yr	354

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.16	0.16	0.01		0.06	
Connected Load	0.4 W/m²	0.4 W/m²	0.1 W/m²	W/m²	0.1 W/m²	1.15 W/m²
	0.0 W/ft²	0.0 W/ft²	0.00 W/ft²	W/ft²	0.01 W/ft²	0.11 W/ft²
Diversity Occupied Period	80%	80%	80%	80%	100%	80%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	4100
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	4660

Total end-use load (occupied period)	1.8	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	1.2	W/m²	0.1	W/ft²

Usage during occupied period	100%
Usage during unoccupied period	65%

Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.41
		MJ/m².yr	16.00
Plug Loads	EUI	kWh/ft².yr	0.60
		MJ/m².yr	23.23

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Lunch room/cafeteria/restaurant

Fuel Oil / Propane EUI		
EUI	kWh/ft².yr	0.1
	MJ/m².yr	5.0

All Electric EUI		
EUI	kWh/ft².yr	34.3
	MJ/m².yr	1330.0

REFRIGERATION

Provide description below:

Lunch room/cafeteria/restaurant

EUI	kWh/ft².yr	16.8
	MJ/m².yr	650.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All	Existing	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				Total
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	58.9 W/m²	18.7 Btu/hr.ft²	
Seasonal Heating Load (Tertiary Load)	492 MJ/m².yr	12.7 kWh/ft².yr	
Sizing Factor	1.00		
Electric Fuel Share	100.0%	Fuel Oil / Propane Fuel Share	Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	12.7
MJ/m².yr	492

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	12.7
MJ/m².yr	492

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		WSHP	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE		Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	3.5	3.5	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.29	0.29	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7 °C	44.6 °F
Condenser Water	30 °C	86 °F
Supply Air	14.0 °C	57.2 °F

Peak Cooling Load	66 W/m²	21 Btu/hr.ft²	570 ft²/Ton
Seasonal Cooling Load (Tertiary Load)	72.9 MJ/m².yr	1.9 kWh/ft².yr	

Sizing Factor 1.00 — Operation (occ. period) 3000 hrs/year — Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 25.0%

Electric Fuel Share 100.0% — Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.8
MJ/m².yr	32

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.8
MJ/m².yr	32

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Tank				Boiler
System Present (%)					0%
Eff./COP	0.65				0.75

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.75	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 700.0

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	19.9
MJ/m².yr	769

Fuel Oil / Propane EUI	
kWh/ft².yr	24.1
MJ/m².yr	933

Market Composite EUI	
kWh/ft².yr	19.9
MJ/m².yr	769.2

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All	Existing	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	4.0	L/s.m²	0.79	CFM/ft²
System Static Pressure CAV	350	Pa	1.4	wg
System Static Pressure VAV	350	Pa	1.4	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	1.00			
Fan Design Load CAV	3.2	W/m²	0.30	W/ft²
Fan Design Load VAV	3.2	W/m²	0.30	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	60%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.04	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.06	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	40%			
Fan Motor Efficiency	80%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.30	W/m²	0.12	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.004	L/s.m²	0.005	U.S. gpm/ft²
Pump Head Pressure	90	kPa	30	ft
Pump Efficiency	55%			
Pump Motor Efficiency	90%			
Sizing Factor	1.0			
Pump Connected Load	0.64	W/m²	0.06	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0042	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	150	kPa	50	ft		
Pump Efficiency	55%					
Pump Motor Efficiency	90%					
Sizing Factor	0.5					
Pump Connected Load	0.4	W/m²	0.04	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	14.3	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.8	kWh/m².yr
Condenser Pump Energy Consumption	0.3	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	1.6
	MJ/m².yr	60.4

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All	Existing	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	**Electricity:**	**96.4**	kWh/ft².yr	**3,734.2**	MJ/m².yr	**Fuel Oil / Propane:**	**0.0** kWh/ft².yr	**0.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr	END USE:	Electricity kWh/ft².yr	Electricity MJ/m².yr	Fuel Oil / Propane kWh/ft².yr	Fuel Oil / Propane MJ/m².yr
GENERAL LIGHTING	2.4	91.7					
ARCHITECTURAL LIGHTING	6.8	262.4	SPACE HEATING	12.7	492.0		
SPECIAL PURPOSE LIGHTING			SPACE COOLING	0.2	7.9		
OTHER PLUG LOADS	0.6	23.2	DOMESTIC HOT WATER	19.9	769.2	0.0	0.0
HVAC FANS & PUMPS	1.6	60.4	FOOD SERVICE EQUIPMENT	34.3	1,330.0		
REFRIGERATION	16.8	650.0					
MISCELLANEOUS	0.1	5.0					
BLOCK HEATERS	0.1	5.0					
COMPUTER EQUIPMENT	0.4	16.0					
COMPUTER SERVERS	0.1	4.4					
ELEVATORS							
OUTDOOR LIGHTING	0.4	17.0					

Terms Used in Building Profile Summaries

Profile Term	Explanation
Building envelope	Defines the thermal characteristics of a building's exterior components
U-value	The rate of heat loss, in Btu per hour per square foot per degree Fahrenheit (BTU/hr. f^2.^{o}F) through walls, roofs and windows. The U-value is the reciprocal of the R-value
Shading coefficient (SC)	Is a measure of the total amount of heat passing through the glazing compared with that through a single clear glass
Window-to-wall ratio	Defines the ratio of window to insulated exterior wall area
General lighting	Defines the lighting types that are used within the main areas of a building, e.g., for a School, the area is classrooms and the lighting type is fluorescent; for a Food Retail store, the main area is the retail floor.
LPD	Lighting power density expressed in terms of W/ft^2
Lux	The amount of visible light per square meter incident on a surface (lumen/m^2)
Inc	Incandescent lamps
CFL	Compact fluorescent lamps
T12	T12 fluorescent lamps with magnetic ballasts
T8	T8 fluorescent lamps with electronic ballasts
MH	Metal halide lamps
HPS	High-pressure sodium lamps
HID	High-intensity discharge lighting includes both MH and HPS
T5HO	T5 High Output fluorescent lamps
LED	Light Emitting Diode lamps
Secondary lighting	Defines the lighting types that are used within the secondary areas of a building, e.g., for a School, the secondary areas are corridors, lobbies, foyers, etc.
Outdoor lighting	Defines the outdoor lighting including parking lot and façade
Overall LPD	The total floor weighted LPD that includes general, secondary, and outdoor
Fans	Defines the mix of air handling systems
CAV	Constant air volume
VAV	Variable air volume
Space heating	Defines the mix of heating equipment types found within the stock of buildings
ASHP	Air-source heat pump
WSHP	Water-source heat pump
Resistance	Electric resistance heating equipment including boilers and baseboard heaters
Fuel Oil / Propane	Fossil fuel fired equipment, including space heating, domestic hot water heating, and cooking equipment
Space cooling	Defines the mix of cooling equipment types found within the stock of buildings
Centrifugal	Standard centrifugal chillers with a full load performance of 0.75 kW/ton
Centri HE	High-efficiency centrifugal chillers assumed to have a performance of <0.65 kW/ton
Recip open	Semi-hermetic reciprocating chillers
DX	Direct expansion cooling equipment that use small tonnage hermetic compressors

Appendix B Background-Section 4: Base Year Peak Load

Introduction

Appendix B provides additional detailed information related to each of the major steps employed in the generation of the Commercial sector Base Year peak loads. The discussion is organized as follows:

- Overview of peak load methodology
- Segmentation of commercial sub sectors
- Detailed results

B.1 Overview of Peak Load Profile Methodology

As noted in the main text, development of the electric peak load estimates employs four specific factors as outlined below:

- **Monthly Usage Allocation Factor:** This factor represents the percent of annual electric energy usage that is allocated to each month. This set of monthly fractions (percentages) reflects the seasonality of the load shape, whether a facility, process or end use, and is dictated by weather or other seasonal factors. This allocation factor can be obtained from either (in decreasing order of priority): (a) monthly consumption statistics from end-use load studies; (b) monthly seasonal sales (preferably weather normalized) obtained by subtracting a “base” month from winter and summer heating and cooling months; or (c) heating or cooling degree days on an appropriate base.
- **Weekend to Weekday Factor:** This factor is a ratio that describes the relationship between weekends and weekdays, reflecting the degree of weekend activity inherent in the facility or end use. This may vary by month or season. Based on this ratio, the average electric energy per day type can be computed from the corresponding monthly electric energy.
- **Peak Day Factor:** This factor reflects the degree of daily weather sensitivity associated with the load shape, particularly heating or cooling; it compares a peak (e.g., hottest or coldest) day to a typical weekday in that month.
- **Per Unit Hourly Factor:** The relationship of load among different hours of the day for each day type (weekday, weekend day, peak day) and for each month reflects the operating hours of the electric equipment or end use within facilities by sub sector. For example, for lighting, this would be affected by time of day, season (affected by daylight), and space type, where applicable. For the Base Year, lighting is treated on an aggregate basis by facility.

The four factors (sets of ratios) defined above provide the basis for converting annual energy to any hourly demand specified including the grouping of hours used in the four peak periods defined in this study. Exhibit 101, below, illustrates how each of the above four factors is applied sequentially to a known annual energy value to produce a peak load value, defined as a specific peak period. In the example, the 36-hour winter peak period is used. The winter peak is defined as follows:

> *The morning period from 7 am to noon and the evening period from 4 pm to 8 pm on the four coldest days in the December to March period; this is a total of 36 hours per year.*[39]

[39] Source: NL (Feb 2014) http://hydroblog.nalcorenergy.com/meeting-peak-demand/

Exhibit 101 Illustrative Application of Annual Energy to Peak Period Value Factors

The Winter Peak demand is computed based on the average demand for the 36-hour period. The NL peak is assumed to occur on the four coldest days in December and January.

The following steps are required:

- **Step 1:** The monthly usage allocation factor for December and January are applied to the annual energy use to calculate December and January energy use.
- **Step 2:** The average weekday in December and January is calculated based on the formula shown below, which adjusts the average day type use to reflect any difference in typical weekend use versus typical weekday use.

$$\frac{1}{(Days\ in\ Month) * \left(\frac{5}{7} + \left(\frac{2}{7} * Weekend\ Ratio\right)\right)}$$

- **Step 3:** The peak day factor is then applied to the average weekday electric energy use to determine the peak day use for the four peak days (as defined by the NL utilities).
- **Step 4:** The average peak over the 9 hours of peak period per day is then calculated based on allocating the peak day use according to the per unit hourly load factor for a peak winter day, using the percentage of use in those hours versus the daily usage for the peak day.

It should be noted that the methodology shown in Exhibit 101 produces aggregate diversified average loads for all customers or end uses in the defined sub sector.

Exhibit 102 provides a specific numeric example for the calculation of Winter Peak Period demand (kW). The example presented in Exhibit 102 is for secondary lighting use in large office buildings, prior to adjustment for fuel share. The example shows how the annual consumption of 10,000 kWh can be converted to a peak demand value for the Winter Peak Period by the calculation of a corresponding hours-use value.

Exhibit 102 Sample Hours-Use Calculation for Office Secondary Lighting

Winter Peak Period =

$$\frac{Annual\ kWh\ \times Mo.Allocation\ (Dec)}{Days\ in\ Month \times \left[\frac{5}{7} + \left(\frac{2}{7} \times Weekend\ Ratio\right)\right]} \times Peak\ Day\ Factor \times Peak\ Hour\ \%\ Daily\ kWh$$

Winter Peak Period =

$$\frac{10{,}000\ [\mathrm{Ann.kWh}] \times\ 14.75\%\ [\mathrm{Mo.Alloc.}]}{62 \times \left[\frac{5}{7} + \left(\frac{2}{7} \times 1.0\ [\mathrm{Dec.Wkend\ Ratio}]\right)\right]} \times 1.0\ [\mathrm{Peak\ Day\ Fact.}]\ \times 0.06410\ [\mathrm{Peak\ Hr\ \%\ Day\ kWh}]$$

= 1.525 kW

Hours-use Factor =

$$\frac{10{,}000\ [\mathrm{annual\ kWh}]}{1.525\ [\mathrm{Winter\ Peak\ Period}]} = 6{,}557\ [\mathrm{Winter\ Peak\ Hours\ Use}]$$

This means that any applicable Office annual secondary lighting kWh can be converted to average demand in kW during the 36-hour winter peak period by dividing by 6,557 hours**.**

B2 Segmentation of Commercial Buildings

The Commercial sector segmentation used to generate the electric peak load profiles is the same as that used for electric energy use. That is, there is a load profile that corresponds to each combination of sub sector and end use. Exhibit 103 shows the Commercial sub sectors and end uses that were addressed.

Exhibit 103 Commercial Segmentation Used for Electric Peak Load Calculations

Sub sectors (Large Office, Small Office, Large Non-Food Retail, Small Non-Food Retail, Food Retail, Large Accommodation, Small Accommodation, Healthcare, School, Universities and College, Warehouse/Wholesale, Restaurant)

End uses (general lighting, secondary lighting, outdoor lighting, computer equipment, computer servers, other plug load, food service equipment, refrigeration, elevator, miscellaneous equipment, space heating space cooling, HVAC fans & pumps, domestic hot water, block heaters, street lighting)

Exhibit 104 describes the assumptions and data sources for the load profile factors that were used to develop the corresponding hours-use factors. To produce a demand for a combination of sub sector and end use, the corresponding annual energy is divided by the hours-use factor for the peak period for the applicable load shape. For certain end uses that are assumed to have no usage during the winter months (e.g., cooling) the hours-use values are considered infinite (noted by 1E+15), resulting in virtually zero demand when divided into annual energy.

Most of the studies referenced in the exhibit are the same as those used to develop hours-use factors for the CDM Potential Study completed for NL in 2008 and are also the same as those used for studies in other provinces. For most end uses, hours-use factors remain very stable from year to year and across jurisdictions, as long as the peak period of interest is the same. The amount of energy consumed varies from year to year and from place to place, but the shape of the load – when the energy is used – remains very similar.

In this analysis, therefore, the initial estimate of peak demand used the hours-use factors from the 2008 CDM Potential Study. The results were within a few percent of utility measured values. The team then calibrated the model by adjusting the hours-use factors for the weather-sensitive end uses (such as space heating) for all three sectors simultaneously, until the model peak demand output agreed closely with the Utilities' measured peak demand.

Exhibit 104 Commercial End Use Load Shape Parameters

Load Shape #	End Use	Monthly Breakdown	Wkend / Wkday Ratio	Peak Day Factor	Hourly Profile
2001	General lighting – Office	RG&E Office lighting	App. 0.50 RG&E Office lighting	1.00 assumed	Office lighting - RG&E 1991 Study[40]
2002	General lighting – Non-food Retail	RG&E Retail lighting	RG&E Retail lighting	1.00 assumed	RG&E Retail lighting
2003	General lighting – Food Retail	RG&E Grocery lighting	RG&E Grocery lighting	1.00 assumed	RG&E Grocery lighting
2004	General lighting – Accommodation	RG&E Hotel/Motel lighting	RG&E Hotel/Motel lighting	1.00 assumed	RG&E Hotel/Motel lighting
2005	General lighting – Healthcare	RG&E Hospital/Long-term Care lighting	RG&E Hospital/Long-term Care lighting	1.00 assumed	RG&E Hospital/Long-term Care lighting
2006	General lighting – Schools, Universities and Colleges	RG&E College lighting	RG&E College lighting	1.00 assumed	RG&E College lighting
2007	General lighting – Restaurant	RG&E Full-serve Restaurant lighting	RG&E Full-serve Restaurant lighting	1.00 assumed	RG&E Full-serve Restaurant lighting
2008	General lighting – Warehouse	RG&E Warehouse lighting	RG&E Warehouse lighting	1.00 assumed	RG&E Warehouse lighting
2009	General lighting – Small Office and Other Commercial	RG&E Office lighting	RG&E Office lighting (modified)[41]	1.00 assumed	RG&E Office lighting (modified)
2010	General lighting – Small Non-food Retail	RG&E Small Non-food Retail lighting	RG&E Non-food Retail lighting (modified)	1.00 assumed	RG&E Non-food Retail lighting (modified)
2011	Secondary lighting – Office & Education	Architectural lighting model	1.00 assumed	1.00 assumed	Architectural lighting model 6 am-6 pm 100%, 50% evening, 10% overnight
2012	Secondary lighting – Retail & Restaurant	Architectural lighting model	1.00 assumed	1.00 assumed	Architectural lighting model 6 am-10 pm 100%, 50% evening, 10% overnight
2013	Secondary lighting – Health & Warehouse	Architectural lighting model	1.00 assumed	1.00 assumed	Architectural lighting model 6 am-10 pm 100%, 80% evening, 50% overnight
2014	Secondary lighting – all other	Architectural lighting model	1.00 assumed	1.00 assumed	Architectural lighting model 6 am-6 pm 100%, 50% evening, 10% overnight
2015	Refrigeration – Restaurant, Accommodation, Health	RG&E Restaurant refrigeration	RG&E total Restaurant refrigeration	RG&E total Restaurant refrigeration	RG&E total Restaurant refrigeration
2016	Refrigeration – Food Retail	RG&E Grocery refrigeration	RG&E Grocery refrigeration	RG&E Grocery refrigeration	RG&E Grocery refrigeration
2017	Refrigeration – Warehouse / Wholesale	RG&E Warehouse refrigeration	RG&E Warehouse refrigeration	RG&E Warehouse refrigeration	RG&E Warehouse refrigeration
2018	Refrigeration – Schools, Universities and Colleges	RG&E School refrigeration	RG&E School refrigeration	RG&E School refrigeration	RG&E School refrigeration
2019	Refrigeration – all Other Commercial	RG&E total Commercial refrigeration	RG&E total Commercial refrigeration	RG&E total Commercial refrigeration	RG&E total Commercial refrigeration
2020	Streetlighting	Based on dusk-to-dawn lighting model	1.00 assumed	1.00 assumed	Dusk-to-dawn model, average St. John's sunrise/ sunset

[40] Rochester Gas & Electric Company; 1991 DSM Evaluation Report Load Shape working papers.
[41] Modifications for per-unit load shapes for Small Office and Small Non-food Retail reduced overnight loads by 50% after 6 pm (Office) and after 9 pm (Non-food Retail).

Exhibit 104 Commercial End Use Load Shape Parameters (cont'd…)

Load Shape #	End Use	Monthly Breakdown	Wkend / Wkday Ratio	Peak Day Factor	Hourly Profile
2021	Outdoor lighting	Based on outdoor lighting model	1.00 assumed	1.00 assumed	Outdoor lighting model, with RG&E 1991 study factors (0.55 overnight, 0.1 day, 1.0 eve.)
2022	Space heating – Office	St. John's Newfoundland 1971-2000 (30-year) Normal HDD; then calibrated to actual utility demand[42]	1.00 assumed	10-year average ratio of peak/avg. HDD	RG&E 1991 Study for Office Space Heating
2023	Space heating – Retail Food/Non-Food	10-year average St. John's HDD	1.00 assumed	10-year average ratio of peak/avg. HDD	RG&E 1991 study for Retail Space heating
2024	Space heating – Accommodation/ Healthcare	St. John's Newfoundland 1971-2000 (30-year) Normal HDD; then calibrated to actual utility demand	1.00 assumed	10-year average ratio of peak/avg. HDD	RG&E 1991 study for Hospital/Long-term care space heating
2025	Space heating – School / University and College	St. John's Newfoundland 1971-2000 (30-year) Normal HDD; then calibrated to actual utility demand	1.00 assumed	10-year average ratio of peak/avg. HDD	RG&E 1991 study for School space heating
2026	Space heating – Restaurant	St. John's Newfoundland 1971-2000 (30-year) Normal HDD; then calibrated to actual utility demand	1.00 assumed	10-year average ratio of peak/avg. HDD	RG&E 1991 study for total Restaurant space heating
2027	Space heating – all Other Commercial	St. John's Newfoundland 1971-2000 (30-year) Normal HDD; then calibrated to actual utility demand	1.00 assumed	10-year average ratio of peak/avg. HDD	RG&E 1991 study for Commercial space heating
2028	Food service equipment – Restaurant	RG&E total Restaurant cooking	RG&E total Restaurant cooking	RG&E total Restaurant cooking	RG&E total Restaurant cooking
2029	Food service equipment – Accommodation / Healthcare	RG&E total Hospital/Long-term Care cooking	RG&E total Hospital/Long-term Care Cooking	RG&E total Hospital/Long-term Care Cooking	RG&E total Hospital/Long-term Care cooking
2030	Food service equipment – Food Retail	RG&E Grocery cooking	RG&E Grocery cooking	RG&E Grocery cooking	RG&E Grocery cooking
2031	Food service equipment – School/University	RG&E School cooking	RG&E School cooking	RG&E School cooking	RG&E School cooking
2032	Food service equipment – all Other Commercial	RG&E School cooking	RG&E School cooking	RG&E School cooking	RG&E School cooking
2033	Domestic hot water (DHW) – Restaurant	RG&E Restaurant water heat	RG&E Restaurant water heat	RG&E Restaurant water heat	RG&E Restaurant water heat
2034	Domestic hot water (DHW) – Accommodation / Health	RG&E total Commercial water heat	RG&E total Commercial water heat	RG&E total Commercial water heat	RG&E total Commercial water heat

[42] Heating degree days on an 18°C base for period 2001 - 2010 for the St. John's weather station.

Exhibit 104 Commercial End Use Load Shape Parameters (cont'd…)

Load Shape #	End Use	Monthly Breakdown	Wkend / Wkday Ratio	Peak Day Factor	Hourly Profile
2035	DHW – Food Retail and Non-Food Retail	RG&E Retail water heat	RG&E Retail water heat	RG&E Retail water heat	RG&E Retail water heat
2036	DHW – School / University	RG&E School water heat	RG&E School water heat	RG&E School water heat	RG&E School water heat
2037	DHW – all Other Commercial	RG&E water heat Commercial	RG&E water heat Commercial	RG&E water heat Commercial	RG&E water heat Commercial
2038	Space cooling – All Commercial	Assumed 100% off winter peak	1.00 various studies	Assumed 100% off winter peak	RG&E 1991 study for Commercial space cooling
2039	Computer, plug load	RG&E Office lighting	RG&E Office lighting	1.00 assumed	RG&E Office lighting
2040	Elevators	NYC subways	NYC subways (0.7881)	1.0 Assumed	NYC subways (6 am-6 pm), arch Office lighting (6 pm –6 am)
2041	Engine Block Heaters	Monthly shape for Labrador assumed similar to SK; then calibrated to actual utility demand	1.00 assumed	Peak Day factor assumed similar to SK	Flat, average 7.9 hrs/day for 90 days[43]

Exhibit 105 shows the distinct hour-use values developed for each combination of peak period, sector, sub sector and end use employed in this study, as generated from the applicable load shape.

The hours-use value represents the divisor to convert annual energy (e.g., MWh) to that peak period demand. For example, dividing the annual electricity consumed for general lighting in offices by the hours-use value for the Annual Peak Hour (i.e. 5,771) will convert annual MWh to demand at the annual system peak hour (6 pm).

[43] Ontario Power Authority – OPA Measures and Assumptions List (prescriptive) as of January 31, 2010; 1,450 watts at 7.9 hours/day x 90 days.

Exhibit 105 Commercial Sector Load Shape Hours-Use Values

Region	Sub-sector	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting
	Large Office	964	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,137	7,139
	Small Office	964	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,137	7,139
	Large Non-food Retail	964	6,393	6,393	7,130	6,393	2,657	5,790	6,393	6,393	6,393	7,139	8,453	6,393	1.E+15	2,520	7,139
	Small Non-food Retail	964	6,393	6,393	7,130	6,393	2,657	5,790	6,393	6,393	6,393	7,139	8,453	6,393	1.E+15	2,520	7,139
	Food Retail	964	6,393	6,393	7,130	6,393	7,307	6,778	6,393	6,393	6,393	7,139	8,772	6,393	1.E+15	2,520	7,139
	Large Accomodation	964	6,393	6,393	6,207	6,393	6,152	6,535	6,393	6,393	6,393	7,139	8,490	6,393	1.E+15	3,386	7,139
	Small Accomodation	964	6,393	6,393	6,207	6,393	6,152	6,535	6,393	6,393	6,393	7,139	8,490	6,393	1.E+15	3,386	7,139
	Healthcare	964	7,488	7,488	6,207	7,488	6,152	6,800	7,488	7,488	7,488	7,139	8,490	7,488	1.E+15	3,386	7,139
	Schools	964	6,557	6,557	4,128	6,557	2,657	4,578	6,557	6,557	6,557	7,139	9,841	6,557	1.E+15	2,989	7,139
Island	Universities and Colleges	964	6,557	6,557	4,128	6,557	2,657	6,156	6,557	6,557	6,557	7,139	9,841	6,557	1.E+15	2,989	7,139
	Warehouse/Wholesale	964	7,488	7,488	6,207	7,488	2,657	5,387	7,488	7,488	7,488	7,139	7,801	7,488	1.E+15	3,116	7,139
	Restaurants	964	6,393	6,393	6,141	6,393	5,190	7,841	6,393	6,393	6,393	7,139	8,490	6,393	1.E+15	3,294	7,139
	Labrador Isolated C/I Buildings	964	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,137	7,139
	Island Isolated C/I Buildings	964	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,137	7,139
	Large Other Buildings	964	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,137	7,139
	Small Other Buildings	964	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,137	7,139
	Other Institutional	964	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,137	7,139
	Non-Buildings	964	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,137	7,139
	Street Lighting	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139
	Large Office	1,148	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,736	7,139
	Small Office	1,148	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,736	7,139
	Large Non-food Retail	1,148	6,393	6,393	7,130	6,393	2,657	5,790	6,393	6,393	6,393	7,139	8,453	6,393	1.E+15	3,002	7,139
	Small Non-food Retail	1,148	6,393	6,393	7,130	6,393	2,657	5,790	6,393	6,393	6,393	7,139	8,453	6,393	1.E+15	3,002	7,139
	Food Retail	1,148	6,393	6,393	7,130	6,393	7,307	6,778	6,393	6,393	6,393	7,139	8,772	6,393	1.E+15	3,002	7,139
	Large Accomodation	1,148	6,393	6,393	6,207	6,393	6,152	6,535	6,393	6,393	6,393	7,139	8,490	6,393	1.E+15	4,033	7,139
	Small Accomodation	1,148	6,393	6,393	6,207	6,393	6,152	6,535	6,393	6,393	6,393	7,139	8,490	6,393	1.E+15	4,033	7,139
	Healthcare	1,148	7,488	7,488	6,207	7,488	6,152	6,800	7,488	7,488	7,488	7,139	8,490	7,488	1.E+15	4,033	7,139
	Schools	1,148	6,557	6,557	4,128	6,557	2,657	4,578	6,557	6,557	6,557	7,139	9,841	6,557	1.E+15	3,561	7,139
Labrador	Universities and Colleges	1,148	6,557	6,557	4,128	6,557	2,657	6,156	6,557	6,557	6,557	7,139	9,841	6,557	1.E+15	3,561	7,139
	Warehouse/Wholesale	1,148	7,488	7,488	6,207	7,488	2,657	5,387	7,488	7,488	7,488	7,139	7,801	7,488	1.E+15	3,712	7,139
	Restaurants	1,148	6,393	6,393	6,141	6,393	5,190	7,841	6,393	6,393	6,393	7,139	8,490	6,393	1.E+15	3,924	7,139
	Labrador Isolated C/I Buildings	1,148	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,736	7,139
	Island Isolated C/I Buildings	1,148	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,736	7,139
	Large Other Buildings	1,148	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,736	7,139
	Small Other Buildings	1,148	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,736	7,139
	Other Institutional	1,148	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,736	7,139
	Non-Buildings	1,148	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	3,736	7,139
	Street Lighting	6,882	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	6,882	7,139

Exhibit 106 Commercial Sector Load Shape Hours-Use Values (cont'd…)

Region	Sub-sector	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting
	Large Office	821	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	2,671	7,139
	Small Office	821	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	2,671	7,139
	Large Non-food Retail	821	6,393	6,393	7,130	6,393	2,657	5,790	6,393	6,393	6,393	7,139	8,453	6,393	1.E+15	2,146	7,139
	Small Non-food Retail	821	6,393	6,393	7,130	6,393	2,657	5,790	6,393	6,393	6,393	7,139	8,453	6,393	1.E+15	2,146	7,139
	Food Retail	821	6,393	6,393	7,130	6,393	7,307	6,778	6,393	6,393	6,393	7,139	8,772	6,393	1.E+15	2,146	7,139
	Large Accomodation	821	6,393	6,393	6,207	6,393	6,152	6,535	6,393	6,393	6,393	7,139	8,490	6,393	1.E+15	2,883	7,139
	Small Accomodation	821	6,393	6,393	6,207	6,393	6,152	6,535	6,393	6,393	6,393	7,139	8,490	6,393	1.E+15	2,883	7,139
	Healthcare	821	7,488	7,488	6,207	7,488	6,152	6,800	7,488	7,488	7,488	7,139	8,490	7,488	1.E+15	2,883	7,139
	Schools	821	6,557	6,557	4,128	6,557	2,657	4,578	6,557	6,557	6,557	7,139	9,841	6,557	1.E+15	2,545	7,139
Isolated	Universities and Colleges	821	6,557	6,557	4,128	6,557	2,657	6,156	6,557	6,557	6,557	7,139	9,841	6,557	1.E+15	2,545	7,139
	Warehouse/Wholesale	821	7,488	7,488	6,207	7,488	2,657	5,387	7,488	7,488	7,488	7,139	7,801	7,488	1.E+15	2,653	7,139
	Restaurants	821	6,393	6,393	6,141	6,393	5,190	7,841	6,393	6,393	6,393	7,139	8,490	6,393	1.E+15	2,805	7,139
	Labrador Isolated C/I Buildings	821	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	2,671	7,139
	Island Isolated C/I Buildings	821	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	2,671	7,139
	Large Other Buildings	821	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	2,671	7,139
	Small Other Buildings	821	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	2,671	7,139
	Other Institutional	821	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	2,671	7,139
	Non-Buildings	821	6,557	6,557	6,207	6,557	2,657	5,771	6,557	6,557	6,557	7,139	8,453	6,557	1.E+15	2,671	7,139
	Street Lighting	3,137	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	7,139	3,137	7,139

Since the Utilities do not conduct regular class or end-use load analysis studies, there is no actual total (or sub sector) end-use load profile upon which to calibrate the load profile models developed for this study. The best option for calibrating NL-specific load profile parameters is the weather-sensitive loads, since that is the most area specific.

Since separately metered space heating end-use load data was not available from the Utilities, normal weather for the past 10 years was used to determine monthly allocations, and weekend/weekday ratios were developed from similar studies for another Canadian utility.

For peak day factors, analysis of the past 30 years' average vs. peak weather conditions (in heating degree days) for St. John's was analyzed to determine typical peak day factors for normal weather, which ranged from about 1.4 to 1.5 for winter months. For non weather-sensitive end uses, a factor of 1.0 was assumed, absent specific load study data.

B.3 Detailed Results

The following exhibits shows peak demand by region, sub sector and end use for the peak period identified for this study.

Exhibit 107 Commercial Sector Base Year (2014) Peak Hour Demand, Island Interconnected, by Sub Sector and End Use (MW)*

Sub Sector	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Large Office	-	4	1	2	0	0	9	7	0	1	1	0	2	4	30	-	62
Small Office	-	3	1	2	-	-	7	3	0	1	1	0	1	3	24	-	45
Large Non-food Retail	-	0	0	1	-	1	6	4	0	0	0	1	1	1	11	-	27
Small Non-food Retail	-	0	0	1	-	-	7	4	0	1	1	-	1	2	16	-	33
Food Retail	-	0	0	1	-	3	3	2	0	0	0	10	0	1	7	-	29
Large Accomodation	-	0	0	6	0	1	1	1	0	0	0	0	1	0	5	-	16
Small Accomodation	-	0	0	3	-	0	1	0	0	0	0	0	0	0	3	-	7
Healthcare	-	0	0	3	0	3	1	4	0	1	0	0	3	1	16	-	33
Schools	-	1	0	2	-	1	9	1	0	0	1	0	1	0	26	-	43
Universities and Colleges	-	2	0	0	0	1	6	5	0	1	0	0	1	0	4	-	22
Warehouse/Wholesale	-	0	0	1	-	-	4	1	0	1	0	1	1	0	8	-	16
Restaurants	-	0	0	7	-	13	0	1	0	0	0	2	1	0	4	-	28
Large Other Buildings	-	1	0	3	0	3	5	3	0	1	0	2	1	1	14	-	35
Small Other Buildings	-	1	0	3	0	3	5	3	0	1	0	2	1	1	13	-	32
Other Institutional	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-Buildings	-	-	-	-	-	-	-	-	30	-	-	-	-	-	-	-	30
Street Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	5
Grand Total	-	13	2	34	1	30	64	39	33	7	6	18	16	15	180	5	463

*Results are measured at the customer's point-of-use and do not include line losses. Any differences in totals are due to rounding.

Exhibit 108 Commercial Sector Base Year (2014) Peak Hour Demand, Labrador Interconnected, by Sub Sector and End Use (MW)*

Sub Sector	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Small Office	0.0	0.1	0.0	0.0	-	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	0.5	-	1
Large Non-food Retail	0.0	0.0	0.0	0.1	-	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.9	-	2
Small Non-food Retail	0.0	0.0	0.0	0.1	-	-	0.7	0.2	0.0	0.1	0.1	-	0.1	0.0	2.2	-	4
Food Retail	0.0	0.0	0.0	0.1	-	0.2	0.2	0.0	0.0	0.0	0.0	0.5	0.0	0.0	1.6	-	3
Large Accomodation	0.0	0.0	0.0	0.6	-	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.7	-	2
Small Accomodation	0.0	0.0	0.0	0.1	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-	0
Healthcare	0.1	0.1	0.0	0.7	0.0	0.4	0.1	0.5	0.0	0.1	0.1	0.0	0.4	0.0	0.8	-	3
Schools	0.0	0.1	0.0	0.1	-	0.0	0.5	0.1	0.0	0.0	0.0	0.0	0.1	0.0	1.8	-	3
Universities and Colleges	0.0	0.0	0.0	0.0	-	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	-	1
Warehouse/Wholesale	0.0	0.0	0.0	0.1	-	-	0.3	0.1	0.0	0.0	0.0	0.1	0.0	0.0	1.1	-	2
Restaurants	0.0	0.0	0.0	0.7	-	1.2	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.3	-	2
Large Other Buildings	0.1	0.2	0.0	2.0	0.0	1.8	1.4	1.0	0.0	0.3	0.2	0.7	0.7	0.1	6.1	-	15
Small Other Buildings	0.1	0.2	0.0	1.0	0.0	1.0	1.1	0.6	0.0	0.2	0.1	0.4	0.4	0.1	4.3	-	10
Other Institutional	0.2	0.2	-	0.9	-	0.2	2.2	1.3	0.1	0.3	0.2	0.2	0.7	0.1	2.7	-	9
Non-Buildings	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	1
Street Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	0
Grand Total	1	1	0	7	0	5	7	4	1	1	1	2	3	0	23	0	56

*Results are measured at the customer’s point-of-use and do not include line losses. Any differences in totals are due to rounding.

Exhibit 109 Commercial Sector Base Year (2014) Peak Hour Demand, Isolated, by Sub Sector and End Use (MW)*

Sub Sector	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Labrador Isolated C/I Buildings	0.1	0.2	-	0.1	-	0.2	1.2	0.2	-	0.1	0.1	0.4	0.2	-	0.2	-	3.0
Island Isolated C/I Buildings	-	0.0	-	-	-	0.0	0.1	0.0	-	0.0	0.0	0.0	0.0	-	-	-	0.2
Street Lighting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1
Grand Total	**0.1**	**0.2**	**-**	**0.1**	**-**	**0.2**	**1.3**	**0.2**	**-**	**0.1**	**0.1**	**0.4**	**0.3**	**-**	**0.2**	**0.1**	**3.3**

*Results are measured at the customer's point-of-use and do not include line losses. Any differences in totals are due to rounding.

Appendix C Background-Section 5: Reference Case Electricity Use

Introduction

Appendix C provides additional detailed information related to the construction of the Commercial sector Reference Case. The appendix discusses the following:

- Natural change assumptions
- Expected growth in building stock
- CEEAM archetype summaries – new buildings

C.1 Natural Change Assumptions

For the purposes of this study, "natural" changes to electricity consumption are defined as those changes to electricity usage patterns that occur without incentive or other intervention. Expected natural changes in electricity consumption patterns over the study period take into account four major factors:

- Naturally-occurring improvements in equipment efficiency
- Expected stock penetration by more efficient equipment
- Changes in equipment density, e.g., computers and plug loads, etc.
- Changes in electric share in end uses for which fuel may vary, such as space heating and water heating.

Note that the first two factors will have the effect of reducing electricity consumption, while the third and fourth factor may result in either increased or decreased electricity demand.

Based on the assessment of current trends, the most significant natural changes are expected to involve the following end uses:

- Space cooling
- Lighting
- Computer equipment and other plug loads
- Water heating
- Space heating

Further discussion of these changes follows and, in each case, the discussion identifies the technical change, the major driver(s) and the assumed electricity impact.

Space Cooling

As a result of natural conservation and efficiency gains, it is assumed that new space cooling equipment will provide improved electricity performance compared to existing equipment. Packaged rooftop units are available on the market with energy-efficiency ratios (EER) exceeding 12.0.[44] Similarly, new VFD centrifugal chillers achieve performance efficiencies in the region of 0.35 kW/ton. The combined effects of natural conservation and efficiency gains are estimated to result in a decrease of 5% in space cooling EUI over the length of the study. At the same time, the saturation of cooling equipment in new buildings will increase.

[44] See http://www.energence.com/res/pdf/52W81_energence_58937_0709.pdf for example. Current federal energy-efficiency regulations require a minimum EER of 10.3 for rooftop air conditioning units with a capacity of 5.5 - 11 tons.

As illustrated in Exhibit 110, the net effect of efficiency gains and increased space cooling saturation is expected to reduce energy consumption for space cooling in existing commercial buildings. Increases in overall space cooling energy use through time are expected to be due entirely to the construction of new building stock (Exhibit 111).

Exhibit 110 Reference Case Space Cooling Electricity Use in Existing Buildings by Sub Sector and Milestone Year – Existing Buildings (MWh/yr.)

Sub-Sector	2014	2017	2020	2023	2026	2029
Large Office	10,209	10,107	10,005	9,903	9,801	9,699
Small Office	7,928	7,849	7,769	7,690	7,611	7,532
Large Non-food Retail	3,224	3,192	3,160	3,128	3,095	3,063
Small Non-food Retail	4,984	4,935	4,885	4,835	4,785	4,735
Food Retail	1,610	1,594	1,577	1,561	1,545	1,529
Large Accomodation	1,210	1,198	1,186	1,174	1,162	1,150
Small Accomodation	411	407	403	399	394	390
Healthcare	2,446	2,397	2,373	2,349	2,325	2,300
Schools	279	277	274	271	268	265
Universities and Colleges	1,341	1,328	1,315	1,301	1,288	1,274
Warehouse/Wholesale	114	113	112	110	109	108
Restaurants	1,007	997	987	977	967	957
Labrador Isolated C/I Buildings	0	0	0	0	0	0
Island Isolated C/I Buildings	0	0	0	0	0	0
Large Other Buildings	2,936	2,906	2,877	2,848	2,818	2,789
Small Other Buildings	2,711	2,672	2,645	2,618	2,591	2,564
Other Institutional	219	217	214	212	210	208
Non-Buildings	0	0	0	0	0	0
Street Lighting	0	0	0	0	0	0
Grand Total	40,630	40,187	39,781	39,375	38,969	38,564

Exhibit 111 Reference Case Space Cooling Electricity Use in New Buildings by Sub Sector and Milestone Year – New Buildings (MWh/yr.)

Sub-Sector	2014	2017	2020	2023	2026	2029
Large Office	0	356	850	1,527	2,012	2,569
Small Office	0	213	751	1,220	1,555	1,940
Large Non-food Retail	0	101	312	497	635	791
Small Non-food Retail	0	77	323	574	768	985
Food Retail	0	26	105	181	236	299
Large Accomodation	0	28	105	177	229	289
Small Accomodation	0	6	34	64	85	110
Healthcare	0	17	99	188	254	329
Schools	0	23	91	159	211	269
Universities and Colleges	0	91	243	380	491	613
Warehouse/Wholesale	0	5	17	27	35	43
Restaurants	0	19	74	124	159	200
Labrador Isolated C/I Buildings	0	0	0	0	0	0
Island Isolated C/I Buildings	0	0	0	0	0	0
Large Other Buildings	0	80	269	442	570	716
Small Other Buildings	0	1	109	260	378	507
Other Institutional	0	2	4	6	7	9
Non-Buildings	0	0	0	0	0	0
Street Lighting	0	0	0	0	0	0
Grand Total	0	1,046	3,387	5,826	7,626	9,669

Lighting

As a result of natural conservation, it is assumed that the replacement of existing T12 fluorescent lighting and electromagnetic ballasts with new T8 fluorescent lamps and electronic ballasts and even some LED lamps and fixtures will continue. Similarly, CFLs and LED lamps will continue to increase their market share over incandescent lamps, particularly in sub sectors such as Hotel/Motel and Non-food Retail. In addition, LED fixtures designed for outdoor applications will gain market share from MH and HPS fixtures.

The continued growth of CFLs, T8 lighting/electronic ballasts, and LED lamps and fixtures is being driven by:

- Recent improvements in LED lighting efficacy combined with rapidly declining costs
- Increased consumer recognition of the operating cost savings
- Energy regulations that are gradually removing electromagnetic fluorescent ballasts and incandescent lighting products from the marketplace

Overall, the Reference Case assumes that by 2030 the energy intensity of general and secondary lighting in the existing building stock will decrease by 10%, while the energy intensity of outdoor lighting will decrease by 20%.

Exhibit 112 shows the impact of these EUI improvements on indoor lighting[45] energy consumption, while Exhibit 113 shows indoor lighting energy use by sub sector and milestone year in new construction. Exhibit 114 and Exhibit 115 show the energy consumption in existing and new construction for outdoor lighting. Again, all increases in overall lighting energy use through time are expected to be due entirely to the construction of new building stock.

Exhibit 112 Reference Case Indoor Lighting Electricity Use by Sub Sector and Milestone Year – Existing Buildings (MWh/yr.)

Sub-Sector	2014	2017	2020	2023	2026	2029
Large Office	69,866	68,469	67,072	65,674	64,277	62,880
Small Office	46,547	45,616	44,685	43,754	42,824	41,893
Large Non-food Retail	40,054	39,252	38,451	37,650	36,849	36,048
Small Non-food Retail	50,833	49,816	48,799	47,783	46,766	45,749
Food Retail	23,933	23,454	22,976	22,497	22,018	21,540
Large Accomodation	15,282	14,977	14,671	14,365	14,060	13,754
Small Accomodation	5,890	5,772	5,654	5,536	5,418	5,301
Healthcare	30,169	28,722	28,136	27,550	26,964	26,377
Schools	55,194	54,090	52,987	51,883	50,779	49,675
Universities and Colleges	45,256	44,351	43,446	42,541	41,636	40,731
Warehouse/Wholesale	24,656	24,163	23,670	23,177	22,684	22,191
Restaurants	10,710	10,496	10,281	10,067	9,853	9,639
Labrador Isolated C/I Buildings	8,517	8,246	8,078	7,910	7,741	7,573
Island Isolated C/I Buildings	800	771	756	740	724	708
Large Other Buildings	50,707	49,693	48,679	47,665	46,651	45,636
Small Other Buildings	44,114	43,065	42,186	41,307	40,429	39,550
Other Institutional	17,273	16,927	16,582	16,236	15,891	15,545
Grand Total	539,801	527,882	517,109	506,336	495,563	484,790

[45] Including general and secondary lighting

Exhibit 113 Reference Case Indoor Lighting Electricity Use by Sub Sector and Milestone Year – New Buildings (MWh/yr.)

Sub-Sector	2017	2020	2023	2026	2029
Large Office	1,527	3,646	6,549	8,628	11,017
Small Office	801	2,836	4,608	5,879	7,336
Large Non-food Retail	849	2,623	4,170	5,328	6,645
Small Non-food Retail	570	2,412	4,284	5,743	7,368
Food Retail	296	1,211	2,084	2,715	3,435
Large Accomodation	192	707	1,192	1,548	1,952
Small Accomodation	34	182	336	450	579
Healthcare	137	797	1,516	2,048	2,647
Schools	730	2,857	4,993	6,608	8,429
Universities and Colleges	426	1,140	1,784	2,307	2,880
Warehouse/Wholesale	436	1,414	2,274	2,919	3,649
Restaurants	122	475	795	1,024	1,286
Labrador Isolated C/I Buildings	0	1,144	1,510	1,859	2,209
Island Isolated C/I Buildings	0	125	160	195	230
Large Other Buildings	615	2,044	3,351	4,324	5,424
Small Other Buildings	13	922	2,135	3,095	4,140
Other Institutional	116	233	351	469	589
Grand Total	6,863	24,767	42,091	55,138	69,816

Exhibit 114 Reference Case Outdoor Lighting Electricity Use by Sub Sector and Milestone Year – Existing Buildings (MWh/yr.)

Sub-Sector	2014	2017	2020	2023	2026	2029
Large Office	4,524	4,343	4,162	3,981	3,800	3,619
Small Office	3,756	3,606	3,455	3,305	3,155	3,005
Large Non-food Retail	3,583	3,440	3,296	3,153	3,010	2,866
Small Non-food Retail	5,305	5,093	4,881	4,669	4,456	4,244
Food Retail	2,612	2,507	2,403	2,298	2,194	2,089
Large Accomodation	1,172	1,125	1,079	1,032	985	938
Small Accomodation	523	502	481	460	439	418
Healthcare	4,036	3,764	3,608	3,451	3,294	3,137
Schools	6,281	6,030	5,779	5,528	5,276	5,025
Universities and Colleges	3,289	3,157	3,026	2,894	2,763	2,631
Warehouse/Wholesale	2,385	2,289	2,194	2,098	2,003	1,908
Restaurants	474	455	436	417	398	379
Labrador Isolated C/I Buildings	739	701	671	642	613	584
Island Isolated C/I Buildings	69	66	63	60	57	55
Large Other Buildings	4,741	4,551	4,362	4,172	3,982	3,793
Small Other Buildings	4,365	4,174	4,000	3,827	3,653	3,479
Other Institutional	1,406	1,350	1,294	1,237	1,181	1,125
Grand Total	49,260	47,154	45,189	43,224	41,260	39,295

Exhibit 115 Reference Case Outdoor Lighting Electricity Use by Sub Sector and Milestone Year – New Buildings (MWh/yr.)

Sub-Sector	2017	2020	2023	2026	2029
Large Office	126	300	539	710	907
Small Office	79	280	456	581	725
Large Non-food Retail	101	311	495	633	789
Small Non-food Retail	68	289	513	688	882
Food Retail	54	219	378	492	623
Large Accomodation	21	78	132	172	217
Small Accomodation	5	26	48	65	83
Healthcare	22	129	246	332	429
Schools	96	377	658	871	1,111
Universities and Colleges	37	99	155	201	251
Warehouse/Wholesale	50	161	259	333	416
Restaurants	8	30	50	65	81
Labrador Isolated C/I Buildings	0	142	188	231	274
Island Isolated C/I Buildings	0	16	20	24	29
Large Other Buildings	71	236	388	500	627
Small Other Buildings	2	114	262	380	508
Other Institutional	12	25	37	50	62
Grand Total	752	2,834	4,825	6,327	8,016

Computer Equipment, Computer Servers and Other Plug Loads

Computer equipment and other plug loads will continue to grow as a result of increased density of computers and peripherals per occupant, increased use of server load, and growth in other peripherals, such as telephone network equipment. Increased penetration of laptops, more efficient server hardware and higher penetration of ENERGY STAR® rated computer equipment and other plug loads is expected to counterbalance the effect of increasing hardware density to some degree.

Overall, the Reference Case assumes that by 2030 the energy intensity of computer equipment and plug loads in the existing building stock will increase by 10%. The impact on electricity use in existing buildings and new buildings is shown in Exhibit 116 and Exhibit 117, below.

Exhibit 116 Computer and Plug Load Energy Use in by Sub Sector and Milestone Year –Existing Buildings (MWh/yr.)

Sub-Sector	2014	2017	2020	2023	2026	2029
Large Office	36,032	36,752	37,473	38,194	38,914	39,635
Small Office	29,916	30,514	31,112	31,711	32,309	32,907
Large Non-food Retail	5,119	5,222	5,324	5,426	5,529	5,631
Small Non-food Retail	7,580	7,731	7,883	8,035	8,186	8,338
Food Retail	5,152	5,255	5,358	5,461	5,564	5,667
Large Accomodation	2,769	2,824	2,880	2,935	2,990	3,046
Small Accomodation	1,240	1,264	1,289	1,314	1,339	1,364
Healthcare	13,131	13,012	13,267	13,522	13,777	14,032
Schools	10,708	10,922	11,136	11,350	11,564	11,778
Universities and Colleges	15,622	15,935	16,247	16,559	16,872	17,184
Warehouse/Wholesale	7,009	7,149	7,289	7,429	7,569	7,709
Restaurants	1,169	1,193	1,216	1,239	1,263	1,286
Labrador Isolated C/I Buildings	1,728	1,741	1,775	1,809	1,843	1,878
Island Isolated C/I Buildings	162	163	166	169	172	176
Large Other Buildings	15,065	15,366	15,668	15,969	16,270	16,572
Small Other Buildings	13,485	13,700	13,969	14,238	14,506	14,775
Other Institutional	3,287	3,353	3,418	3,484	3,550	3,616
Grand Total	169,173	172,096	175,470	178,845	182,219	185,593

Exhibit 117 Computer and Plug Load Energy Use in by Sub Sector and Milestone Year – New Buildings (MWh/yr.)

Sub-Sector	2017	2020	2023	2026	2029
Large Office	1,002	2,392	4,295	5,659	7,226
Small Office	631	2,234	3,630	4,631	5,779
Large Non-food Retail	144	445	708	904	1,128
Small Non-food Retail	98	413	733	983	1,261
Food Retail	71	290	499	650	822
Large Accomodation	49	180	304	394	497
Small Accomodation	11	60	111	149	191
Healthcare	71	410	779	1,052	1,360
Schools	164	642	1,122	1,485	1,894
Universities and Colleges	176	471	737	953	1,190
Warehouse/Wholesale	146	473	761	977	1,222
Restaurants	19	74	123	159	199
Labrador Isolated C/I Buildings	0	292	386	475	564
Island Isolated C/I Buildings	0	32	41	50	59
Large Other Buildings	230	770	1,263	1,629	2,044
Small Other Buildings	4	331	774	1,122	1,502
Other Institutional	26	53	79	106	133
Grand Total	2,841	9,561	16,344	21,378	27,070

Water Heating

Electricity consumption for water heating is expected to stay constant within the existing building stock. However, it will grow within the new building stock, as electric water heating fuel shares are expected to be higher in new buildings than in existing ones. This is largely driven by an expected increase in electric space heating in the new building stock (see below), and the fact that buildings rarely maintain oil or propane service for water heating alone.

Exhibit 118 illustrates the increased difference in electric water heating penetration between existing and new buildings. This leads to a growth in electricity use for water heating, which will outpace growth in floor area.

Exhibit 118 Electric DHW Share by Sub Sector – Existing and New Buildings (%)

Sub Sector	Island - Existing Buildings	Island - New Buildings	Labrador - Existing Buildings	Labrador - New Buildings
Large Office	90%	100%	100%	100%
Small Office	95%	100%	100%	100%
Large Non-Food Retail	90%	100%	100%	100%
Small Non-Food Retail	95%	100%	100%	100%
Food Retail	90%	100%	100%	100%
Large Accomodation	90%	100%	100%	100%
Small Accomodation	90%	100%	100%	100%
Healthcare	60%	100%	100%	100%
Schools	80%	100%	100%	100%
Universities and Colleges	25%	100%	100%	100%
Warehouse / Wholesale	80%	100%	100%	100%
Restaurant	95%	100%	100%	100%

It should be noted that the electric fuel share and space cooling saturation was not estimated for all sub sectors. Rather, the end use EUIs for the other sub sectors was derived based on a weighted average of the EUIs for specific sub sectors. Section 5.3 includes more details on how this approach was implemented.

Space Heating

In recent years, electric space heating penetrations in new commercial construction have exceeded the historical average, a trend that is presently expected to continue. Similar to the discussion of water heating energy above, electricity consumption for space heating is expected to stay constant within the existing building stock, but to grow rapidly within the new building stock. The penetration of high performance, electrically powered heating equipment is expected to remain low over the study period.

Exhibit 119 illustrates the increased difference in electric space heating penetration between existing and new buildings. This leads to a growth in electricity use for space heating, which will outpace growth in floor area.

Exhibit 119 Electric Space Heating Share by Sub Sector – Existing and New Buildings (%)

Sub Sector	Island - Existing Buildings	Island - New Buildings	Labrador - Existing Buildings	Labrador - New Buildings
Large Office	85%	100%	100%	100%
Small Office	90%	100%	100%	100%
Large Non-Food Retail	85%	100%	100%	100%
Small Non-Food Retail	85%	100%	100%	100%
Food Retail	85%	100%	100%	100%
Large Accomodation	90%	100%	100%	100%
Small Accomodation	90%	100%	100%	100%
Healthcare	50%	100%	100%	100%
Schools	75%	100%	100%	100%
Universities and Colleges	20%	100%	90%	100%
Warehouse / Wholesale	75%	100%	80%	100%
Restaurant	90%	100%	100%	100%

It should be noted that the electric fuel share and space cooling saturation was not estimated for all sub sectors. Rather, the end use EUIs for the other sub sectors was derived based on a weighted average of the EUIs for specific sub sectors. Section 5.3 includes more details on how this approach was implemented.

Overall Impact of Natural Changes

As illustrated in Exhibit 120, the overall impact of the natural changes in energy usage patterns described above are very minimal, as load growth is anticipated by the Utilities in each milestone year. Virtually all growth in electricity use through the study period occurs within the new building stock.

Exhibit 120 Total Energy Use by Sub Sector and Milestone Year – Existing Sub sectors (MWh/yr.)

Sub-Sector	2014	2017	2020	2023	2026	2029
Large Office	273,262	272,302	271,343	270,383	269,423	268,463
Small Office	193,065	192,503	191,941	191,379	190,816	190,254
Large Non-food Retail	123,515	122,641	121,767	120,892	120,018	119,144
Small Non-food Retail	148,847	147,719	146,592	145,465	144,338	143,211
Food Retail	173,352	172,856	172,360	171,864	171,368	170,871
Large Accomodation	69,655	69,346	69,036	68,727	68,418	68,109
Small Accomodation	28,191	28,073	27,955	27,837	27,719	27,601
Healthcare	161,941	157,667	157,155	156,643	156,131	155,619
Schools	174,289	173,145	172,001	170,857	169,714	168,570
Universities and Colleges	124,745	124,007	123,270	122,532	121,794	121,057
Warehouse/Wholesale	79,216	78,766	78,317	77,867	77,418	76,968
Restaurants	105,467	105,248	105,028	104,808	104,588	104,368
Labrador Isolated C/I Buildings	17,062	16,693	16,530	16,366	16,203	16,040
Island Isolated C/I Buildings	1,505	1,466	1,451	1,435	1,420	1,405
Large Other Buildings	217,045	216,113	215,181	214,249	213,318	212,386
Small Other Buildings	182,923	181,429	180,617	179,806	178,995	178,184
Other Institutional	45,979	69,261	85,623	85,285	84,947	84,608
Non-Buildings	204,856	207,490	214,805	221,041	225,350	230,330
Street Lighting	37,127	36,851	36,931	36,999	37,043	37,086
Grand Total	2,362,042	2,373,575	2,387,902	2,384,436	2,379,020	2,374,274

C.2 Expected Growth in Building Stock

The next step in developing the Reference Case involved the development and application of estimated levels of floor space growth in each building sub sector over the study period. The stock growth rates were derived from the sales forecast data provided by the Utilities. The derivation of floor space data in each of the milestone periods applied the following steps:

- As described above for the existing building stock, estimate and apply the expected impact of natural changes within the new building stock over the study period. Efficiency improvements are expected to be more moderate within the new building stock through time. Computer and other plug load growth are expected to be consistent in both existing and new buildings.
- Add floor space at a rate consistent with the utility forecast of electricity consumption growth for each combination of sub sector and milestone year.

A summary of the total new commercial floor space at each milestone period is provided in Exhibit C11.

Exhibit 121 New Commercial Building Floor Space, by Sub Sector and Milestone Year (ft2)

Sub-Sector	2017	2020	2023	2026	2029
Large Office	287,000	686,000	1,231,000	1,622,000	2,071,000
Small Office	181,000	640,000	1,040,000	1,328,000	1,656,000
Large Non-food Retail	115,000	356,000	565,000	722,000	901,000
Small Non-food Retail	78,000	330,000	586,000	785,000	1,007,000
Food Retail	41,000	169,000	291,000	379,000	479,000
Large Accomodation	49,000	179,000	302,000	392,000	495,000
Small Accomodation	11,000	60,000	110,000	148,000	190,000
Healthcare	25,000	144,000	273,000	369,000	477,000
Schools	220,000	860,000	1,503,000	1,989,000	2,537,000
Universities and Colleges	85,000	226,000	354,000	458,000	572,000
Warehouse/Wholesale	113,000	368,000	591,000	759,000	949,000
Restaurants	18,000	68,000	114,000	147,000	185,000
Labrador Isolated C/I Buildings	0	354,000	467,000	575,000	683,000
Island Isolated C/I Buildings	0	39,000	49,000	60,000	71,000
Large Other Buildings	127,000	422,000	693,000	894,000	1,121,000
Small Other Buildings	3,000	190,000	443,000	642,000	859,000
Other Institutional	23,000	45,000	68,000	91,000	115,000
Grand Total	1,374,000	5,136,000	8,682,000	11,361,000	14,370,000

C.3 Results by Region

This section of the appendix presents the reference case electricity consumption for the three regions.

Exhibit 122 - Reference Case Electricity Consumption by Sub sector, End Use and Milestone Year, Island Interconnected (MWh/yr.)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Large Office	2014	0	24,326	4,319	5,999	1,033	1,067	53,893	46,186	2,666	7,386	4,524	1,067	15,973	10,209	94,614	0	273,262
	2017	0	25,489	4,526	6,179	1,062	1,096	54,127	47,938	2,740	7,739	4,469	1,096	15,870	10,463	96,854	0	279,648
	2020	0	26,914	4,779	6,427	1,101	1,137	54,868	50,370	2,843	8,172	4,462	1,137	15,850	10,855	99,960	0	288,877
	2023	0	28,686	5,093	6,768	1,156	1,194	56,281	53,700	2,984	8,710	4,520	1,194	15,942	11,430	104,216	0	301,873
	2026	0	30,093	5,343	7,013	1,195	1,234	56,989	56,085	3,085	9,137	4,510	1,234	15,916	11,813	107,265	0	310,912
	2029	0	31,637	5,617	7,293	1,240	1,280	57,962	58,826	3,201	9,606	4,526	1,280	15,935	12,268	110,768	0	321,441
Small Office	2014	0	19,802	3,516	5,155	0	0	39,734	19,864	2,170	6,012	3,682	868	5,902	7,866	74,726	0	189,299
	2017	0	20,624	3,662	5,268	0	0	39,687	20,687	2,217	6,262	3,614	868	5,837	8,000	76,011	0	192,738
	2020	0	22,091	3,922	5,552	0	0	40,774	22,759	2,335	6,708	3,666	868	5,852	8,457	79,243	0	202,226
	2023	0	23,420	4,158	5,799	0	0	41,617	24,563	2,437	7,111	3,692	868	5,850	8,844	82,057	0	210,419
	2026	0	24,483	4,347	5,976	0	0	41,994	25,852	2,510	7,434	3,669	868	5,815	9,099	84,069	0	216,118
	2029	0	25,645	4,553	6,179	0	0	42,544	27,333	2,594	7,787	3,664	868	5,792	9,403	86,379	0	222,741
Large Non-food Retail	2014	0	1,886	435	1,685	0	3,817	33,975	27,191	985	2,456	3,344	5,725	3,596	3,168	27,391	0	115,655
	2017	0	1,980	457	1,740	0	3,930	34,073	27,841	1,015	2,578	3,309	5,895	3,579	3,236	27,913	0	117,546
	2020	0	2,135	493	1,858	0	4,169	35,037	29,214	1,076	2,780	3,384	6,253	3,621	3,415	29,015	0	122,450
	2023	0	2,276	525	1,959	0	4,377	35,788	30,409	1,130	2,963	3,433	6,565	3,649	3,566	29,974	0	126,614
	2026	0	2,390	552	2,036	0	4,532	36,175	31,301	1,170	3,112	3,435	6,797	3,651	3,671	30,690	0	129,511
	2029	0	2,515	581	2,122	0	4,708	36,712	32,317	1,215	3,275	3,456	7,062	3,664	3,795	31,505	0	132,927
Small Non-food Retail	2014	0	2,733	631	2,577	0	0	41,215	28,604	1,428	3,559	4,845	0	4,845	4,863	39,263	0	134,563
	2017	0	2,825	652	2,614	0	0	40,907	28,989	1,447	3,678	4,717	0	4,783	4,890	39,807	0	135,310
	2020	0	2,996	691	2,729	0	0	41,689	30,189	1,508	3,900	4,729	0	4,794	5,077	41,499	0	139,801
	2023	0	3,169	732	2,847	0	0	42,512	31,420	1,570	4,127	4,746	0	4,808	5,270	43,236	0	144,436
	2026	0	3,315	765	2,938	0	0	42,950	32,363	1,618	4,316	4,714	0	4,796	5,406	44,566	0	147,748
	2029	0	3,472	801	3,040	0	0	43,544	33,423	1,671	4,521	4,702	0	4,794	5,565	46,061	0	151,595
Food Retail	2014	0	2,199	322	3,279	0	8,744	19,666	11,213	729	2,369	2,473	87,439	3,103	1,584	18,821	0	161,939
	2017	0	2,274	333	3,332	0	8,871	19,534	11,373	739	2,451	2,427	88,630	3,074	1,594	19,013	0	163,644
	2020	0	2,415	354	3,495	0	9,262	19,944	11,866	772	2,604	2,492	92,300	3,115	1,657	19,604	0	169,881
	2023	0	2,551	374	3,651	0	9,637	20,320	12,337	803	2,753	2,551	95,809	3,152	1,717	20,169	0	175,824
	2026	0	2,661	390	3,763	0	9,906	20,480	12,677	826	2,873	2,565	98,337	3,161	1,756	20,577	0	179,972
	2029	0	2,781	408	3,892	0	10,214	20,719	13,064	851	3,004	2,595	101,222	3,180	1,802	21,041	0	184,773

Exhibit 122 - Reference Case Electricity Consumption by Sub sector, End Use and Milestone Year, Island Interconnected (MWh/yr.) (cont'd…)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Large Accomodation	2014	0	1,104	232	14,755	244	3,090	6,841	5,480	631	1,205	1,070	1,892	7,169	1,153	17,745	0	62,610
	2017	0	1,146	241	15,076	249	3,120	6,787	5,582	643	1,253	1,048	1,910	7,131	1,170	18,081	0	63,437
	2020	0	1,222	258	15,946	262	3,202	6,876	5,858	676	1,341	1,062	1,960	7,275	1,234	18,994	0	66,167
	2023	0	1,295	275	16,766	274	3,279	6,951	6,118	708	1,426	1,073	2,008	7,402	1,294	19,853	0	68,720
	2026	0	1,354	288	17,364	283	3,336	6,969	6,308	731	1,494	1,069	2,042	7,456	1,335	20,481	0	70,508
	2029	0	1,418	302	18,046	293	3,400	7,009	6,524	757	1,568	1,071	2,082	7,538	1,383	21,196	0	72,586
Small Accomodation	2014	0	525	110	7,022	0	750	3,690	1,397	300	574	509	450	2,047	402	9,485	0	27,262
	2017	0	541	114	7,097	0	757	3,633	1,412	303	591	494	454	2,023	405	9,570	0	27,393
	2020	0	571	120	7,417	0	788	3,633	1,475	315	626	494	473	2,054	428	9,932	0	28,326
	2023	0	602	127	7,752	0	820	3,636	1,541	328	662	496	492	2,088	453	10,313	0	29,310
	2026	0	628	133	7,998	0	844	3,619	1,590	338	691	491	506	2,102	470	10,593	0	30,004
	2029	0	656	139	8,278	0	871	3,609	1,645	348	723	489	523	2,124	491	10,910	0	30,805
Healthcare	2014	0	3,645	844	8,124	807	8,332	4,604	27,075	1,042	7,008	3,534	1,562	21,812	2,338	54,806	0	145,533
	2017	0	3,741	866	8,207	812	8,383	4,544	27,256	1,048	7,192	3,415	1,572	21,480	2,332	55,087	0	145,934
	2020	0	3,919	907	8,598	835	8,624	4,605	28,107	1,078	7,534	3,379	1,617	21,536	2,389	56,406	0	149,535
	2023	0	4,107	950	9,026	861	8,887	4,681	29,036	1,111	7,896	3,352	1,666	21,638	2,454	57,848	0	153,511
	2026	0	4,264	987	9,340	879	9,080	4,712	29,719	1,135	8,199	3,295	1,703	21,597	2,495	58,908	0	156,313
	2029	0	4,433	1,026	9,694	900	9,299	4,759	30,490	1,162	8,522	3,249	1,744	21,607	2,545	60,104	0	159,534
Schools	2014	0	7,376	1,293	5,337	0	1,404	42,801	8,422	1,053	1,486	5,957	1,053	9,582	267	76,730	0	162,762
	2017	0	7,640	1,339	5,443	0	1,427	42,544	8,597	1,070	1,540	5,813	1,070	9,509	287	78,070	0	164,350
	2020	0	8,131	1,425	5,753	0	1,492	43,437	9,108	1,119	1,639	5,852	1,119	9,666	352	81,980	0	171,072
	2023	0	8,622	1,511	6,064	0	1,558	44,340	9,622	1,168	1,738	5,892	1,168	9,825	417	85,912	0	177,836
	2026	0	9,029	1,583	6,299	0	1,607	44,809	10,009	1,205	1,820	5,863	1,205	9,897	465	88,874	0	182,665
	2029	0	9,470	1,660	6,564	0	1,663	45,449	10,446	1,247	1,909	5,861	1,247	10,004	520	92,219	0	188,258
Warehouse/Wholesale	2014	0	1,742	579	1,958	0	0	19,171	4,292	1,310	4,212	2,223	7,861	3,812	108	24,251	0	71,518
	2017	0	1,816	603	2,016	0	0	19,199	4,363	1,339	4,389	2,183	8,034	3,756	112	24,817	0	72,627
	2020	0	1,936	643	2,144	0	0	19,727	4,521	1,403	4,679	2,203	8,419	3,724	122	26,071	0	75,593
	2023	0	2,046	680	2,257	0	0	20,144	4,660	1,460	4,945	2,210	8,757	3,688	131	27,172	0	78,147
	2026	0	2,136	710	2,341	0	0	20,357	4,763	1,501	5,164	2,192	9,009	3,641	137	27,993	0	79,943
	2029	0	2,234	742	2,436	0	0	20,651	4,880	1,549	5,401	2,184	9,295	3,598	145	28,925	0	82,041
Restaurants	2014	0	410	113	18,743	0	33,431	2,352	3,434	256	545	435	16,672	7,540	989	11,925	0	96,846
	2017	0	426	118	19,090	0	34,019	2,345	3,484	261	565	425	16,965	7,471	998	12,259	0	98,426
	2020	0	455	126	20,077	0	35,690	2,411	3,627	274	603	430	17,799	7,552	1,042	13,210	0	103,295
	2023	0	481	133	20,971	0	37,205	2,466	3,757	285	639	432	18,554	7,612	1,081	14,072	0	107,689
	2026	0	503	139	21,605	0	38,280	2,492	3,850	294	667	429	19,090	7,610	1,106	14,684	0	110,749
	2029	0	526	145	22,334	0	39,514	2,529	3,956	303	698	427	19,705	7,630	1,136	15,386	0	114,290

Exhibit 122 - Reference Case Electricity Consumption by Sub sector, End Use and Milestone Year, Island Interconnected (MWh/yr.) (cont'd…)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Large Other Buildings	2014	0	6,633	1,116	7,707	356	7,918	28,123	21,288	1,335	3,972	3,382	16,038	9,791	2,667	42,605	0	152,930
	2017	0	6,888	1,159	7,884	363	8,062	28,012	21,697	1,360	4,125	3,312	16,320	9,715	2,717	43,401	0	155,014
	2020	0	7,318	1,231	8,314	379	8,409	28,545	22,688	1,420	4,383	3,336	17,005	9,809	2,877	45,329	0	161,045
	2023	0	7,722	1,299	8,706	394	8,726	28,982	23,593	1,475	4,625	3,346	17,630	9,878	3,020	47,088	0	166,485
	2026	0	8,055	1,355	8,994	404	8,959	29,154	24,258	1,515	4,824	3,318	18,089	9,877	3,119	48,380	0	170,301
	2029	0	8,414	1,416	9,322	416	9,224	29,426	25,014	1,561	5,040	3,304	18,612	9,903	3,234	49,851	0	174,736
Small Other Buildings	2014	0	6,124	1,028	6,768	196	7,039	26,977	17,711	1,293	3,876	3,410	15,178	8,068	2,502	40,739	0	140,908
	2017	0	6,216	1,044	6,736	195	7,005	26,309	17,625	1,286	3,934	3,258	15,105	7,868	2,465	40,541	0	139,586
	2020	0	6,480	1,088	6,932	200	7,168	26,329	18,073	1,316	4,101	3,205	15,438	7,834	2,532	41,519	0	142,214
	2023	0	6,812	1,144	7,224	206	7,411	26,622	18,740	1,361	4,312	3,192	15,934	7,861	2,644	42,975	0	146,438
	2026	0	7,094	1,191	7,444	211	7,595	26,712	19,245	1,395	4,490	3,150	16,309	7,842	2,723	44,075	0	149,476
	2029	0	7,393	1,241	7,690	217	7,799	26,874	19,807	1,432	4,680	3,118	16,726	7,839	2,814	45,300	0	152,930
Other Institutional	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Non-Buildings	2014	0	0	0	0	0	0	0	0	199,788	0	0	0	0	0	0	0	199,788
	2017	0	0	0	0	0	0	0	0	202,428	0	0	0	0	0	0	0	202,428
	2020	0	0	0	0	0	0	0	0	209,684	0	0	0	0	0	0	0	209,684
	2023	0	0	0	0	0	0	0	0	215,870	0	0	0	0	0	0	0	215,870
	2026	0	0	0	0	0	0	0	0	220,132	0	0	0	0	0	0	0	220,132
	2029	0	0	0	0	0	0	0	0	225,065	0	0	0	0	0	0	0	225,065
Street Lighting	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34,828	34,828
	2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34,448	34,448
	2020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34,448	34,448
	2023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34,448	34,448
	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34,448	34,448
	2029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34,448	34,448
Grand Total	2014	0	88,376	15,241	90,302	3,375	78,454	362,591	257,551	216,895	49,463	42,624	159,621	108,235	39,433	544,430	34,828	2,091,418
	2017	0	91,785	15,837	91,928	3,428	79,565	360,841	262,546	219,826	51,251	41,629	161,780	107,035	40,062	553,168	34,448	2,115,128
	2020	0	97,147	16,790	96,580	3,539	82,892	366,864	274,072	227,786	54,213	41,771	168,321	107,594	41,969	575,210	34,448	2,189,196
	2023	0	102,723	17,780	101,210	3,665	86,092	373,116	286,179	234,689	57,226	41,937	174,644	108,266	43,977	597,963	34,448	2,263,916
	2026	0	107,274	18,585	104,598	3,758	88,412	375,865	295,079	239,480	59,706	41,619	179,242	108,190	45,348	614,744	34,448	2,316,347
	2029	0	112,213	19,459	108,450	3,863	91,054	379,961	305,198	245,013	62,388	41,485	184,476	108,393	46,961	633,796	34,448	2,377,160

Exhibit 123 Reference Case Electricity Consumption by Sub sector, End Use and Milestone Year, Labrador Interconnected (MWh/yr)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Small Office	2014	22	395	70	108	0	0	793	189	22	120	74	0	118	62	1,793	0	3,766
	2017	22	403	72	108	0	0	777	190	22	122	71	0	115	61	1,794	0	3,757
	2020	22	422	75	111	0	0	781	195	22	128	70	0	114	64	1,867	0	3,871
	2023	23	439	78	114	0	0	781	199	23	133	68	0	113	65	1,931	0	3,968
	2026	23	456	81	116	0	0	781	203	23	139	67	0	112	67	1,992	0	4,062
	2029	24	473	84	119	0	0	781	207	24	144	66	0	111	69	2,053	0	4,154
Large Non-food Retail	2014	35	135	31	134	0	273	2,234	1,154	35	176	239	410	248	56	2,699	0	7,860
	2017	36	139	32	135	0	275	2,205	1,165	36	181	231	413	245	57	2,716	0	7,863
	2020	36	142	33	136	0	277	2,175	1,176	36	185	224	416	241	57	2,733	0	7,867
	2023	36	146	34	137	0	279	2,146	1,187	36	190	216	419	237	58	2,751	0	7,870
	2026	36	150	35	138	0	281	2,117	1,198	36	195	208	421	233	59	2,768	0	7,875
	2029	37	153	35	139	0	283	2,088	1,209	37	200	200	424	229	59	2,786	0	7,879
Small Non-food Retail	2014	68	260	60	258	0	0	4,295	1,163	68	338	460	0	478	121	6,716	0	14,283
	2017	68	266	61	259	0	0	4,227	1,174	68	346	444	0	469	121	6,743	0	14,247
	2020	70	280	65	267	0	0	4,261	1,242	70	364	441	0	468	131	6,923	0	14,581
	2023	72	292	67	275	0	0	4,281	1,303	72	381	435	0	466	139	7,082	0	14,865
	2026	74	305	70	282	0	0	4,299	1,362	74	397	430	0	464	147	7,239	0	15,144
	2029	76	317	73	289	0	0	4,318	1,422	76	413	425	0	461	155	7,395	0	15,422
Food Retail	2014	21	124	5	205	0	493	1,031	309	21	133	139	4,105	133	25	4,669	0	11,414
	2017	21	127	5	206	0	493	1,012	310	21	136	134	4,112	131	25	4,671	0	11,403
	2020	21	130	5	207	0	497	997	316	21	140	130	4,142	129	25	4,680	0	11,441
	2023	21	133	6	208	0	500	982	321	21	144	126	4,168	127	26	4,688	0	11,472
	2026	21	136	6	210	0	503	967	327	21	147	121	4,194	125	26	4,696	0	11,501
	2029	21	140	6	211	0	506	952	332	21	151	117	4,220	123	26	4,704	0	11,530
Large Accomodation	2014	30	90	22	1,572	0	302	585	466	30	116	103	181	687	57	2,803	0	7,044
	2017	30	92	23	1,578	0	303	575	469	30	118	99	182	675	57	2,812	0	7,044
	2020	30	94	23	1,584	0	305	564	472	30	121	95	182	663	57	2,822	0	7,043
	2023	31	96	24	1,589	0	306	554	476	31	124	91	183	651	57	2,831	0	7,042
	2026	31	98	24	1,595	0	307	543	479	31	127	88	183	639	56	2,841	0	7,041
	2029	31	100	25	1,601	0	308	533	482	31	129	84	184	627	56	2,850	0	7,041
Small Accomodation	2014	4	12	3	208	0	20	98	38	4	15	14	12	55	9	438	0	929
	2017	4	12	3	208	0	20	96	38	4	16	13	12	53	8	438	0	927
	2020	4	13	3	214	0	21	96	40	4	16	13	12	53	9	452	0	950
	2023	4	13	3	219	0	21	95	41	4	17	13	13	53	9	464	0	969
	2026	4	14	3	224	0	22	94	41	4	18	12	13	53	9	476	0	988
	2029	4	14	4	229	0	22	93	42	4	18	12	13	53	9	488	0	1,007

Exhibit 123 Reference Case Electricity Consumption by Sub sector, End Use and Milestone Year, Labrador Interconnected (MWh/yr) (cont'd…)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Healthcare	2014	222	518	120	1,924	57	1,184	654	3,671	74	996	502	222	3,099	108	3,057	0	16,408
	2017	171	407	94	1,483	44	913	494	2,829	57	783	372	171	2,341	83	2,356	0	12,598
	2020	171	417	97	1,491	44	917	487	2,851	57	802	358	172	2,305	83	2,368	0	12,621
	2023	172	427	99	1,498	45	922	480	2,872	58	822	345	173	2,268	83	2,379	0	12,642
	2026	172	437	101	1,506	45	927	472	2,893	58	841	331	174	2,231	84	2,391	0	12,662
	2029	172	447	104	1,513	45	931	465	2,914	58	860	318	175	2,194	84	2,403	0	12,683
Schools	2014	29	402	70	363	0	76	2,331	933	29	81	324	21	481	12	6,374	0	11,527
	2017	29	411	72	365	0	77	2,293	937	29	83	313	21	474	12	6,402	0	11,518
	2020	29	424	74	369	0	78	2,270	945	29	85	304	22	470	13	6,471	0	11,583
	2023	29	436	76	373	0	79	2,245	953	29	88	294	23	465	14	6,534	0	11,639
	2026	30	449	79	377	0	79	2,220	961	30	90	285	23	461	14	6,597	0	11,693
	2029	30	461	81	381	0	80	2,195	969	30	93	275	24	456	15	6,659	0	11,748
Universities and Colleges	2014	15	157	11	76	0	46	631	372	15	77	52	61	80	25	1,410	0	3,028
	2017	15	161	11	76	0	46	620	373	15	78	50	61	78	25	1,416	0	3,028
	2020	15	165	12	77	0	46	610	374	15	80	48	61	77	26	1,421	0	3,027
	2023	15	169	12	77	0	46	599	376	15	82	46	62	76	26	1,426	0	3,027
	2026	15	173	12	77	0	46	589	377	15	84	44	62	74	26	1,432	0	3,027
	2029	16	176	13	78	0	47	578	378	16	86	42	62	73	26	1,437	0	3,027
Warehouse/Wholesale	2014	48	127	42	178	0	0	1,396	461	48	307	162	572	278	6	4,074	0	7,698
	2017	48	130	43	179	0	0	1,372	462	48	314	156	574	272	6	4,082	0	7,685
	2020	49	134	45	182	0	0	1,365	467	49	325	152	584	268	6	4,131	0	7,756
	2023	49	139	46	185	0	0	1,356	472	49	336	148	592	263	6	4,175	0	7,816
	2026	50	143	48	188	0	0	1,347	476	50	346	144	600	258	7	4,218	0	7,874
	2029	51	148	49	190	0	0	1,337	481	51	357	140	609	254	7	4,260	0	7,932
Restaurants	2014	12	37	10	1,776	0	3,071	212	140	12	54	39	1,501	606	18	1,136	0	8,622
	2017	12	38	10	1,777	0	3,073	208	140	12	55	38	1,502	594	18	1,137	0	8,612
	2020	12	39	11	1,801	0	3,114	206	141	12	57	37	1,522	587	19	1,150	0	8,707
	2023	12	40	11	1,822	0	3,150	204	143	12	58	35	1,539	580	19	1,161	0	8,787
	2026	12	41	11	1,842	0	3,184	202	144	12	60	34	1,556	573	20	1,172	0	8,865
	2029	12	42	12	1,862	0	3,219	200	145	12	62	33	1,573	565	20	1,183	0	8,941
Large Other Buildings	2014	358	1,384	272	5,426	50	4,743	7,904	6,537	229	1,689	1,359	6,162	4,889	269	22,842	0	64,115
	2017	359	1,418	279	5,447	50	4,762	7,774	6,572	230	1,729	1,311	6,186	4,807	269	22,912	0	64,104
	2020	360	1,451	285	5,469	50	4,780	7,644	6,606	231	1,770	1,262	6,210	4,724	269	22,982	0	64,094
	2023	361	1,484	292	5,490	51	4,799	7,513	6,641	232	1,810	1,213	6,234	4,642	270	23,053	0	64,084
	2026	362	1,517	298	5,512	51	4,818	7,383	6,676	233	1,850	1,164	6,259	4,560	270	23,123	0	64,076
	2029	363	1,550	305	5,533	51	4,837	7,253	6,711	234	1,891	1,116	6,283	4,478	270	23,194	0	64,068

Exhibit 123 Reference Case Electricity Consumption by Sub sector, End Use and Milestone Year, Labrador Interconnected (MWh/yr) (cont'd…)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Small Other Buildings	2014	238	1,099	212	2,757	31	2,645	6,188	3,936	157	1,147	955	3,513	2,881	209	16,047	0	42,015
	2017	238	1,123	217	2,761	31	2,649	6,074	3,945	158	1,172	919	3,519	2,828	208	16,070	0	41,910
	2020	242	1,177	227	2,842	32	2,726	6,108	4,102	162	1,228	909	3,622	2,837	222	16,450	0	42,889
	2023	246	1,226	237	2,912	33	2,793	6,122	4,239	166	1,280	897	3,711	2,838	234	16,781	0	43,715
	2026	250	1,275	247	2,980	34	2,859	6,132	4,372	170	1,331	883	3,798	2,837	246	17,104	0	44,518
	2029	254	1,324	256	3,048	34	2,923	6,141	4,504	174	1,382	869	3,885	2,836	258	17,424	0	45,313
Other Institutional	2014	412	1,212	0	2,407	0	537	12,713	8,247	412	2,075	1,406	1,763	4,559	219	10,017	0	45,979
	2017	415	1,246	0	2,423	0	542	12,550	8,319	415	2,133	1,362	1,775	4,494	218	33,698	0	69,591
	2020	418	1,280	0	2,438	0	547	12,387	8,392	418	2,191	1,318	1,788	4,428	218	50,460	0	86,285
	2023	421	1,314	0	2,454	0	552	12,225	8,466	421	2,250	1,274	1,801	4,362	218	50,522	0	86,281
	2026	425	1,348	0	2,470	0	558	12,063	8,540	425	2,308	1,231	1,814	4,297	217	50,585	0	86,280
	2029	428	1,382	0	2,486	0	563	11,902	8,615	428	2,366	1,187	1,827	4,232	217	50,648	0	86,282
Non-Buildings	2014	0	0	0	0	0	0	0	0	5,068	0	0	0	0	0	0	0	5,068
	2017	0	0	0	0	0	0	0	0	5,063	0	0	0	0	0	0	0	5,063
	2020	0	0	0	0	0	0	0	0	5,121	0	0	0	0	0	0	0	5,121
	2023	0	0	0	0	0	0	0	0	5,171	0	0	0	0	0	0	0	5,171
	2026	0	0	0	0	0	0	0	0	5,218	0	0	0	0	0	0	0	5,218
	2029	0	0	0	0	0	0	0	0	5,264	0	0	0	0	0	0	0	5,264
Street Lighting	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,756	1,756
	2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,845	1,845
	2020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,912	1,912
	2023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,967	1,967
	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,998	1,998
	2029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,030	2,030
Grand Total	2014	1,512	5,951	929	17,392	138	13,390	41,065	27,616	6,224	7,323	5,828	18,523	18,592	1,197	84,075	1,756	251,513
	2017	1,467	5,971	923	17,005	125	13,154	40,276	26,922	6,206	7,267	5,511	18,528	17,576	1,171	107,246	1,845	271,194
	2020	1,480	6,167	955	17,188	127	13,309	39,951	27,320	6,279	7,494	5,360	18,733	17,365	1,199	124,911	1,912	289,749
	2023	1,493	6,355	985	17,353	128	13,447	39,583	27,686	6,341	7,714	5,202	18,917	17,142	1,224	125,779	1,967	291,316
	2026	1,506	6,543	1,016	17,516	129	13,584	39,211	28,049	6,401	7,933	5,043	19,098	16,917	1,248	126,634	1,998	292,823
	2029	1,518	6,729	1,046	17,678	130	13,719	38,838	28,411	6,459	8,152	4,884	19,278	16,692	1,272	127,485	2,030	294,321

Exhibit 124 Reference Case Electricity Consumption by Sub sector, End Use and Milestone Year, Isolated (MWh/yr.)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Labrador Isolated C/I Buildings	2014	305	1,051	0	149	0	496	6,909	1,132	0	677	739	3,416	1,608	0	580	0	17,062
	2017	301	1,059	0	148	0	490	6,689	1,118	0	682	701	3,375	1,557	0	573	0	16,693
	2020	351	1,258	0	172	0	573	7,498	1,409	0	810	813	3,931	1,724	0	650	0	19,187
	2023	367	1,335	0	180	0	599	7,663	1,501	0	860	830	4,109	1,756	0	674	0	19,874
	2026	382	1,410	0	187	0	624	7,815	1,590	0	908	844	4,279	1,785	0	698	0	20,521
	2029	397	1,486	0	194	0	650	7,968	1,679	0	956	858	4,449	1,814	0	721	0	21,173
Island Isolated C/I Buildings	2014	0	99	0	0	0	47	649	106	0	64	69	321	151	0	0	0	1,505
	2017	0	99	0	0	0	46	626	105	0	64	66	316	146	0	0	0	1,466
	2020	0	120	0	0	0	55	716	136	0	78	78	377	164	0	0	0	1,725
	2023	0	128	0	0	0	57	732	145	0	82	80	393	168	0	0	0	1,786
	2026	0	135	0	0	0	60	748	154	0	87	82	411	171	0	0	0	1,847
	2029	0	143	0	0	0	62	765	163	0	92	83	428	174	0	0	0	1,910
Street Lighting	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	544	544
	2017	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	557	557
	2020	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	571	571
	2023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	584	584
	2026	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	596	596
	2029	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	609	609
Grand Total	2014	305	1,150	0	149	0	542	7,558	1,238	0	740	808	3,737	1,759	0	580	544	19,112
	2017	301	1,158	0	148	0	536	7,315	1,223	0	746	766	3,691	1,703	0	573	557	18,716
	2020	351	1,378	0	172	0	627	8,214	1,545	0	887	892	4,308	1,889	0	650	571	21,483
	2023	367	1,463	0	180	0	656	8,396	1,647	0	942	910	4,502	1,924	0	674	584	22,244
	2026	382	1,546	0	187	0	684	8,563	1,744	0	995	925	4,689	1,956	0	698	596	22,965
	2029	397	1,628	0	194	0	712	8,733	1,842	0	1,048	941	4,877	1,988	0	721	609	23,691

C.4 CEEAM Archetype Summaries – New Buildings

This section includes summary profiles of the twelve new building archetypes constructed for this study. **Exhibit 125** presents a table of contents for the CEEAM building profiles that follow. A glossary of terms and acronyms used in the building profiles is included at the end of this appendix.

Exhibit 125 Table of Contents - New CEEAM Building Profiles

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW	New	Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.42	W/m².°C	0.07	Btu/hr.ft² .°F	
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	
Window/Wall Ratio (WIWAR) (%)	0.60				
Shading Coefficient (SC)	0.58				

Typical Building Size	3,717	m²	40,000	ft²
Typical Footprint (m²)	1,859	m²	20,000	ft²
Footprint Aspect Ratio (L:W)	1			
Percent Conditioned Space	100%			
Percent Conditioned Space Defined as Exterior Zone	45%			
Typical # Stories	3			
Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	50%				50%				100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	26	m²/person	274	ft²/person
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person

%OA 13.04%

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right:
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation L/s.m² CFM/ft² operation (%)

Sizing Factor	1.5			
Total Air Circulation or Design Air Flow	6.01	L/s.m²	1.18	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based	Total
Incidence of Use			100%	100%
Switchover Point		KJ/kg.	18 °C	
		Btu/lbm	64.4 °F	

Summary of Design Parameters		
Peak Design Cooling Load	1,586,900	
Peak Zone Sensible Load	678,953	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	31,585	
Total air circulation or Design air	6.01	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				98%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	23	°C	73.4	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	23	°C	73.4	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW	New	Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.90			
Connected Load	12.9	W/m²	1.2	W/ft²

Occ. Period(Hrs./yr.)	3300
Unocc. Period(Hrs./yr.)	5460
Usage During Occupied Period	95%
Usage During Unoccupied Period	20%

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				100%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval — years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	4.6
	MJ/m².yr	177

ARCHITECTURAL LIGHTING

Light Level	350	Lux	32.5	ft-candles
Floor Fraction (ALFF)	0.10			
Connected Load	15.1	W/m²	1.4	W/ft²

Occ. Period(Hrs./yr.)	3400
Unocc. Period(Hrs./yr.)	5360
Usage During Occupied Period	95%
Usage During Unoccupied Period	40%

Light Level (Lux)	200	300	400	500				Total
% Distribution	10%	40%	40%	10%				100%
Weighted Average								**350**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	10%	30%		40%	5%	15%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval — years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	0.8
	MJ/m².yr	29

EUI = Load X Hrs. X SF X GLFF

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval — years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 13.13 W/m²

EUI TOTAL	kWh/ft².yr	5
	MJ/m².yr	206

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		50			
Density (device/occupant)	0.9		0.9		0.15		0.1		0.26			
Connected Load	1.9	W/m²	1.8	W/m²	0.6	W/m²	0.8	W/m²	0.5	W/m²	1.5	W/m²
	0.2	W/ft²	0.2	W/ft²	0.05	W/ft²	0.07	W/ft²	0.05	W/ft²	0.14	W/ft²
Diversity Occupied Period	80%		80%		80%		80%		100%		80%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		50%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2000		2500	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6760		6260	

Total end-use load (occupied period)	5.8	W/m²	0.5	W/ft²
Total end-use load (unocc. period)	3.8	W/m²	0.4	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	66%			

Computer Servers	EUI	kWh/ft².yr	0.42
		MJ/m².yr	16.20
Computer Equipment	EUI	kWh/ft².yr	2.36
		MJ/m².yr	91.24
Plug Loads	EUI	kWh/ft².yr	0.72
		MJ/m².yr	27.70

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Lunch room/cafeteria/restaurant

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	0.1	EUI	kWh/ft².yr	0.10
	MJ/m².yr	5.0		MJ/m².yr	4.00

REFRIGERATION

Provide description below:

Lunch room/cafeteria/restaurant

EUI	kWh/ft².yr	0.10
	MJ/m².yr	4.00

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.26
		MJ/m².yr	10.00

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS: **Large Office** **Baseline** | **SIZE:** **> 100 kW** | **VINTAGE:** **New** | **REGION:** **Island Interconnected**

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				Total
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	
System Present (%)							100%	100%
Eff./COP	70%	80%	75%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.33	0.59	0.33	0.22	1.00	

Peak Heating Load	53.1	W/m²	16.9	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	302	MJ/m².yr	7.8	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	kWh/ft².yr	7.8
	MJ/m².yr	302
Fuel Oil / Propane EUI	kWh/ft².yr	
	MJ/m².yr	
Market Composite EUI	kWh/ft².yr	7.8
	MJ/m².yr	302

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		WSHP	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE		Open	DX	W. H.	CW	
System Present (%)		20.0%			80.0%			100.0%
COP	4.7	5.4	3.5	3.5	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.29	0.29	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load	125	W/m²	40	Btu/hr.ft²	302	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	129.0	MJ/m².yr	3.3	kWh/ft².yr		

Sizing Factor 1.00 Operation (occ. period) 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 90.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	kWh/ft².yr	1.4
	MJ/m².yr	53
Fuel Oil / Propane EUI	kWh/ft².yr	
	MJ/m².yr	
Market Composite EUI	kWh/ft².yr	1.4
	MJ/m².yr	53

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share		100%
Blended Efficiency	#DIV/0!	0.94

Service Hot Water load (MJ/m².yr) (Tertiary Load) 22.8

Wetting Use Percentage 90%

All Electric EUI	kWh/ft².yr	0.6
	MJ/m².yr	24
Fuel Oil / Propane EUI	kWh/ft².yr	#DIV/0!
	MJ/m².yr	#DIV/0!
Market Composite EUI	kWh/ft².yr	#DIV/0!
	MJ/m².yr	#DIV/0!

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW	New	Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	6.0	L/s.m²	1.18	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	1.00			
Fan Design Load CAV	10.2	W/m²	0.95	W/ft²
Fan Design Load VAV	10.2	W/m²	0.95	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	50%	50%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.02	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.04	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	40%			
Fan Motor Efficiency	80%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.018	kW/kW	0.06	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	2.24	W/m²	0.21	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.007	L/s.m²	0.010	U.S. gpm/ft²
Pump Head Pressure	100	kPa	33.333333	ft
Pump Efficiency	55%			
Pump Motor Efficiency	90%			
Sizing Factor	1.0			
Pump Connected Load	1.34	W/m²	0.12	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.005	L/s.m²	0.0079	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	150	kPa	50	ft		
Pump Efficiency	55%					
Pump Motor Efficiency	90%					
Sizing Factor	0.5					
Pump Connected Load	0.8	W/m²	0.08	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	62.2	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.2	kWh/m².yr
Condenser Pump Energy Consumption	1.7	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.6	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI	kWh/ft².yr	6.1
	MJ/m².yr	236.4

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW	New	Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **25.6** kWh/ft².yr **990.8** MJ/m².yr **Fuel Oil / Propane:** **#DIV/0!** kWh/ft².yr **#DIV/0!** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	4.6	176.9
ARCHITECTURAL LIGHTING	0.8	29.2
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.7	27.7
HVAC FANS & PUMPS	6.1	236.4
REFRIGERATION	0.1	4.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	2.4	91.2
COMPUTER SERVERS	0.4	16.2
ELEVATORS	0.1	3.9
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	7.8	302.1		
SPACE COOLING	1.2	48.0		
DOMESTIC HOT WATER	0.6	24.2	#DIV/0!	#DIV/0!
FOOD SERVICE EQUIPMENT	0.1	4.0		

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	New	Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	1,859	m²	20,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	929	m²	10,000	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.35								
Shading Coefficient (SC)	0.58				Typical # Stories	3			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%				50%				150%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	26	m²/person	274	ft²/person	%OA	13.99%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right:
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | L/s.m² | CFM/ft² | operation (%)

Sizing Factor	1.5			
Total Air Circulation or Design Air Flow	5.61	L/s.m²	1.10	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)	L/s.m²	CFM/ft²
Operation occupied period	50%	
Operation unoccupied period	50%	

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	770,463	
Peak Zone Sensible Load	316,489	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	14,723	
Total air circulation or Design air	5.61	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				98%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	23	°C	73.4	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	23	°C	73.4	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Small Office	**< 100 kW**	**New**	**Island Interconnected**
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.95			
Connected Load	12.9	W/m²	1.2	W/ft²

Occ. Period(Hrs./yr.)	2500
Unocc. Period(Hrs./yr.)	6260
Usage During Occupied Period	95%
Usage During Unoccupied Period	20%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				100%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	4.1
	MJ/m².yr	160

ARCHITECTURAL LIGHTING

Light Level	350	Lux	32.5	ft-candles
Floor Fraction (ALFF)	0.05			
Connected Load	12.9	W/m²	1.2	W/ft²

Occ. Period(Hrs./yr.)	2500
Unocc. Period(Hrs./yr.)	6260
Usage During Occupied Period	95%
Usage During Unoccupied Period	40%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	200	300	400	500				Total
% Distribution	10%	40%	40%	10%				100%
Weighted Average								**350**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	5%	30%		40%	5%	15%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	0.3
	MJ/m².yr	11

EUI = Load X Hrs. X SF X GLFF

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 12.92 W/m²

EUI TOTAL	kWh/ft².yr	4
	MJ/m².yr	172

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	50	
Density (device/occupant)	0.9	0.9	0.15	0.1	0.26	
Connected Load	1.9 W/m²	1.8 W/m²	0.6 W/m²	0.8 W/m²	0.5 W/m²	1.5 W/m²
	0.2 W/ft²	0.2 W/ft²	0.05 W/ft²	0.07 W/ft²	0.05 W/ft²	0.14 W/ft²
Diversity Occupied Period	80%	80%	80%	80%	100%	80%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	2500
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	6260

Total end-use load (occupied period)	5.8 W/m²	0.5 W/ft²
Total end-use load (unocc. period)	3.8 W/m²	0.4 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	66%	

Computer Servers	EUI	kWh/ft².yr	0.42
		MJ/m².yr	16.20
Computer Equipment	EUI	kWh/ft².yr	2.36
		MJ/m².yr	91.24
Plug Loads	EUI	kWh/ft².yr	0.72
		MJ/m².yr	27.70

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: Electricity Fuel Share: 100.0%

	Fuel Oil / Propane EUI	All Electric EUI
EUI kWh/ft².yr		
MJ/m².yr		

REFRIGERATION

Provide description below:

EUI	kWh/ft².yr	
	MJ/m².yr	

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.26
		MJ/m².yr	10.00

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	New	Island Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				Total
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	70%	80%	75%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.33	0.59	0.33	0.22	1.00	

Peak Heating Load	48.9	W/m²	15.5	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	275	MJ/m².yr	7.1	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	7.1
MJ/m².yr	275

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	7.1
MJ/m².yr	275

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		WSHP	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE		Open	DX	W. H.	CW	
System Present (%)		20.0%			80.0%			100.0%
COP	4.7	5.4	3.5	3.5	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.29	0.29	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load	121	W/m²	39	Btu/hr.ft²	312	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	122.1	MJ/m².yr	3.2	kWh/ft².yr		

Sizing Factor 1.00 Operation (occ. period) 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 90.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	1.3
MJ/m².yr	51

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	1.3
MJ/m².yr	51

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)	100.00%				
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	55000.00	0.94

Service Hot Water load (MJ/m².yr) (Tertiary Load) 22.8

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	0.6
MJ/m².yr	24

Fuel Oil / Propane EUI	
kWh/ft².yr	0.0
MJ/m².yr	0

Market Composite EUI	
kWh/ft².yr	0.6
MJ/m².yr	24.2

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	New	Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	5.6	L/s.m²	1.10	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	0.50			
Fan Design Load CAV	4.8	W/m²	0.44	W/ft²
Fan Design Load VAV	4.8	W/m²	0.44	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%	50%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.04	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.06	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	40%			
Fan Motor Efficiency	80%			
Sizing Factor	0.5			
Exhaust Fan Connected Load	0.1	W/m²	0.01	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.018	kW/kW	0.06	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	2.17	W/m²	0.20	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.006	L/s.m²	0.009	U.S. gpm/ft²
Pump Head Pressure	100	kPa	33.333333	ft
Pump Efficiency	55%			
Pump Motor Efficiency	90%			
Sizing Factor	0.5			
Pump Connected Load	0.65	W/m²	0.06	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.005	L/s.m²	0.0077	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	150	kPa	50	ft		
Pump Efficiency	55%					
Pump Motor Efficiency	90%					
Sizing Factor	0.5					
Pump Connected Load	0.8	W/m²	0.07	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	46.7	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	0.9	kWh/m².yr
Condenser Pump Energy Consumption	0.8	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.6	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI	kWh/ft².yr	4.6
	MJ/m².yr	176.4

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	New	Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	22.1 kWh/ft².yr	855.1 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	4.1	160.2
ARCHITECTURAL LIGHTING	0.3	11.3
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.7	27.7
HVAC FANS & PUMPS	4.6	176.4
REFRIGERATION		
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	2.4	91.2
COMPUTER SERVERS	0.4	16.2
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	7.1	275.2		
SPACE COOLING	1.2	45.6		
DOMESTIC HOT WATER	0.6	24.2	0.0	0.0
FOOD SERVICE EQUIPMENT				

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All	New	Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	2,788	m²	30,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	1,225	m²	13,181	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	40%			
Window/Wall Ratio (WIWAR) (%)	0.11								
Shading Coefficient (SC)	0.69				Typical # Stories	1			
					Floor to Floor Height (m)	6.0	m	19.7	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	45	m²/person	484	ft²/person	%OA	15.81%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right:
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	3			
Total Air Circulation or Design Air Flow	2.81	L/s.m²	0.55	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	232,012	
Peak Zone Sensible Load	118,985	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	5,535	
Total air circulation or Design air	2.81	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	22	°C	71.6	°F	16	°C	60.8	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All	New	Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.90			
Connected Load	13.2	W/m²	1.2	W/ft²
Occ. Period(Hrs./yr.)	5000			
Unocc. Period(Hrs./yr.)	3760			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	20%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	400	500	600	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	2%	3%		55%	10%	30%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI: 6.4 kWh/ft².yr; 246 MJ/m².yr

SECONDARY LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.10			
Connected Load	12.8	W/m²	1.2	W/ft²
Occ. Period(Hrs./yr.)	5000			
Unocc. Period(Hrs./yr.)	3760			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	50%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				80%	5%	15%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI: 0.8 kWh/ft².yr; 32 MJ/m².yr

EUI = Load X Hrs. X SF X GLFF

TERTIARY LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)							0%	0.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI: kWh/ft².yr; MJ/m².yr

TOTAL LIGHTING — Overall LP 13.18 W/m² — EUI TOTAL 7 kWh/ft².yr; 278 MJ/m².yr

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.65	0.65	0.01	0.01	0.03	
Connected Load	0.8 W/m²	0.7 W/m²	0.0 W/m²	0.0 W/m²	0.1 W/m²	1.5 W/m²
	0.1 W/ft²	0.1 W/ft²	0.00 W/ft²	0.00 W/ft²	0.01 W/ft²	0.14 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	90%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2600	4100
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6160	4660

Total end-use load (occupied period)	2.9 W/m²	0.3 W/ft²
Total end-use load (unocc. period)	1.7 W/m²	0.2 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	58%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

		kWh/ft².yr	MJ/m².yr
Computer Servers	EUI	0.11	4.42
Computer Equipment	EUI	0.76	29.56
Plug Loads	EUI	0.84	32.51

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: — Electricity Fuel Share: 100.0%

		kWh/ft².yr	MJ/m².yr
Fuel Oil / Propane EUI	EUI	2.6	100.0
All Electric EUI	EUI	3.1	120.0

REFRIGERATION

Provide description below:

Commercial refrigeration display cases

EUI: 29.0 kWh/ft².yr; 1125.0 MJ/m².yr

BLOCK HEATERS & MISCELLANEOUS

		kWh/ft².yr	MJ/m².yr
Block Heaters	EUI		
Miscellaneous	EUI	0.3	10

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All	New	Island Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Rooftop					
System Present (%)							100%	100%
Eff./COP	80%	88%	95%	3.20	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.25	1.14	1.05	0.31	0.33	0.22	1.00	

Peak Heating Load	32.0 W/m²	10.1 Btu/hr.ft²	
Seasonal Heating Load (Tertiary Load)	181 MJ/m².yr	4.7 kWh/ft².yr	
Sizing Factor	1.00		
Electric Fuel Share	100.0%	Fuel Oil / Propane Fuel Share	Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	4.7
MJ/m².yr	181

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	4.7
MJ/m².yr	181

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.2	4.4	3.2	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.31	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7 °C	44.6 °F
Condenser Water	30 °C	86 °F
Supply Air	13.0 °C	55.4 °F

Peak Cooling Load	24 W/m²	8 Btu/hr.ft²	1552 ft²/Ton
Seasonal Cooling Load (Tertiary Load)	77.8 MJ/m².yr	2.0 kWh/ft².yr	

Sizing Factor 1.00 Operation (occ. period 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 80.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Sh

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.8
MJ/m².yr	30

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.8
MJ/m².yr	30

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)	0.00%				
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.55	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 45.5

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	1.3
MJ/m².yr	50

Fuel Oil / Propane EUI	
kWh/ft².yr	2.1
MJ/m².yr	83

Market Composite EUI	
kWh/ft².yr	1.3
MJ/m².yr	50.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All	New	Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	2.8	L/s.m²	0.55	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	4.4	W/m²	0.41	W/ft²
Fan Design Load VAV	4.4	W/m²	0.41	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	100%		100%	
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.03	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.05	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.4	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.49	W/m²	0.05	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.001	L/s.m²	0.002	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.001	L/s.m²	0.0015	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure		kPa	50	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load		W/m²		W/ft²		

Supply Fan Occ. Period	5000	hrs./year
Supply Fan Unocc. Period	3760	hrs./year
Supply Fan Energy Consumption	38.5	kWh/m².yr
Exhaust Fan Occ. Period	5000	hrs./year
Exhaust Fan Unocc. Period	3760	hrs./year
Exhaust Fan Energy Consumption	3.1	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	3.9
	MJ/m².yr	151.1

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All	New	Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	53.1 kWh/ft².yr	2,056.5 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	6.4	246.5
SECONDARY LIGHTING	0.8	31.6
TERTIARY LIGHTING		
OTHER PLUG LOADS	0.8	32.5
HVAC FANS & PUMPS	3.9	151.1
REFRIGERATION	29.0	1,125.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.8	29.6
COMPUTER SERVERS	0.1	4.4
ELEVATORS		
OUTDOOR LIGHTING	1.3	50.4

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	4.7	181.2		
SPACE COOLING	0.6	24.2		
DOMESTIC HOT WATER	1.3	50.0	0.0	0.0
FOOD SERVICE EQUIPMENT	3.1	120.0		

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	New	Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	1,859	m²	20,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	1,859	m²	20,000	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	5			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.10								
Shading Coefficient (SC)	0.78				Typical # Stories	1			
					Floor to Floor Height (m)	6.0	m	19.7	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	25	m²/person	269	ft²/person	%OA	15.06%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right: | 34%
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	2			
Total Air Circulation or Design Air Flow	5.31	L/s.m²	1.05	CFM/ft²
Infiltration Rate		L/s.m²		CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	533,548	
Peak Zone Sensible Load	224,846	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	10,460	
Total air circulation or Design air	5.31	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	21	°C	69.8	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	New	Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500 Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.95		
Connected Load	15.9 W/m²	1.5	W/ft²

Occ. Period(Hrs./yr.)	4500	Light Level (Lux)	300	500	700	1000				Total
Unocc. Period(Hrs./yr.)	4260	% Distribution		100%						100%
Usage During Occupied Period	95%	Weighted Average								**500**
Usage During Unoccupied Period	15%									
			INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
Fixture Cleaning:		System Present (%)	5%	10%		55%	10%	20%	0%	100.0%
Incidence of Practice		CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
Interval	years	LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
		Efficacy (L/W)	15	50	72	88	65	95	90	
Relamping Strategy & Incidence of Practice	Group / Spot									

EUI	kWh/ft².yr	6.9
	MJ/m².yr	267

ARCHITECTURAL LIGHTING

Light Level	500 Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.05		
Connected Load	16.1 W/m²	1.5	W/ft²

Occ. Period(Hrs./yr.)	4500	Light Level (Lux)	300	500	700	1000				Total
Unocc. Period(Hrs./yr.)	4260	% Distribution		100%						100%
Usage During Occupied Period	95%	Weighted Average								**500**
Usage During Unoccupied Period	50%									
			INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
Fixture Cleaning:		System Present (%)	5%	10%		20%	10%	50%	5%	100.0%
Incidence of Practice		CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
Interval	years	LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
		Efficacy (L/W)	15	50	72	88	65	95	90	
Relamping Strategy & Incidence of Practice	Group / Spot									

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.5
	MJ/m².yr	19

SPECIAL PURPOSE LIGHTING

Light Level	Lux		ft-candles
Floor Fraction (HBLFF)			
Connected Load	W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000	Light Level (Lux)	300	500	700	1000				Total
Unocc. Period(Hrs./yr.)	4760	% Distribution								
Usage During Occupied Period	0%	Weighted Average								
Usage During Unoccupied Period	100%									
			INC	CFL	T12	T8		MH	HPS	TOTAL
Fixture Cleaning:		System Present (%)								
Incidence of Practice		CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
Interval	years	LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
		Efficacy (L/W)	15	50	72	84	88	65	90	
Relamping Strategy & Incidence of Practice	Group / Spot									

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING Overall LP 15.88 W/m²

EUI TOTAL	kWh/ft².yr	7
	MJ/m².yr	285

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.22	0.22	0.01	0.01	0.02	
Connected Load	0.5 W/m²	0.4 W/m²	0.0 W/m²	0.1 W/m²	0.1 W/m²	1.15 W/m²
	0.0 W/ft²	0.0 W/ft²	0.00 W/ft²	0.01 W/ft²	0.01 W/ft²	0.11 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	90%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	4100
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	4660

Total end-use load (occupied period)	2.1 W/m²	0.2 W/ft²
Total end-use load (unocc. period)	1.2 W/m²	0.1 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	59%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.14
Plug Loads	EUI	kWh/ft².yr	0.64
		MJ/m².yr	24.92

FOOD SERVICE EQUIPMENT

5

Provide description below:

Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr		EUI	kWh/ft².yr	1.0
	MJ/m².yr			MJ/m².yr	38.7

REFRIGERATION

Provide description below:

EUI	kWh/ft².yr	1.5
	MJ/m².yr	58.1

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS: **Large Non-Food Retail** **Baseline**
SIZE: **> 100 kW**
VINTAGE: **New**
REGION: **Island Interconnected**

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane Boilers Stan.	Fuel Oil / Propane Boilers High	Fuel Oil / Propane Packaged Rooftop	Electric A/A HP	Electric W. S. HP	Electric H/R Chiller	Electric Resistance	Total
System Present (%)							100%	100%
Eff./COP	75%	80%	75%	3.20	3.50	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.25	1.33	0.31	0.29	0.22	1.00	

Peak Heating Load	33.1	W/m²	10.5	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	179	MJ/m².yr	4.6	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

EUI	kWh/ft².yr	MJ/m².yr
All Electric EUI	4.6	179
Fuel Oil / Propane EUI		
Market Composite EUI	4.6	179

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Recprocting Chillers Open	Recprocting Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)					100.0%			100.0%
COP	4.8	5.4	4.4	3.7	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.27	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	14.0	57.2

Peak Cooling Load	84	W/m²	27	Btu/hr.ft²	450	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	115.1	MJ/m².yr	3.0	kWh/ft².yr		

Sizing Factor 1.00

A/C Saturation (Incidence of A/C) 90.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

EUI	kWh/ft².yr	MJ/m².yr
All Electric EUI	1.0	38
Fuel Oil / Propane EUI		
Market Composite EUI	1.0	38

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)	0.00%				
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.55	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 17.3

Wetting Use Percentage 90%

EUI	kWh/ft².yr	MJ/m².yr
All Electric EUI	0.5	19
Fuel Oil / Propane EUI	0.8	31
Market Composite EUI	0.5	19.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	New	Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	5.3	L/s.m²	1.05	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	88%			
Sizing Factor	1.00			
Fan Design Load CAV	7.5	W/m²	0.70	W/ft²
Fan Design Load VAV	7.5	W/m²	0.70	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	50%	50%

Comments:

EXHAUST FANS

Washroom Exhaust	50	L/s.washroom	106	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.03	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.68	W/m²	0.16	W/ft²

Condenser Pump

Pump Design Flow		L/s.KW		U.S. gpm/Ton
Pump Design Flow per unit floor area		L/s.m²		U.S. gpm/ft²
Pump Head Pressure	45	kPa	15	ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0053	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure		kPa		ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load		W/m²		W/ft²		

Supply Fan Occ. Period	5500	hrs./year
Supply Fan Unocc. Period	3260	hrs./year
Supply Fan Energy Consumption	59.9	kWh/m².yr
Exhaust Fan Occ. Period	5500	hrs./year
Exhaust Fan Unocc. Period	3260	hrs./year
Exhaust Fan Energy Consumption	1.5	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.5	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	5.8
	MJ/m².yr	222.8

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	New	Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	**Electricity:**	**24.0**	kWh/ft².yr	**929.1**	MJ/m².yr	**Fuel Oil / Propane:**	**0.0** kWh/ft².yr	**0.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	6.9	266.6
ARCHITECTURAL LIGHTING	0.5	18.6
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.6	24.9
HVAC FANS & PUMPS	5.8	222.8
REFRIGERATION	1.5	58.1
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.5	19.1
COMPUTER SERVERS	0.1	4.4
ELEVATORS/ESCALATORS		
OUTDOOR LIGHTING	0.9	33.9

Fuel Specific EUIs for Heating Cooling & DHW

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	4.6	178.8		
SPACE COOLING	0.9	34.1		
DOMESTIC HOT WATER	0.5	19.0	0.0	0.0
FOOD SERVICE EQUIPMENT	1.0	38.7		

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Non-Food Retail	< 100 kW	New	Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	929 m²	10,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	929 m²	10,000	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	5		
					Percent Conditioned Space	100%		
					Percent Conditioned Space Defined as Exterior Zone	45%		
Window/Wall Ratio (WIWAR) (%)	0.10							
Shading Coefficient (SC)	0.78				Typical # Stories	1		
					Floor to Floor Height (m)	6.0 m	19.7	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	25 m²/person	269 ft²/person	%OA	17.20%
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	20 L/s.person	42 CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3): 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)
If Fresh Air Control Type = "2" enter % FA. to the right: 34%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	1.4	
Total Air Circulation or Design Air Flow	4.65 L/s.m²	0.92 CFM/ft²
Infiltration Rate	0.42 L/s.m²	0.08 CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)	L/s.m²	CFM/ft²
Operation occupied period	50%	
Operation unoccupied period	50%	

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	294,944	
Peak Zone Sensible Load	140,593	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	6,540	
Total air circulation or Design air	4.65	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	21	°C	69.8	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Non-Food Retail	< 100 kW	New	Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500 Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.95		
Connected Load	18.8 W/m²	1.8	W/ft²

		Light Level (Lux)	300	500	700	1000				Total
Occ. Period(Hrs./yr.)	3500	% Distribution		100%						100%
Unocc. Period(Hrs./yr.)	5260	Weighted Average								**500**
Usage During Occupied Period	95%									
Usage During Unoccupied Period	15%									

			INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
Fixture Cleaning:		System Present (%)	10%	5%		55%	30%	0%	0%	100.0%
Incidence of Practice		CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
Interval	years	LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
		Efficacy (L/W)	15	50	72	88	65	95	90	

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	6.8
	MJ/m².yr	265

ARCHITECTURAL LIGHTING

Light Level	500 Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.05		
Connected Load	16.6 W/m²	1.5	W/ft²

		Light Level (Lux)	300	500	700	1000				Total
Occ. Period(Hrs./yr.)	3500	% Distribution		100%						100%
Unocc. Period(Hrs./yr.)	5260	Weighted Average								**500**
Usage During Occupied Period	95%									
Usage During Unoccupied Period	50%									

			INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
Fixture Cleaning:		System Present (%)	5%	10%		20%	20%	40%	5%	100.0%
Incidence of Practice		CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
Interval	years	LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
		Efficacy (L/W)	15	50	72	88	65	95	90	

Relamping Strategy & Incidence of Practice: Group | Spot

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.5
	MJ/m².yr	18

SPECIAL PURPOSE LIGHTING

Light Level	Lux		ft-candles
Floor Fraction (HBLFF)			
Connected Load	W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

		Light Level (Lux)	300	500	700	1000				Total
Occ. Period(Hrs./yr.)	4000	% Distribution								
Unocc. Period(Hrs./yr.)	4760	Weighted Average								
Usage During Occupied Period	0%									
Usage During Unoccupied Period	100%									

			INC	CFL	T12	T8		MH	HPS	TOTAL
Fixture Cleaning:		System Present (%)								
Incidence of Practice		CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
Interval	years	LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
		Efficacy (L/W)	15	50	72	84	88	65	90	

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING — Overall LP 18.72 W/m²

EUI TOTAL	kWh/ft².yr	7
	MJ/m².yr	283

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.22	0.22	0.01	0.01	0.02	
Connected Load	0.5 W/m²	0.4 W/m²	0.0 W/m²	0.1 W/m²	0.1 W/m²	1.15 W/m²
	0.0 W/ft²	0.0 W/ft²	0.00 W/ft²	0.01 W/ft²	0.01 W/ft²	0.11 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	90%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	4100
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	4660

Total end-use load (occupied period)	2.1 W/m²	0.2 W/ft²
Total end-use load (unocc. period)	1.2 W/m²	0.1 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	59%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.14
Plug Loads	EUI	kWh/ft².yr	0.64
		MJ/m².yr	24.92

FOOD SERVICE EQUIPMENT

5

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr		EUI	kWh/ft².yr	
	MJ/m².yr			MJ/m².yr	

REFRIGERATION

Provide description below:

EUI	kWh/ft².yr	
	MJ/m².yr	

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Non-Food Retail	< 100 kW	New	Island Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Rooftop					
System Present (%)							100%	100%
Eff./COP	75%	80%	75%	3.20	3.50	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.25	1.33	0.31	0.29	0.22	1.00	

Peak Heating Load	49.8	W/m²	15.8	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	279	MJ/m².yr	7.2	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	7.2
MJ/m².yr	279

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	7.2
MJ/m².yr	279

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Recprocting Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.8	5.4	4.4	3.7	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.27	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load	93	W/m²	29	Btu/hr.ft²	407	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	131.3	MJ/m².yr	3.4	kWh/ft².yr		
Sizing Factor	1.00					
A/C Saturation (Incidence of A/C)	90.0%					

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	1.1
MJ/m².yr	43

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	1.1
MJ/m².yr	43

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)	0.00%				
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.55		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 17.3

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	0.5
MJ/m².yr	19

Fuel Oil / Propane EUI	
kWh/ft².yr	0.8
MJ/m².yr	31

Market Composite EUI	
kWh/ft².yr	0.5
MJ/m².yr	19.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS: Small Non-Food Retail Baseline | **SIZE:** < 100 kW | **VINTAGE:** New | **REGION:** Island Interconnected

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	4.6	L/s.m²	0.92	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	88%			
Sizing Factor	1.00			
Fan Design Load CAV	6.6	W/m²	0.61	W/ft²
Fan Design Load VAV	6.6	W/m²	0.61	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	50%	50%
Comments:				

EXHAUST FANS

Washroom Exhaust	50	L/s.washroom	106	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.02	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.04	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.3	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.86	W/m²	0.17	W/ft²

Condenser Pump

Pump Design Flow		L/s.KW		U.S. gpm/Ton
Pump Design Flow per unit floor area		L/s.m²		U.S. gpm/ft²
Pump Head Pressure	45	kPa	15	ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0059	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure		kPa		ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load		W/m²		W/ft²		

Supply Fan Occ. Period	5500	hrs./year
Supply Fan Unocc. Period	3260	hrs./year
Supply Fan Energy Consumption	52.5	kWh/m².yr
Exhaust Fan Occ. Period	5500	hrs./year
Exhaust Fan Unocc. Period	3260	hrs./year
Exhaust Fan Energy Consumption	2.0	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.5	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	5.1
	MJ/m².yr	198.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Non-Food Retail	< 100 kW	New	Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	23.5	kWh/ft².yr	910.3	MJ/m².yr	Fuel Oil / Propane:	0.0	kWh/ft².yr	0.0	MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	6.8	265.0
ARCHITECTURAL LIGHTING	0.5	17.8
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.6	24.9
HVAC FANS & PUMPS	5.1	198.0
REFRIGERATION		
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.5	19.1
COMPUTER SERVERS	0.1	4.4
ELEVATORS/ESCALATORS		
OUTDOOR LIGHTING	0.9	33.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	7.2	279.3		
SPACE COOLING	1.0	38.8		
DOMESTIC HOT WATER	0.5	19.0	0.0	0.0
FOOD SERVICE EQUIPMENT				

Fuel Specific EUIs for Heating Cooling & DHW

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Accommodation	> 100 kW	New	Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	3,717	m²	40,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	1,500	m²	16,140	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	4			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.30								
Shading Coefficient (SC)	0.65				Typical # Stories	3			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	FCoils	IU	100% O.A	TOTAL
System Present (%)	90%				10%				100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	50	m²/person	538	ft²/person	%OA 9.65%
Occupancy Schedule Occ. Period	50%				
Occupancy Schedule Unocc. Period	80%				
Fresh Air Requirements or Outside Air	15	L/s.person	32	CFM/person	

Fresh Air Control Type *(enter a 1, 2 or 3): 1

(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 15%

If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² 0.10 CFM/ft²; 50% operation (%)

Sizing Factor	1.4			
Total Air Circulation or Design Air Flow	3.11	L/s.m²	0.61	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA) L/s.m² CFM/ft²

Operation occupied period 50%

Operation unoccupied period 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	652,273	
Peak Zone Sensible Load	376,026	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	17,493	
Total air circulation or Design air	3.11	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Accommodation	> 100 kW	New	Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING (SUITES)

Light Level	125	Lux	11.6	ft-candles
Floor Fraction (GLFF)	0.75			
Connected Load	8.9	W/m²	0.8	W/ft²

Occ. Period(Hrs./yr.)	2500
Unocc. Period(Hrs./yr.)	6260
Usage During Occupied Period	50%
Usage During Unoccupied Period	25%

Light Level (Lux)	50	100	200	300			Total
% Distribution		75%	25%				100%
Weighted Average							**125**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	30%	50%		10%		0%	10%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice	Group	Spot

EUI	kWh/ft².yr	1.7
	MJ/m².yr	67

SECONDARY LIGHTING

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.25			
Connected Load	13.9	W/m²	1.3	W/ft²

Occ. Period(Hrs./yr.)	3000
Unocc. Period(Hrs./yr.)	5760
Usage During Occupied Period	85%
Usage During Unoccupied Period	75%

Light Level (Lux)	300	500	700	1000			Total
% Distribution	100%						100%
Weighted Average							**300**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	15%	15%		55%		0%	15%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice	Group	Spot

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	2.2
	MJ/m².yr	86

TERTIARY LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

Light Level (Lux)						Total
% Distribution						
Weighted Average						

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice	Group	Spot

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 10.11 W/m²

EUI TOTAL	kWh/ft².yr	4
	MJ/m².yr	153

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.3		0.3		0.05		0.033		0.02			
Connected Load	0.3	W/m²	0.3	W/m²	0.1	W/m²	0.1	W/m²	0.1	W/m²	1.5	W/m²
	0.0	W/ft²	0.0	W/ft²	0.01	W/ft²	0.01	W/ft²	0.01	W/ft²	0.14	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		70%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		25%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2500		3000	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6260		5760	

Total end-use load (occupied period)	1.9	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	0.9	W/m²	0.1	W/ft²

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Usage during occupied period	100%
Usage during unoccupied period	48%

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	0.42
		MJ/m².yr	16.11
Plug Loads	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.12

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: 2.0% Electricity Fuel Share: 98.0%

Kitchen services

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	1.3	EUI	kWh/ft².yr	0.6
	MJ/m².yr	50.0		MJ/m².yr	25.0

REFRIGERATION

Provide description below:

Walk-in coolers/freezers, reach-in coolers/freezers, refrigerated buffet cases

EUI	kWh/ft².yr	0.4
	MJ/m².yr	15.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Large Accommodation	**> 100 kW**	**New**	**Island Interconnected**
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)							100%	100%
Eff./COP	75%	80%	75%	3.20	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.25	1.33	0.31	0.33	0.22	1.00	

Peak Heating Load	50.2	W/m²	15.9	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	273	MJ/m².yr	7.0	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	7.0
MJ/m².yr	273

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	7.0
MJ/m².yr	273

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)		20.0%			80.0%			100.0%
COP	4.7	5.4	4.4	3.5	2.9	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.29	0.34	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	44	W/m²	14	Btu/hr.ft²	866	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	74.1	MJ/m².yr	1.9	kWh/ft².yr		

Sizing Factor 0.85 Operation (occ. perio 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 80.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.7
MJ/m².yr	28

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.7
MJ/m².yr	28

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)	0.00%				
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.55		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 236.6

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	6.7
MJ/m².yr	260

Fuel Oil / Propane EUI	
kWh/ft².yr	11.1
MJ/m².yr	430

Market Composite EUI	
kWh/ft².yr	6.7
MJ/m².yr	260.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Accommodation	> 100 kW	New	Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.1	L/s.m²	0.61	CFM/ft²
System Static Pressure CAV	300	Pa	1.2	wg
System Static Pressure VAV	300	Pa	1.2	wg
Fan Efficiency	45%			
Fan Motor Efficiency	70%			
Sizing Factor	1.00			
Fan Design Load CAV	3.0	W/m²	0.28	W/ft²
Fan Design Load VAV	3.0	W/m²	0.28	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	60%	40%	100%	
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.03	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.05	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.3	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.022	kW/kW	0.08	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.95	W/m²	0.09	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.002	L/s.m²	0.003	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.002	L/s.m²	0.0028	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.4	W/m²	0.03	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	19.7	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	2.7	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.5	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	2.1
	MJ/m².yr	82.5

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Accommodation	> 100 kW	New	Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **23.2** kWh/ft².yr **900.0** MJ/m².yr **Fuel Oil / Propane:** **0.0** kWh/ft².yr **1.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING (SUITES)	1.7	67.3
SECONDARY LIGHTING	2.2	85.8
TERTIARY LIGHTING		
OTHER PLUG LOADS	0.5	19.1
HVAC FANS & PUMPS	2.1	82.5
REFRIGERATION	0.4	15.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.4	16.1
COMPUTER SERVERS	0.1	3.7
ELEVATORS	0.1	3.9
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	7.0	272.6		
SPACE COOLING	0.6	22.7		
DOMESTIC HOT WATER	6.7	260.0	0.0	0.0
FOOD SERVICE EQUIPMENT	0.6	24.5	0.0	1.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW	New	Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	1,859	m²	20,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	1,500	m²	16,140	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	4			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.30								
Shading Coefficient (SC)	0.65				Typical # Stories	2			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	FCoils	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	50	m²/person	538	ft²/person	%OA	7.63%
Occupancy Schedule Occ. Period	50%					
Occupancy Schedule Unocc. Period	80%					
Fresh Air Requirements or Outside Air	15	L/s.person	32	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3): 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 15%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	1.4			
Total Air Circulation or Design Air Flow	3.93	L/s.m²	0.77	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)	L/s.m²	CFM/ft²
Operation occupied period	50%	
Operation unoccupied period	50%	

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	422,031	
Peak Zone Sensible Load	237,866	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	11,066	
Total air circulation or Design air	3.93	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW	New	Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING (SUITES)

Light Level	125	Lux	11.6	ft-candles
Floor Fraction (GLFF)	0.85			
Connected Load	6.9	W/m²	0.6	W/ft²
Occ. Period(Hrs./yr.)	2500			
Unocc. Period(Hrs./yr.)	6260			
Usage During Occupied Period	50%			
Usage During Unoccupied Period	25%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	50	100	200	300				Total
% Distribution		75%	25%					100%
Weighted Average								**125**
	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	20%	30%		50%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	1.5
	MJ/m².yr	60

SECONDARY LIGHTING

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.15			
Connected Load	15.7	W/m²	1.5	W/ft²
Occ. Period(Hrs./yr.)	3000			
Unocc. Period(Hrs./yr.)	5760			
Usage During Occupied Period	85%			
Usage During Unoccupied Period	75%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**
	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	20%	15%		55%		0%	10%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	1.5
	MJ/m².yr	58

TERTIARY LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)								Total
% Distribution								
Weighted Average								
	INC	CFL	T12	T8 Mag		MH	HPS	TOTAL
System Present (%)		0%		T8		100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 8.25 W/m²

EUI TOTAL	kWh/ft².yr	3
	MJ/m².yr	118

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.3		0.3		0.05		0.033		0.02			
Connected Load	0.3	W/m²	0.3	W/m²	0.1	W/m²	0.1	W/m²	0.1	W/m²	1.5	W/m²
	0.0	W/ft²	0.0	W/ft²	0.01	W/ft²	0.01	W/ft²	0.01	W/ft²	0.14	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		70%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		25%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2500		3000	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6260		5760	

Total end-use load (occupied period)	1.9	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	0.9	W/m²	0.1	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	48%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	0.42
		MJ/m².yr	16.11
Plug Loads	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.12

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Kitchen services

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	1.3	EUI	kWh/ft².yr	0.6
	MJ/m².yr	50.0		MJ/m².yr	25.0

REFRIGERATION

Provide description below:

Walk-in coolers/freezers, reach-in coolers/freezers, refrigerated buffet cases

EUI	kWh/ft².yr	0.4
	MJ/m².yr	15.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS: Small Accommodation Baseline | **SIZE:** < 100 kW | **VINTAGE:** New | **REGION:** Island Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)							100%	100%
Eff./COP	75%	80%	75%	3.20	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.25	1.33	0.31	0.33	0.22	1.00	

Peak Heating Load: 52.3 W/m² | 16.6 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load): 295 MJ/m².yr | 7.6 kWh/ft².yr
Sizing Factor: 1.00

Electric Fuel Share: 100.0% | Fuel Oil / Propane Fuel Share: | Oil Fuel Share:

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	7.6		7.6
MJ/m².yr	295		295

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Reciprocating Chillers Open	Reciprocating Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)					100.0%			100.0%
COP	4.7	5.4	4.4	3.5	2.9	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.29	0.34	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	13.0	55.4

Peak Cooling Load: 57 W/m² | 18 Btu/hr.ft² | 669 ft²/Ton
Seasonal Cooling Load (Tertiary Load): 67.0 MJ/m².yr | 1.7 kWh/ft².yr

Sizing Factor: 0.85 | Operation (occ. perio 4000 hrs/year | Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C): 80.0%

Electric Fuel Share: 100.0% | Fuel Oil / Propane Fuel Share:

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.7		0.7
MJ/m².yr	28		28

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)	0.00%				
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.55	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 236.6

Wetting Use Percentage: 90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	6.7	11.1	6.7
MJ/m².yr	260	430	260.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW	New	Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.9	L/s.m²	0.77	CFM/ft²
System Static Pressure CAV	300	Pa	1.2	wg
System Static Pressure VAV	300	Pa	1.2	wg
Fan Efficiency	45%			
Fan Motor Efficiency	70%			
Sizing Factor	0.50			
Fan Design Load CAV	1.9	W/m²	0.17	W/ft²
Fan Design Load VAV	1.9	W/m²	0.17	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	60%	40%	100%	
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.03	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.05	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	0.5			
Exhaust Fan Connected Load	0.2	W/m²	0.01	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.022	kW/kW	0.08	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.23	W/m²	0.11	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.003	L/s.m²	0.004	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	0.5			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.002	L/s.m²	0.0036	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.5					
Pump Connected Load	0.3	W/m²	0.03	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	12.5	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.4	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	1.3
	MJ/m².yr	51.3

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW	New	Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	22.0 kWh/ft².yr	852.7 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING (SUITES)	1.5	59.7
SECONDARY LIGHTING	1.5	58.3
TERTIARY LIGHTING		
OTHER PLUG LOADS	0.5	19.1
HVAC FANS & PUMPS	1.3	51.3
REFRIGERATION	0.4	15.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.4	16.1
COMPUTER SERVERS	0.1	3.7
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	7.6	295.1		
SPACE COOLING	0.6	22.4		
DOMESTIC HOT WATER	6.7	260.0	0.0	0.0
FOOD SERVICE EQUIPMENT	0.6	25.0		

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS: Health Care Baseline | **SIZE:** All | **VINTAGE:** New | **REGION:** Island Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.28 W/m².°C	0.05 Btu/hr.ft² .°F	Typical Building Size	8,829 m²	95,000 ft²
Roof U value (W/m².°C)	0.19 W/m².°C	0.03 Btu/hr.ft² .°F	Typical Footprint (m²)	1,400 m²	15,064 ft²
Glazing U value (W/m².°C)	2.80 W/m².°C	0.49 Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	2	
			Percent Conditioned Space	100%	
			Percent Conditioned Space Defined as Exterior Zone	45%	
Window/Wall Ratio (WIWAR) (%)	0.20		Typical # Stories	3	
Shading Coefficient (SC)	0.65		Floor to Floor Height (m)	4.3 m	14.0 ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	FCoils	IU	100% O.A	TOTAL
System Present (%)	50%				50%				100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	30 m²/person	323 ft²/person	%OA	26.49%
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period	75%			
Fresh Air Requirements or Outside Air	45 L/s.person	95 CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3): 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)
If Fresh Air Control Type = "2" enter % FA. to the right: 15%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor: 6
Total Air Circulation or Design Air Flow: 5.66 L/s.m² | 1.12 CFM/ft²

Separate Make-up air unit (100% OA): L/s.m² | CFM/ft²
Operation occupied period: 50%
Operation unoccupied period: 50%

Infiltration Rate: 0.70 L/s.m² | 0.14 CFM/ft²
(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	#######	
Peak Zone Sensible Load	379,501	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R.H	13.2	ft³/lbm
Design CFM	17,654	
Total air circulation or Design air flo	5.66	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	24	°C	75.2	°F	16.5	°C	61.7	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	24	°C	75.2	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	New	Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING (PATIENT ROOMS)

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (GLFF)	0.40			
Connected Load	10.1	W/m²	0.9	W/ft²

Occ. Period(Hrs./yr.)	8760
Unocc. Period(Hrs./yr.)	
Usage During Occupied Period	40%
Usage During Unoccupied Period	

Light Level (Lux)	50	100	200	300	Total
% Distribution				100%	100%
Weighted Average					**300**

Fixture Cleaning:
Incidence of Practice
Interval years

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	5%	10%		85%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Relamping Strategy & Incidence of Practice: Group | Spot

EUI kWh/ft².yr 1.3
MJ/m².yr 51

SECONDARY LIGHTING (NURSING STATIONS, EXAMINATION ROOMS, LABORATORIES, ICU, RECOVERY)

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.60			
Connected Load	13.3	W/m²	1.2	W/ft²

Occ. Period(Hrs./yr.)	8760
Unocc. Period(Hrs./yr.)	
Usage During Occupied Period	65%
Usage During Unoccupied Period	

Light Level (Lux)	300	500	700	1000	Total
% Distribution		100%			100%
Weighted Average					**500**

Fixture Cleaning:
Incidence of Practice
Interval years

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)		5%		90%		0%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Relamping Strategy & Incidence of Practice: Group | Spot

EUI kWh/ft².yr 4.2
EUI = Load X Hrs. X SF X GLFF
MJ/m².yr 164

TERTIARY LIGHTING (CORRIDORS, OTHER)

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	100%
Usage During Unoccupied Period	100%

Light Level (Lux)					Total
% Distribution					
Weighted Average					

Fixture Cleaning:
Incidence of Practice
Interval years

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)	5%	5%		90%			0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	88	88	65	90	

Relamping Strategy & Incidence of Practice: Group | Spot

EUI kWh/ft².yr
MJ/m².yr

TOTAL LIGHTING Overall LPD 12.02 W/m² EUI TOTAL kWh/ft².yr 6
MJ/m².yr 215

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	54.55	51	100	200	217	
Density (device/occupant)	0.48	0.48	0.02	0.02	0.04	
Connected Load	0.9 W/m²	0.8 W/m²	0.1 W/m²	0.1 W/m²	0.3 W/m²	3.85 W/m²
	0.1 W/ft²	0.1 W/ft²	0.01 W/ft²	0.01 W/ft²	0.02 W/ft²	0.36 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	90%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	25%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2600	4100
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6160	4660

Total end-use load (occupied period)	5.4 W/m²	0.5 W/ft²
Total end-use load (unocc. period)	2.2 W/m²	0.2 W/ft²

to see notes (cells with red indicator in upper right corner, type "SHIFT F2"

Computer Servers	EUI	kWh/ft².yr	0.21
		MJ/m².yr	8.10
Computer Equipment	EUI	kWh/ft².yr	0.90
		MJ/m².yr	35.00
Plug Loads	EUI	kWh/ft².yr	1.74
		MJ/m².yr	67.29

Usage during occupied period 100%
Usage during unoccupied period 40%

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: Electricity Fuel Share: 100.0%
Commercial food services

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	3.1	EUI	kWh/ft².yr	2.1
	MJ/m².yr	120.0		MJ/m².yr	80.0

REFRIGERATION

Provide description below:
Walk-in coolers/freezers, reach-in coolers/freezers, refrigerated buffet cases

EUI kWh/ft².yr 0.4
MJ/m².yr 15.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Health Care	**All**	**New**	**Island Interconnected**
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	75%	88%	95%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.14	1.05	0.59	0.33	0.22	1.00	

Peak Heating Load	39.0 W/m²	12.4	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	439 MJ/m².yr	11.3	kWh/ft².yr
Sizing Factor	1.00		

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	kWh/ft².yr	11.3
	MJ/m².yr	439
Fuel Oil / Propane EUI	kWh/ft².yr	
	MJ/m².yr	
Market Composite EUI	kWh/ft².yr	11.3
	MJ/m².yr	439

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)		50.0%			50.0%			100.0%
COP	4.7	6.1	4.4	3.6	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.16	0.23	0.28	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load	36 W/m²	11 Btu/hr.ft²	1065 ft²/Ton
Seasonal Cooling Load (Tertiary Load)	121.3 MJ/m².yr	3.1 kWh/ft².yr	

Sizing Factor 0.65 Operation (occ. perio 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 80.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	kWh/ft².yr	0.9
	MJ/m².yr	34
Fuel Oil / Propane EUI	kWh/ft².yr	
	MJ/m².yr	
Market Composite EUI	kWh/ft².yr	0.9
	MJ/m².yr	34

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	88.000	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.90	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 118.3

Wetting Use Percentage 90%

All Electric EUI	kWh/ft².yr	3.4
	MJ/m².yr	130
Fuel Oil / Propane EUI	kWh/ft².yr	3.4
	MJ/m².yr	131
Market Composite EUI	kWh/ft².yr	3.4
	MJ/m².yr	130.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	New	Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	5.7	L/s.m²	1.12	CFM/ft²
System Static Pressure CAV	875	Pa	3.5	wg
System Static Pressure VAV	875	Pa	3.5	wg
Fan Efficiency	55%			
Fan Motor Efficiency	89%			
Sizing Factor	1.00			
Fan Design Load CAV	10.1	W/m²	0.94	W/ft²
Fan Design Load VAV	10.1	W/m²	0.94	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	80%	20%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.03	CFM/ft²
Other Exhaust (Smoking/Conference)	0.5	L/s.m²	0.10	CFM/ft²
Total Building Exhaust	0.6	L/s.m²	0.13	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.9	W/m²	0.08	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.017	kW/kW	0.06	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.59	W/m²	0.05	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.002	L/s.m²	0.003	U.S. gpm/ft²
Pump Head Pressure	100	kPa	33	ft
Pump Efficiency	60%			
Pump Motor Efficiency	88%			
Sizing Factor	1.0			
Pump Connected Load	0.36	W/m²	0.03	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.002	L/s.m²	0.0023	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	60%					
Pump Motor Efficiency	88%					
Sizing Factor	0.8					
Pump Connected Load	0.2	W/m²	0.02	W/ft²		

Supply Fan Occ. Period	4000	hrs./year
Supply Fan Unocc. Period	4760	hrs./year
Supply Fan Energy Consumption	71.1	kWh/m².yr
Exhaust Fan Occ. Period	4000	hrs./year
Exhaust Fan Unocc. Period	4760	hrs./year
Exhaust Fan Energy Consumption	6.5	kWh/m².yr
Condenser Pump Energy Consumption	0.4	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.5	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	7.3
	MJ/m².yr	282.7

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	New	Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	34.9	kWh/ft².yr	1,350.6	MJ/m².yr	Fuel Oil / Propane:	0.0	kWh/ft².yr	0.0	MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING (PATIENT RO	1.3	51.0
SECONDARY LIGHTING (NURSING	4.2	163.6
TERTIARY LIGHTING (CORRIDORS		
OTHER PLUG LOADS	1.7	67.3
HVAC FANS & PUMPS	7.3	282.7
REFRIGERATION	0.4	15.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.9	35.0
COMPUTER SERVERS	0.2	8.1
ELEVATORS	0.2	7.7
OUTDOOR LIGHTING	0.9	34.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	11.3	438.5		
SPACE COOLING	0.7	26.8		
DOMESTIC HOT WATER	3.4	130.0	0.0	0.0
FOOD SERVICE EQUIPMENT	2.1	80.0		

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS: School
Baseline
SIZE: All
VINTAGE: New
REGION: Island Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.28 W/m².°C	0.05 Btu/hr.ft² .°F	Typical Building Size	3,717 m² / 40,000 ft²
Roof U value (W/m².°C)	0.19 W/m².°C	0.03 Btu/hr.ft² .°F	Typical Footprint (m²)	2,300 m² / 24,748 ft²
Glazing U value (W/m².°C)	2.80 W/m².°C	0.49 Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	5
			Percent Conditioned Space	100%
			Percent Conditioned Space Defined as Exterior Zone	50%
Window/Wall Ratio (WIWAR) (%)	0.15			
Shading Coefficient (SC)	0.65		Typical # Stories	1
			Floor to Floor Height (m)	3.7 m / 12.2 ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	90%				10%				100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	10 m²/person	108 ft²/person	%OA 8.81%
Occupancy Schedule Occ. Period	90%		
Occupancy Schedule Unocc. Period			
Fresh Air Requirements or Outside Air	3 L/s.person	6 CFM/person	

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)
If Fresh Air Control Type = "2" enter % FA. to the right: 34%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation 0.5 L/s.m² 0.10 CFM/ft²
50% operation (%)

Sizing Factor	2.5	
Total Air Circulation or Design Air Flow	3.41 L/s.m²	0.67 CFM/ft²
Infiltration Rate	0.42 L/s.m²	0.08 CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA) L/s.m² CFM/ft²
Operation occupied period 50%
Operation unoccupied period 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	418,815	
Peak Zone Sensible Load	230,702	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	10,732	
Total air circulation or Design air	3.41	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	21	°C	69.8	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	19.5	°C	67.1	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
School	All	New	Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.85			
Connected Load	12.9	W/m²	1.2	W/ft²
Occ. Period(Hrs./yr.)	2000			
Unocc. Period(Hrs./yr.)	6760			
Usage During Occupied Period	85%			
Usage During Unoccupied Period	15%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				100%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI		
	kWh/ft².yr	2.8
	MJ/m².yr	107

SECONDARY LIGHTING

Light Level	400	Lux	37.2	ft-candles
Floor Fraction (ALFF)	0.15			
Connected Load	14.1	W/m²	1.3	W/ft²
Occ. Period(Hrs./yr.)	2000			
Unocc. Period(Hrs./yr.)	6760			
Usage During Occupied Period	90%			
Usage During Unoccupied Period	15%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	400	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**400**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	5%	20%		10%	20%	30%	15%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI		
	kWh/ft².yr	0.6
	MJ/m².yr	21

TERTIARY LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	2500			
Unocc. Period(Hrs./yr.)	6260			
Usage During Occupied Period	100%			
Usage During Unoccupied Period				
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)								Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI		
	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 13.09 W/m²

EUI TOTAL		
	kWh/ft².yr	3
	MJ/m².yr	129

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.05		0.05		0.02		0.02		0.01			
Connected Load	0.3	W/m²	0.3	W/m²	0.2	W/m²	0.4	W/m²	0.1	W/m²	0.2	W/m²
	0.0	W/ft²	0.0	W/ft²	0.02	W/ft²	0.04	W/ft²	0.01	W/ft²	0.02	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		100%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		50%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2000		3000	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6760		5760	

Total end-use load (occupied period)	1.3 W/m²	0.1 W/ft²		
Total end-use load (unocc. period)	0.8 W/m²	0.1 W/ft²		
Usage during occupied period	100%			
Usage during unoccupied period	59%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

	EUI		
Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	0.54
		MJ/m².yr	21.01
Plug Loads	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.23

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Cafeteria

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	0.2	EUI	kWh/ft².yr	0.1
	MJ/m².yr	8.0		MJ/m².yr	4.0

REFRIGERATION

Provide description below:

Unknown

EUI		
	kWh/ft².yr	0.1
	MJ/m².yr	3.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	3

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS: School Baseline | **SIZE:** All | **VINTAGE:** New | **REGION:** Island Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)							100%	100%
Eff./COP	73%	83%	75%	2.60	3.10	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.37	1.20	1.33	0.38	0.32	0.22	1.00	

Peak Heating Load	46.7	W/m²	14.8	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	240	MJ/m².yr	6.2	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	6.2		6.2
MJ/m².yr	240		240

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Reciprocating Chillers Open	Reciprocating Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)					100.0%			100.0%
COP	2.5	5.4	4.4	3.6	3	0.9	1	
Performance (1 / COP) (kW/kW)	0.40	0.19	0.23	0.28	0.33	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	33	W/m²	10	Btu/hr.ft²	1146	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	97.7	MJ/m².yr	2.5	kWh/ft².yr		

Sizing Factor 1.00 Operation (occ. perio 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 10.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	1.1		1.1
MJ/m².yr	41		41

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.90	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 17.3

Wetting Use Percentage 90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.5	0.5	0.5
MJ/m².yr	19	19	19.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
School	All	New	Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.4	L/s.m²	0.67	CFM/ft²
System Static Pressure CAV	300	Pa	1.2	wg
System Static Pressure VAV	300	Pa	1.2	wg
Fan Efficiency	60%			
Fan Motor Efficiency	88%			
Sizing Factor	1.00			
Fan Design Load CAV	1.9	W/m²	0.18	W/ft²
Fan Design Load VAV	1.9	W/m²	0.18	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	25%	75%	25%	75%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.02	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.04	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.66	W/m²	0.06	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.002	L/s.m²	0.003	U.S. gpm/ft²
Pump Head Pressure	45	kPa	15	ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load	0.20	W/m²	0.02	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.001	L/s.m²	0.0021	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.3	W/m²	0.03	W/ft²		

Supply Fan Occ. Period	2000	hrs./year
Supply Fan Unocc. Period	6760	hrs./year
Supply Fan Energy Consumption	7.1	kWh/m².yr
Exhaust Fan Occ. Period	2000	hrs./year
Exhaust Fan Unocc. Period	6760	hrs./year
Exhaust Fan Energy Consumption	0.9	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.6	kWh/m².yr
Circulating Pump Yearly Operation	3000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	0.8
	MJ/m².yr	31.3

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
School	All	New	Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	12.4 kWh/ft².yr	478.8 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	2.8	107.3
SECONDARY LIGHTING	0.6	21.4
TERTIARY LIGHTING		
OTHER PLUG LOADS	0.1	4.2
HVAC FANS & PUMPS	0.8	31.3
REFRIGERATION	0.1	3.0
MISCELLANEOUS	0.1	3.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.5	21.0
COMPUTER SERVERS	0.1	3.7
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	6.2	239.8		
SPACE COOLING	0.1	4.1		
DOMESTIC HOT WATER	0.5	19.0	0.0	0.0
FOOD SERVICE EQUIPMENT	0.1	4.0		

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
University/College	All	New	Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	6,506	m²	70,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	4,500	m²	48,420	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	7			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	50%			
Window/Wall Ratio (WIWAR) (%)	0.30								
Shading Coefficient (SC)	0.65				Typical # Stories	2			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	50%				50%				100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	14	m²/person	151	ft²/person
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	10	L/s.person	21	CFM/person

%OA 14.20%

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 34%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation 0.5 L/s.m² 0.10 CFM/ft²
50% operation (%)

Sizing Factor	1.6			
Total Air Circulation or Design Air Flow	5.03	L/s.m²	0.99	CFM/ft²
Infiltration Rate	0.40	L/s.m²	0.08	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA) L/s.m² CFM/ft²
Operation occupied period 50%
Operation unoccupied period 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	#######	
Peak Zone Sensible Load	931,391	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	43,328	
Total air circulation or Design air	5.03	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	22	°C	71.6	°F	16	°C	60.8	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
University/College	All	New	Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500 Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.90		
Connected Load	11.9 W/m²	1.1	W/ft²

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	90%
Usage During Unoccupied Period	20%

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				95%	5%	0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	4.5
	MJ/m².yr	175

SECONDARY LIGHTING

Light Level	300 Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.10		
Connected Load	8.5 W/m²	0.8	W/ft²

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	100%
Usage During Unoccupied Period	50%

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)		15%		80%		0%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.5
	MJ/m².yr	20

TERTIARY LIGHTING

Light Level	Lux		ft-candles
Floor Fraction (HBLFF)			
Connected Load	W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

Light Level (Lux)						Total
% Distribution						
Weighted Average						

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING Overall LP 11.56 W/m²

EUI TOTAL	kWh/ft².yr	5
	MJ/m².yr	195

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	54.55		51		100		200		217			
Density (device/occupant)	0.31		0.31		0.02		0.02		0.01			
Connected Load	1.2	W/m²	1.1	W/m²	0.1	W/m²	0.3	W/m²	0.1	W/m²	1.3	W/m²
	0.1	W/ft²	0.1	W/ft²	0.01	W/ft²	0.03	W/ft²	0.01	W/ft²	0.12	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		100%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		50%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2600		2000	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6160		6760	

Total end-use load (occupied period)	3.9 W/m²	0.4 W/ft²		
Total end-use load (unocc. period)	2.2 W/m²	0.2 W/ft²		
Usage during occupied period	100%			
Usage during unoccupied period	55%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	1.34
		MJ/m².yr	51.73
Plug Loads	EUI	kWh/ft².yr	0.65
		MJ/m².yr	25.18

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	0.5	EUI	kWh/ft².yr	0.4
	MJ/m².yr	20.0		MJ/m².yr	15.0

REFRIGERATION

Provide description below:
Unknown

EUI	kWh/ft².yr	0.5
	MJ/m².yr	20.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
University/College	**All**	**New**	**Island Interconnected**
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	75%	83%	95%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.20	1.05	0.59	0.33	0.22	1.00	

Peak Heating Load	37.8	W/m²	12.0	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	192	MJ/m².yr	5.0	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	5.0
MJ/m².yr	192

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	5.0
MJ/m².yr	192

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)		25.0%			75.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	105	W/m²	33	Btu/hr.ft²	359	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	128.2	MJ/m².yr	3.3	kWh/ft².yr		

Sizing Factor 1.00 Operation (occ. perio 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 70.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	1.5
MJ/m².yr	59

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	1.5
MJ/m².yr	59

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.90		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 22.8

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	0.6
MJ/m².yr	25

Fuel Oil / Propane EUI	
kWh/ft².yr	0.7
MJ/m².yr	25

Market Composite EUI	
kWh/ft².yr	0.6
MJ/m².yr	25.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS: University/College Baseline | **SIZE:** All | **VINTAGE:** New | **REGION:** Island Interconnected

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	5.0	L/s.m²	0.99	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	7.9	W/m²	0.73	W/ft²
Fan Design Load VAV	7.9	W/m²	0.73	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	50%	50%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	50%	50%	50%	50%

Comments:

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.0	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.1	L/s.m²	0.03	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	2.11	W/m²	0.20	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.006	L/s.m²	0.008	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.005	L/s.m²	0.0067	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	50	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.9	W/m²	0.08	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	37.3	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.2	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.8	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI	kWh/ft².yr	3.6
	MJ/m².yr	141.3

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
University/College	All	New	Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	19.1 kWh/ft².yr	741.4 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	4.5	175.5
SECONDARY LIGHTING	0.5	19.6
TERTIARY LIGHTING		
OTHER PLUG LOADS	0.7	25.2
HVAC FANS & PUMPS	3.6	141.3
REFRIGERATION	0.5	20.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	1.3	51.7
COMPUTER SERVERS	0.1	3.7
ELEVATORS	0.1	3.9
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	5.0	192.0		
SPACE COOLING	1.1	41.6		
DOMESTIC HOT WATER	0.6	25.0	0.0	0.0
FOOD SERVICE EQUIPMENT	0.4	15.0		

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All	New	Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	3,253	m²	35,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	3,253	m²	35,000	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	40%			
Window/Wall Ratio (WIWAR) (%)	0.05								
Shading Coefficient (SC)	0.80				Typical # Stories	1			
					Floor to Floor Height (m)	6.1	m	19.9	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	100	m²/person	1076	ft²/person	%OA	14.56%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3): 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right:
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² 0.10 CFM/ft²; 50% operation (%)

Sizing Factor	1			
Total Air Circulation or Design Air Flow	1.37	L/s.m²	0.27	CFM/ft²

Separate Make-up air unit (100% OA): L/s.m² CFM/ft²
Operation occupied period: 50%
Operation unoccupied period: 50%

Infiltration Rate: 0.40 L/s.m² 0.08 CFM/ft²
(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	338,507	
Peak Zone Sensible Load	203,450	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	9,464	
Total air circulation or Design air	1.37	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	16	°C	60.8	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All	New	Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	400	Lux	37.2	ft-candles
Floor Fraction (GLFF)	0.95			
Connected Load	9.7	W/m²	0.9	W/ft²

Occ. Period(Hrs./yr.)	3500	Light Level (Lux)	300	500	700	1000				Total
Unocc. Period(Hrs./yr.)	5260	% Distribution	50%	50%						100%
Usage During Occupied Period	100%	Weighted Average								**400**
Usage During Unoccupied Period	15%									
			INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
Fixture Cleaning:		System Present (%)				15%	50%	35%		100.0%
Incidence of Practice		CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
Interval	years	LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
		Efficacy (L/W)	15	50	72	88	65	95	90	

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	3.7
	MJ/m².yr	142

SECONDARY LIGHTING

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.05			
Connected Load	10.1	W/m²	0.9	W/ft²

Occ. Period(Hrs./yr.)	3000	Light Level (Lux)	300	500	700	1000				Total
Unocc. Period(Hrs./yr.)	5760	% Distribution	100%							100%
Usage During Occupied Period	100%	Weighted Average								**300**
Usage During Unoccupied Period	15%									
			INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
Fixture Cleaning:		System Present (%)	5%	10%		85%		0%	0%	100.0%
Incidence of Practice		CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
Interval	years	LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
		Efficacy (L/W)	15	50	72	88	65	95	90	

Relamping Strategy & Incidence of Practice: Group | Spot

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.2
	MJ/m².yr	7

TERTIARY LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000	Light Level (Lux)	300	500	700	1000				Total
Unocc. Period(Hrs./yr.)	4760	% Distribution								
Usage During Occupied Period	0%	Weighted Average								
Usage During Unoccupied Period	100%									
			INC	CFL	T12	T8		MH	HPS	TOTAL
Fixture Cleaning:		System Present (%)		0%					0%	0.0%
Incidence of Practice		CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
Interval	years	LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
		Efficacy (L/W)	15	50	72	84	88	65	90	

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 9.71 W/m²

EUI TOTAL	kWh/ft².yr	3.9
	MJ/m².yr	149

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	54.55	51	100	200	217	
Density (device/occupant)	0.59	0.59	0.03	0.03	0.06	
Connected Load	0.3 W/m²	0.3 W/m²	0.0 W/m²	0.1 W/m²	0.1 W/m²	2 W/m²
	0.0 W/ft²	0.0 W/ft²	0.00 W/ft²	0.01 W/ft²	0.01 W/ft²	0.19 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	90%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	25%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	3500
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	5260

Total end-use load (occupied period)	2.6 W/m²	0.2 W/ft²
Total end-use load (unocc. period)	1.0 W/m²	0.1 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	39%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.34
		MJ/m².yr	13.30
Plug Loads	EUI	kWh/ft².yr	0.83
		MJ/m².yr	32.15

FOOD SERVICE EQUIPMENT

Provide description below:

Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr		EUI	kWh/ft².yr	
	MJ/m².yr			MJ/m².yr	

REFRIGERATION

Provide description below:

Large refrigeration storage

EUI	kWh/ft².yr	1.5
	MJ/m².yr	60.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	
		MJ/m².yr	
Miscellaneous	EUI	kWh/ft².yr	0.3
		MJ/m².yr	10

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All	New	Island Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Hot Water System: Boiler	Unit Heater	Packaged Rooftop	A/A HP	W. S. HP	H/R Chiller	Electric Resistance	Total
System Present (%)							100%	100%
Eff./COP	75%	75%	95%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.33	1.05	0.59	0.33	0.22	1.00	

Peak Heating Load: 34.0 W/m² — 10.8 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load): 196 MJ/m².yr — 5.0 kWh/ft².yr
Sizing Factor: 1.00

Electric Fuel Share: 100.0% — Fuel Oil / Propane Fuel Share: — Oil Fuel Share:

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	5.0		5.0
MJ/m².yr	196		196

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Reciprocating Chillers Open	Reciprocating Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)					100.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.9	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.34	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	13.0	55.4

Peak Cooling Load: 30 W/m² — 10 Btu/hr.ft² — 1241 ft²/Ton
Seasonal Cooling Load (Tertiary Load): 43.3 MJ/m².yr — 1.1 kWh/ft².yr

Sizing Factor: 1.00 — Operation (occ. perio 4000 hrs/year — Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C): 10.0%

Electric Fuel Share: 100.0% — Fuel Oil / Propane Fuel Share:

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.5		0.5
MJ/m².yr	18		18

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.90	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 18.2

Wetting Use Percentage: 90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.5	0.5	0.5
MJ/m².yr	20	20	20.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All	New	Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	1.4	L/s.m²	0.27	CFM/ft²
System Static Pressure CAV	300	Pa	1.2	wg
System Static Pressure VAV	300	Pa	1.2	wg
Fan Efficiency	60%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	0.9	W/m²	0.08	W/ft²
Fan Design Load VAV	0.9	W/m²	0.08	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	50%	50%	50%	50%

Comments:

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.03	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.61	W/m²	0.06	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.002	L/s.m²	0.002	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.001	L/s.m²	0.0019	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure		kPa		ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load		W/m²		W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	5.3	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.3	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.3	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI	kWh/ft².yr	0.6
	MJ/m².yr	24.6

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All	New	Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	13.6 kWh/ft².yr	527.9 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	3.7	142.1
SECONDARY LIGHTING	0.2	7.0
TERTIARY LIGHTING		
OTHER PLUG LOADS	0.8	32.1
HVAC FANS & PUMPS	0.6	24.6
REFRIGERATION	1.5	60.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.3	13.3
COMPUTER SERVERS	0.1	4.4
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	5.0	195.5		
SPACE COOLING	0.0	1.8		
DOMESTIC HOT WATER	0.5	20.0	0.0	0.0
FOOD SERVICE EQUIPMENT				

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All	New	Island Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.38	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Building Size	929	m²	10,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	929	m²	10,000	ft²
Glazing U value (W/m².°C)	3.52	W/m².°C	0.62	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.36								
Shading Coefficient (SC)	0.58				Typical # Stories	1			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	60%							40%	100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	20	m²/person	215	ft²/person
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person

%OA 29.87%

Fresh Air Control Type *(enter a 1, 2 or 3): 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right:
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: L/s.m² CFM/ft² operation (%)

Sizing Factor	1.3			
Total Air Circulation or Design Air Flow	3.35	L/s.m²	0.66	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)	L/s.m²	CFM/ft²
Operation occupied period	50%	
Operation unoccupied period	50%	

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	301,959	
Peak Zone Sensible Load	109,020	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	5,072	
Total air circulation or Design air	3.35	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				98%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All	New	Island Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	400	Lux	37.2	ft-candles
Floor Fraction (GLFF)	0.50			
Connected Load	10.3	W/m²	1.0	W/ft²
Occ. Period(Hrs./yr.)	4300			
Unocc. Period(Hrs./yr.)	4460			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	10%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

								Total
Light Level (Lux)	450	550	650					
% Distribution	10%	80%	10%					100%
Weighted Average								**550**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				100.0%				100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI kWh/ft².yr 2.3; MJ/m².yr 88

ARCHITECTURAL LIGHTING

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.50			
Connected Load	21.2	W/m²	2.0	W/ft²
Occ. Period(Hrs./yr.)	4300			
Unocc. Period(Hrs./yr.)	4460			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	10%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

								Total
Light Level (Lux)	200	300	400	500				
% Distribution	10%	40%	40%	10%				100%
Weighted Average								**350**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	30%	50%					20%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	84	65	95	90	

EUI kWh/ft².yr 4.7; MJ/m².yr 181

EUI = Load X Hrs. X SF X GLFF

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	2500			
Unocc. Period(Hrs./yr.)	6260			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 — 1.00

								Total
Light Level (Lux)	300	500	700	1000				
% Distribution								
Weighted Average								

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	84	65	95	90	

EUI kWh/ft².yr; MJ/m².yr

TOTAL LIGHTING — Overall LP 15.75 W/m² — EUI TOTAL kWh/ft².yr 7; MJ/m².yr 269

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.16	0.16	0.01		0.03	
Connected Load (W/m²)	0.4	0.4	0.1		0.1	1.15
Connected Load (W/ft²)	0.0	0.0	0.00		0.01	0.11
Diversity Occupied Period	80%	80%	80%	80%	100%	80%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	2500
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	6260

Total end-use load (occupied period)	1.8	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	1.2	W/m²	0.1	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	65%			

		kWh/ft².yr	MJ/m².yr
Computer Servers	EUI	0.11	4.42
Computer Equipment	EUI	0.41	16.00
Plug Loads	EUI	0.55	21.24

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: 2.0% Electricity Fuel Share: 98.0%

Lunch room/cafeteria/restaurant

	Fuel Oil / Propane EUI	All Electric EUI
EUI kWh/ft².yr	0.1	34.3
MJ/m².yr	5.0	1330.0

REFRIGERATION

Provide description below:

Lunch room/cafeteria/restaurant

EUI kWh/ft².yr 16.8; MJ/m².yr 650.0

BLOCK HEATERS & MISCELLANEOUS

		kWh/ft².yr	MJ/m².yr
Block Heaters	EUI		
Miscellaneous	EUI	0.3	10

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All	New	Island Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				Total
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load	59.0	W/m²		18.7	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	742	MJ/m².yr		19.1	kWh/ft².yr
Sizing Factor	1.00				

Electric Fuel Share: 100.0% Fuel Oil / Propane Fuel Share: Oil Fuel Share:

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	19.1
MJ/m².yr	742

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	19.1
MJ/m².yr	742

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		WSHP	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE		Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	3.5	3.5	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.29	0.29	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load	95	W/m²	30	Btu/hr.ft²	397	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	107.4	MJ/m².yr	2.8	kWh/ft².yr		

Sizing Factor: 1.00 Operation (occ. period): 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C): 90.0%

Electric Fuel Share: 100.0% Fuel Oil / Propane Fuel Share:

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	1.2
MJ/m².yr	47

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	1.2
MJ/m².yr	47

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Tank				Boiler
System Present (%)					0%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 700.0

Wetting Use Percentage: 90%

All Electric EUI	
kWh/ft².yr	19.9
MJ/m².yr	769

Fuel Oil / Propane EUI	
kWh/ft².yr	24.1
MJ/m².yr	933

Market Composite EUI	
kWh/ft².yr	19.9
MJ/m².yr	769.2

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All	New	Island Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.3	L/s.m²	0.66	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	1.00			
Fan Design Load CAV	5.7	W/m²	0.53	W/ft²
Fan Design Load VAV	5.7	W/m²	0.53	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	60%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	90%	10%	90%	10%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.04	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.06	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	40%			
Fan Motor Efficiency	80%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.87	W/m²	0.17	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.005	L/s.m²	0.007	U.S. gpm/ft²
Pump Head Pressure	90	kPa	30	ft
Pump Efficiency	55%			
Pump Motor Efficiency	90%			
Sizing Factor	1.0			
Pump Connected Load	0.92	W/m²	0.09	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0060	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	150	kPa	50	ft		
Pump Efficiency	55%					
Pump Motor Efficiency	90%					
Sizing Factor	0.5					
Pump Connected Load	0.6	W/m²	0.06	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	28.1	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	2.0	kWh/m².yr
Condenser Pump Energy Consumption	0.4	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.6	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI	kWh/ft².yr	2.9
	MJ/m².yr	111.9

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All	New	Island Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **102.1** kWh/ft².yr **3,955.9** MJ/m².yr **Fuel Oil / Propane:** **0.0** kWh/ft².yr **0.1** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	2.3	88.3
ARCHITECTURAL LIGHTING	4.7	180.8
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.5	21.2
HVAC FANS & PUMPS	2.9	111.9
REFRIGERATION	16.8	650.0
MISCELLANEOUS	0.3	10.0
BLOCK HEATERS		
COMPUTER EQUIPMENT	0.4	16.0
COMPUTER SERVERS	0.1	4.4
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	19.1	741.5		
SPACE COOLING	1.1	42.2		
DOMESTIC HOT WATER	19.9	769.2	0.0	0.0
FOOD SERVICE EQUIPMENT	33.6	1,303.4	0.0	0.1

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW	New	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.42	W/m².°C	0.07	Btu/hr.ft² .°F
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F
Window/Wall Ratio (WIWAR) (%)	0.60			
Shading Coefficient (SC)	0.58			

Typical Building Size	929	m²	10,000	ft²
Typical Footprint (m²)	465	m²	5,000	ft²
Footprint Aspect Ratio (L:W)	1			
Percent Conditioned Space	100%			
Percent Conditioned Space Defined as Exterior Zone	45%			
Typical # Stories	2			
Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	50%				50%				100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	26	m²/person	274	ft²/person
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	8	L/s.person	16	CFM/person

%OA 5.35%

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)
If Fresh Air Control Type = "2" enter % FA. to the right:
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation — L/s.m² — CFM/ft² — operation (%)

Sizing Factor	1.5			
Total Air Circulation or Design Air Flow	5.50	L/s.m²	1.08	CFM/ft²
Infiltration Rate	0.40	L/s.m²	0.08	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²	CFM/ft²
Operation occupied period	50%		
Operation unoccupied period	50%		

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	217,193	
Peak Zone Sensible Load	155,218	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	7,221	
Total air circulation or Design air	5.50	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				98%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	23	°C	73.4	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	23	°C	73.4	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS: Large Office Baseline | **SIZE:** > 100 kW | **VINTAGE:** New | **REGION:** Labrador Interconnected

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.90			
Connected Load	12.9	W/m²	1.2	W/ft²
Occ. Period(Hrs./yr.)	3300			
Unocc. Period(Hrs./yr.)	5460			
Usage During Occupied Period	95%			
Usage During Unoccupied Period	20%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				100%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI kWh/ft².yr 4.6; MJ/m².yr 177

ARCHITECTURAL LIGHTING

Light Level	350	Lux	32.5	ft-candles
Floor Fraction (ALFF)	0.10			
Connected Load	12.9	W/m²	1.2	W/ft²
Occ. Period(Hrs./yr.)	3400			
Unocc. Period(Hrs./yr.)	5360			
Usage During Occupied Period	95%			
Usage During Unoccupied Period	40%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	200	300	400	500				Total
% Distribution	10%	40%	40%	10%				100%
Weighted Average								**350**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	5%	30%		40%	5%	15%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI kWh/ft².yr 0.6; MJ/m².yr 25

EUI = Load X Hrs. X SF X GLFF

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 — 1.00

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI kWh/ft².yr; MJ/m².yr

TOTAL LIGHTING — Overall LP 12.92 W/m² — EUI TOTAL kWh/ft².yr 5; MJ/m².yr 202

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	50	
Density (device/occupant)	0.9	0.9	0.15	0.1	0.26	
Connected Load (W/m²)	1.9	1.8	0.6	0.8	0.5	1.5
Connected Load (W/ft²)	0.2	0.2	0.05	0.07	0.05	0.14
Diversity Occupied Period	80%	80%	80%	80%	100%	80%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	2500
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	6260

Total end-use load (occupied period)	5.8	W/m²	0.5	W/ft²
Total end-use load (unocc. period)	3.8	W/m²	0.4	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	66%			

Computer Servers	EUI	kWh/ft².yr	0.42
		MJ/m².yr	16.20
Computer Equipment	EUI	kWh/ft².yr	2.36
		MJ/m².yr	91.24
Plug Loads	EUI	kWh/ft².yr	0.72
		MJ/m².yr	27.70

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: — Electricity Fuel Share: 100.0%

Lunch room/cafeteria/restaurant

	Fuel Oil / Propane EUI	All Electric EUI
EUI kWh/ft².yr	0.1	0.10
MJ/m².yr	5.0	4.00

REFRIGERATION

Provide description below:

Lunch room/cafeteria/restaurant

EUI kWh/ft².yr 0.10; MJ/m².yr 4.00

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.13
		MJ/m².yr	5.00
Miscellaneous	EUI	kWh/ft².yr	0.13
		MJ/m².yr	5.00

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW	New	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	70%	80%	75%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.33	0.59	0.33	0.22	1.00	

Peak Heating Load	89.6	W/m²	28.4	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	801	MJ/m².yr	20.7	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	20.7
MJ/m².yr	801

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	20.7
MJ/m².yr	801

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		WSHP	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE		Open	DX	W. H.	CW	
System Present (%)		20.0%			80.0%			100.0%
COP	4.7	5.4	3.5	3.5	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.29	0.29	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load	68	W/m²	22	Btu/hr.ft²	553	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	92.9	MJ/m².yr	2.4	kWh/ft².yr		

Sizing Factor 1.00 Operation (occ. period) 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 90.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.9
MJ/m².yr	36

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.9
MJ/m².yr	36

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.90	0.94

Service Hot Water load (MJ/m².yr) (Tertiary Load) 22.8

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	0.6
MJ/m².yr	24

Fuel Oil / Propane EUI	
kWh/ft².yr	0.7
MJ/m².yr	25

Market Composite EUI	
kWh/ft².yr	0.6
MJ/m².yr	24.2

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Office	> 100 kW	New	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	5.5	L/s.m²	1.08	CFM/ft²
System Static Pressure CAV	500	Pa	2.0	wg
System Static Pressure VAV	500	Pa	2.0	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	1.00			
Fan Design Load CAV	6.2	W/m²	0.58	W/ft²
Fan Design Load VAV	6.2	W/m²	0.58	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	50%	50%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.4	L/s.m²	0.08	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.5	L/s.m²	0.10	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	40%			
Fan Motor Efficiency	80%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.4	W/m²	0.04	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.018	kW/kW	0.06	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.23	W/m²	0.11	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.004	L/s.m²	0.005	U.S. gpm/ft²
Pump Head Pressure	100	kPa	33.333333	ft
Pump Efficiency	55%			
Pump Motor Efficiency	90%			
Sizing Factor	1.0			
Pump Connected Load	0.73	W/m²	0.07	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0043	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	150	kPa	50	ft		
Pump Efficiency	55%					
Pump Motor Efficiency	90%					
Sizing Factor	0.5					
Pump Connected Load	0.4	W/m²	0.04	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	37.7	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	3.1	kWh/m².yr
Condenser Pump Energy Consumption	0.7	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.5	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	3.9
	MJ/m².yr	151.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Large Office	**> 100 kW**	**New**	**Labrador Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	**Electricity:**	**35.6**	kWh/ft².yr	**1,379.9**	MJ/m².yr	**Fuel Oil / Propane:**	**0.0** kWh/ft².yr	**0.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr	**END USE:**	Electricity kWh/ft².yr	Electricity MJ/m².yr	Fuel Oil / Propane kWh/ft².yr	Fuel Oil / Propane MJ/m².yr
GENERAL LIGHTING	4.6	176.9					
ARCHITECTURAL LIGHTING	0.6	25.0	SPACE HEATING	20.7	800.5		
SPECIAL PURPOSE LIGHTING			SPACE COOLING	0.8	32.1		
OTHER PLUG LOADS	0.7	27.7	DOMESTIC HOT WATER	0.6	24.2	0.0	0.0
HVAC FANS & PUMPS	3.9	151.0	FOOD SERVICE EQUIPMENT	0.1	4.0		
REFRIGERATION	0.1	4.0					
MISCELLANEOUS	0.1	5.0					
BLOCK HEATERS	0.1	5.0					
COMPUTER EQUIPMENT	2.4	91.2					
COMPUTER SERVERS	0.4	16.2					
ELEVATORS							
OUTDOOR LIGHTING	0.4	17.0					

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	New	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.42	W/m².°C	0.07	Btu/hr.ft² .°F	Typical Building Size	929	m²	10,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	465	m²	5,000	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.35								
Shading Coefficient (SC)	0.58				Typical # Stories	1			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	26	m²/person	274	ft²/person	%OA	12.79%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	8	L/s.person	16	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right: |
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | L/s.m² | | CFM/ft² | operation (%)

Sizing Factor	1.5			
Total Air Circulation or Design Air Flow	2.30	L/s.m²	0.45	CFM/ft²
Infiltration Rate	0.40	L/s.m²	0.08	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	95,876	
Peak Zone Sensible Load	64,888	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	3,019	
Total air circulation or Design air	2.30	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				98%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	23	°C	73.4	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	23	°C	73.4	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	New	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.95			
Connected Load	12.9	W/m²	1.2	W/ft²

Occ. Period(Hrs./yr.)	2500
Unocc. Period(Hrs./yr.)	6260
Usage During Occupied Period	95%
Usage During Unoccupied Period	20%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				100%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	4.1
	MJ/m².yr	160

ARCHITECTURAL LIGHTING

Light Level	350	Lux	32.5	ft-candles
Floor Fraction (ALFF)	0.05			
Connected Load	12.9	W/m²	1.2	W/ft²

Occ. Period(Hrs./yr.)	2500
Unocc. Period(Hrs./yr.)	6260
Usage During Occupied Period	95%
Usage During Unoccupied Period	40%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	200	300	400	500				Total
% Distribution	10%	40%	40%	10%				100%
Weighted Average								**350**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	5%	30%		40%	5%	15%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.3
	MJ/m².yr	11

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 12.92 W/m²

EUI TOTAL	kWh/ft².yr	4
	MJ/m².yr	172

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	50	
Density (device/occupant)	0.9	0.9	0.15	0.1	0.26	
Connected Load (W/m²)	1.9	1.8	0.6	0.8	0.5	1.5
Connected Load (W/ft²)	0.2	0.2	0.05	0.07	0.05	0.14
Diversity Occupied Period	80%	80%	80%	80%	100%	80%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	2500
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	6260

Total end-use load (occupied period)	5.8	W/m²	0.5	W/ft²
Total end-use load (unocc. period)	3.8	W/m²	0.4	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	66%			

Computer Servers	EUI	kWh/ft².yr	0.42
		MJ/m².yr	16.20
Computer Equipment	EUI	kWh/ft².yr	2.36
		MJ/m².yr	91.24
Plug Loads	EUI	kWh/ft².yr	0.72
		MJ/m².yr	27.70

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr		EUI	kWh/ft².yr	
	MJ/m².yr			MJ/m².yr	

REFRIGERATION

Provide description below:

EUI	kWh/ft².yr	
	MJ/m².yr	

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.13
		MJ/m².yr	5.00
Miscellaneous	EUI	kWh/ft².yr	0.13
		MJ/m².yr	5.00

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	New	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				Total
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	70%	80%	75%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.33	0.59	0.33	0.22	1.00	

Peak Heating Load	69.3	W/m²	22.0	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	615	MJ/m².yr	15.9	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	15.9		15.9
MJ/m².yr	615		615

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		WSHP	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE		Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	3.5	3.5	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.29	0.29	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load	30	W/m²	10	Btu/hr.ft²	1252	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	69.8	MJ/m².yr	1.8	kWh/ft².yr		

Sizing Factor 1.00 Operation (occ. period) 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 90.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.7		0.7
MJ/m².yr	26		26

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.90	0.94

Service Hot Water load (MJ/m².yr) (Tertiary Load) 22.8

Wetting Use Percentage 90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.6	0.7	0.6
MJ/m².yr	24	25	24.2

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	New	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	2.3	L/s.m²	0.45	CFM/ft²
System Static Pressure CAV	500	Pa	2.0	wg
System Static Pressure VAV	500	Pa	2.0	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	0.50			
Fan Design Load CAV	1.3	W/m²	0.12	W/ft²
Fan Design Load VAV	1.3	W/m²	0.12	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.4	L/s.m²	0.08	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.5	L/s.m²	0.10	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	40%			
Fan Motor Efficiency	80%			
Sizing Factor	0.5			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.018	kW/kW	0.06	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.54	W/m²	0.05	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.002	L/s.m²	0.002	U.S. gpm/ft²
Pump Head Pressure	100	kPa	33.333333	ft
Pump Efficiency	55%			
Pump Motor Efficiency	90%			
Sizing Factor	0.5			
Pump Connected Load	0.16	W/m²	0.02	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.001	L/s.m²	0.0019	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	150	kPa	50	ft		
Pump Efficiency	55%					
Pump Motor Efficiency	90%					
Sizing Factor	0.5					
Pump Connected Load	0.2	W/m²	0.02	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	9.7	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.5	kWh/m².yr
Condenser Pump Energy Consumption	0.1	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.3	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	1.1
	MJ/m².yr	42.2

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Office	< 100 kW	New	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	26.8	kWh/ft².yr	1,039.0	MJ/m².yr	Fuel Oil / Propane:	0.0	kWh/ft².yr	0.0	MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	4.1	160.2
ARCHITECTURAL LIGHTING	0.3	11.3
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.7	27.7
HVAC FANS & PUMPS	1.1	42.2
REFRIGERATION		
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	2.4	91.2
COMPUTER SERVERS	0.4	16.2
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	15.9	615.3		
SPACE COOLING	0.6	23.7		
DOMESTIC HOT WATER	0.6	24.2	0.0	0.0
FOOD SERVICE EQUIPMENT				

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All	New	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	929	m²	10,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	929	m²	10,000	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	40%			
Window/Wall Ratio (WIWAR) (%)	0.11								
Shading Coefficient (SC)	0.69				Typical # Stories	1			
					Floor to Floor Height (m)	6.0	m	19.7	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	45	m²/person	484	ft²/person	%OA	5.55%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right:
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	3			
Total Air Circulation or Design Air Flow	8.00	L/s.m²	1.58	CFM/ft²

Separate Make-up air unit (100% OA) | | L/s.m² | | CFM/ft²

Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Operation occupied period	50%
Operation unoccupied period	50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	198,673	
Peak Zone Sensible Load	112,922	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	5,253	
Total air circulation or Design air	8.00	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	22	°C	71.6	°F	16	°C	60.8	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All	New	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.90			
Connected Load	12.0	W/m²	1.1	W/ft²

Occ. Period(Hrs./yr.)	4500
Unocc. Period(Hrs./yr.)	4260
Usage During Occupied Period	100%
Usage During Unoccupied Period	20%

Light Level (Lux)	400	500	600	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)		3%		55%	10%	30%	2%	100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval — years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	5.4
	MJ/m².yr	208

SECONDARY LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.10			
Connected Load	12.8	W/m²	1.2	W/ft²

Occ. Period(Hrs./yr.)	4500
Unocc. Period(Hrs./yr.)	4260
Usage During Occupied Period	100%
Usage During Unoccupied Period	50%

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				80%	5%	15%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval — years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.8
	MJ/m².yr	30

TERTIARY LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 — 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)							0%	0.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval — years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING — Overall LP 12.07 W/m²

EUI TOTAL	kWh/ft².yr	6
	MJ/m².yr	238

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.65	0.65	0.01	0.01	0.03	
Connected Load	0.8 W/m²	0.7 W/m²	0.0 W/m²	0.0 W/m²	0.1 W/m²	1.5 W/m²
	0.1 W/ft²	0.1 W/ft²	0.00 W/ft²	0.00 W/ft²	0.01 W/ft²	0.14 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	90%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2600	4100
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6160	4660

Total end-use load (occupied period)	2.9 W/m²	0.3 W/ft²
Total end-use load (unocc. period)	1.7 W/m²	0.2 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	58%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.76
		MJ/m².yr	29.56
Plug Loads	EUI	kWh/ft².yr	0.84
		MJ/m².yr	32.51

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: — Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	2.6	EUI	kWh/ft².yr	3.1
	MJ/m².yr	100.0		MJ/m².yr	120.0

REFRIGERATION

Provide description below:
Commercial refrigeration display cases

EUI	kWh/ft².yr	25.8
	MJ/m².yr	1000.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All	New	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane Boilers Stan.	Boilers High	Packaged Rooftop	Electric A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)							100%	100%
Eff./COP	80%	88%	95%	3.20	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.25	1.14	1.05	0.31	0.33	0.22	1.00	

Peak Heating Load	35.3 W/m²	11.2 Btu/hr.ft²	
Seasonal Heating Load (Tertiary Load)	306 MJ/m².yr	7.9 kWh/ft².yr	
Sizing Factor	1.00		
Electric Fuel Share	100.0%	Fuel Oil / Propane Fuel Share	Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	7.9
MJ/m².yr	306

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	7.9
MJ/m².yr	306

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	HE	Screw Chillers	Reciprocating Chillers Open	DX	Absorption Chillers W. H.	CW	Total
System Present (%)					100.0%			100.0%
COP	4.7	5.2	4.4	3.2	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.31	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	13.0	55.4

Peak Cooling Load	63 W/m²	20 Btu/hr.ft²	604 ft²/Ton
Seasonal Cooling Load (Tertiary Load)	50.2 MJ/m².yr	1.3 kWh/ft².yr	

Sizing Factor 1.00 — Operation (occ. period) 4000 hrs/year — Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 90.0%

Electric Fuel Share 100.0% — Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.6
MJ/m².yr	22

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.6
MJ/m².yr	22

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.90		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 45.5

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	1.3
MJ/m².yr	50

Fuel Oil / Propane EUI	
kWh/ft².yr	1.3
MJ/m².yr	51

Market Composite EUI	
kWh/ft².yr	1.3
MJ/m².yr	50.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Food Retail	All	New	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	8.0	L/s.m²	1.58	CFM/ft²
System Static Pressure CAV	350	Pa	1.4	wg
System Static Pressure VAV	350	Pa	1.4	wg
Fan Efficiency	60%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	5.8	W/m²	0.54	W/ft²
Fan Design Load VAV	5.8	W/m²	0.54	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	100%		100%	
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.04	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.06	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.4	W/m²	0.04	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.25	W/m²	0.12	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.003	L/s.m²	0.005	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0040	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure		kPa	50	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load		W/m²		W/ft²		

Supply Fan Occ. Period	5000	hrs./year
Supply Fan Unocc. Period	3760	hrs./year
Supply Fan Energy Consumption	51.1	kWh/m².yr
Exhaust Fan Occ. Period	5000	hrs./year
Exhaust Fan Unocc. Period	3760	hrs./year
Exhaust Fan Energy Consumption	3.7	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.3	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	5.1
	MJ/m².yr	198.3

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Food Retail	**All**	**New**	**Labrador Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	**Electricity:**	**53.2** kWh/ft².yr	**2,059.5** MJ/m².yr	**Fuel Oil / Propane:**	**0.0** kWh/ft².yr	**0.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	5.4	207.9
SECONDARY LIGHTING	0.8	30.5
TERTIARY LIGHTING		
OTHER PLUG LOADS	0.8	32.5
HVAC FANS & PUMPS	5.1	198.3
REFRIGERATION	25.8	1,000.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.8	29.6
COMPUTER SERVERS	0.1	4.4
ELEVATORS		
OUTDOOR LIGHTING	1.3	50.4

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	7.9	306.4		
SPACE COOLING	0.5	19.6		
DOMESTIC HOT WATER	1.3	50.0	0.0	0.0
FOOD SERVICE EQUIPMENT	3.1	120.0		

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	New	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	929	m²	10,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	929	m²	10,000	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	5			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.10								
Shading Coefficient (SC)	0.78				Typical # Stories	1			
					Floor to Floor Height (m)	6.0	m	19.7	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	25	m²/person	269	ft²/person	%OA	7.61%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	15	L/s.person	32	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 34%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation 0.5 L/s.m² 0.10 CFM/ft²
50% operation (%)

Sizing Factor	2			
Total Air Circulation or Design Air Flow	7.88	L/s.m²	1.55	CFM/ft²
Infiltration Rate		L/s.m²		CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	284,710	
Peak Zone Sensible Load	166,814	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	7,760	
Total air circulation or Design air	7.88	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	21	°C	69.8	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	New	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.95			
Connected Load	18.4	W/m²	1.7	W/ft²
Occ. Period(Hrs./yr.)	4500			
Unocc. Period(Hrs./yr.)	4260			
Usage During Occupied Period	95%			
Usage During Unoccupied Period	15%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	10%	5%		55%	10%	20%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	8.0
	MJ/m².yr	310

ARCHITECTURAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.05			
Connected Load	20.5	W/m²	1.9	W/ft²
Occ. Period(Hrs./yr.)	4500			
Unocc. Period(Hrs./yr.)	4260			
Usage During Occupied Period	95%			
Usage During Unoccupied Period	50%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	8%	10%		20%	60%	0%	2%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI	kWh/ft².yr	0.6
	MJ/m².yr	24

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 18.53 W/m²

EUI TOTAL	kWh/ft².yr	9
	MJ/m².yr	333

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.22		0.22		0.01		0.01		0.02			
Connected Load	0.5	W/m²	0.4	W/m²	0.0	W/m²	0.1	W/m²	0.1	W/m²	1.15	W/m²
	0.0	W/ft²	0.0	W/ft²	0.00	W/ft²	0.01	W/ft²	0.01	W/ft²	0.11	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		90%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		50%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2000		4100	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6760		4660	

Total end-use load (occupied period)	2.1	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	1.2	W/m²	0.1	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	59%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.14
Plug Loads	EUI	kWh/ft².yr	0.64
		MJ/m².yr	24.92

FOOD SERVICE EQUIPMENT 5

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr		EUI	kWh/ft².yr	1.0
	MJ/m².yr			MJ/m².yr	38.7

REFRIGERATION

Provide description below:

EUI	kWh/ft².yr	1.5
	MJ/m².yr	58.1

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Large Non-Food Retail	**> 100 kW**	**New**	**Labrador Interconnected**
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Rooftop					
System Present (%)							100%	100%
Eff./COP	75%	80%	75%	3.20	3.50	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.25	1.33	0.31	0.29	0.22	1.00	

Peak Heating Load: 42.5 W/m² — 13.5 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load): 350 MJ/m².yr — 9.0 kWh/ft².yr
Sizing Factor: 1.00

Electric Fuel Share: 100.0% — Fuel Oil / Propane Fuel Share: — Oil Fuel Share:

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	9.0
MJ/m².yr	350

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	9.0
MJ/m².yr	350

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Recprocting Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.8	5.4	4.4	3.7	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.27	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	14.0	57.2

Peak Cooling Load: 90 W/m² — 28 Btu/hr.ft² — 421 ft²/Ton
Seasonal Cooling Load (Tertiary Load): 84.4 MJ/m².yr — 2.2 kWh/ft².yr

Sizing Factor: 1.00

A/C Saturation (Incidence of A/C): 90.0%

Electric Fuel Share: 100.0% — Fuel Oil / Propane Fuel Share:

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.7
MJ/m².yr	28

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.7
MJ/m².yr	28

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.90	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 17.3

Wetting Use Percentage: 90%

All Electric EUI	
kWh/ft².yr	0.5
MJ/m².yr	19

Fuel Oil / Propane EUI	
kWh/ft².yr	0.5
MJ/m².yr	19

Market Composite EUI	
kWh/ft².yr	0.5
MJ/m².yr	19.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	New	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	7.9	L/s.m²	1.55	CFM/ft²
System Static Pressure CAV	500	Pa	2.0	wg
System Static Pressure VAV	500	Pa	2.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	88%			
Sizing Factor	1.00			
Fan Design Load CAV	7.5	W/m²	0.69	W/ft²
Fan Design Load VAV	7.5	W/m²	0.69	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	50%	50%
Comments:				

EXHAUST FANS

Washroom Exhaust	50	L/s.washroom	106	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.02	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.04	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.3	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.80	W/m²	0.17	W/ft²

Condenser Pump

Pump Design Flow		L/s.KW		U.S. gpm/Ton
Pump Design Flow per unit floor area		L/s.m²		U.S. gpm/ft²
Pump Head Pressure	45	kPa	15	ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0057	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure		kPa		ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load		W/m²		W/ft²		

Supply Fan Occ. Period	5500	hrs./year
Supply Fan Unocc. Period	3260	hrs./year
Supply Fan Energy Consumption	59.3	kWh/m².yr
Exhaust Fan Occ. Period	5500	hrs./year
Exhaust Fan Unocc. Period	3260	hrs./year
Exhaust Fan Energy Consumption	2.0	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	5.7
	MJ/m².yr	221.8

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Non-Food Retail	> 100 kW	New	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **29.4** kWh/ft².yr **1,139.1** MJ/m².yr **Fuel Oil / Propane:** **0.0** kWh/ft².yr **0.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	8.0	309.7
ARCHITECTURAL LIGHTING	0.6	23.6
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.6	24.9
HVAC FANS & PUMPS	5.7	221.8
REFRIGERATION	1.5	58.1
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.5	19.1
COMPUTER SERVERS	0.1	4.4
ELEVATORS/ESCALATORS		
OUTDOOR LIGHTING	0.9	33.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	9.0	350.5		
SPACE COOLING	0.6	25.2		
DOMESTIC HOT WATER	0.5	19.0	0.0	0.0
FOOD SERVICE EQUIPMENT	1.0	38.7		

Fuel Specific EUIs for Heating Cooling & DHW

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Non-Food Retail	< 100 kW	New	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28 W/m².°C	0.05 Btu/hr.ft² .°F	Typical Building Size	929 m²	10,000 ft²
Roof U value (W/m².°C)	0.19 W/m².°C	0.03 Btu/hr.ft² .°F	Typical Footprint (m²)	929 m²	10,000 ft²
Glazing U value (W/m².°C)	2.80 W/m².°C	0.49 Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	5	
			Percent Conditioned Space	100%	
			Percent Conditioned Space Defined as Exterior Zone	45%	
Window/Wall Ratio (WIWAR) (%)	0.10				
Shading Coefficient (SC)	0.78		Typical # Stories	1	
			Floor to Floor Height (m)	6.0 m	19.7 ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	25 m²/person	269 ft²/person	%OA	11.07%
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	15 L/s.person	32 CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right: | 34%

(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	1.4	
Total Air Circulation or Design Air Flow	5.42 L/s.m²	1.07 CFM/ft²
Infiltration Rate	0.42 L/s.m²	0.08 CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)	L/s.m²	CFM/ft²
Operation occupied period	50%	
Operation unoccupied period	50%	

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	281,834	
Peak Zone Sensible Load	163,938	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	7,626	
Total air circulation or Design air	5.42	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	21	°C	69.8	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning   Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Non-Food Retail	< 100 kW	New	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.95			
Connected Load	17.6	W/m²	1.6	W/ft²

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	95%
Usage During Unoccupied Period	15%

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	8%	5%		55%	30%	0%	2%	100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI		
	kWh/ft².yr	7.0
	MJ/m².yr	272

ARCHITECTURAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.05			
Connected Load	17.1	W/m²	1.6	W/ft²

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	95%
Usage During Unoccupied Period	50%

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	5%	15%		20%	20%	40%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI = Load X Hrs. X SF X GLFF

EUI		
	kWh/ft².yr	0.5
	MJ/m².yr	19

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI		
	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 17.58 W/m²

EUI TOTAL		
	kWh/ft².yr	8
	MJ/m².yr	291

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.22	0.22	0.01	0.01	0.02	
Connected Load	0.5 W/m²	0.4 W/m²	0.0 W/m²	0.1 W/m²	0.1 W/m²	1.15 W/m²
	0.0 W/ft²	0.0 W/ft²	0.00 W/ft²	0.01 W/ft²	0.01 W/ft²	0.11 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	90%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	4100
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	4660

Total end-use load (occupied period)	2.1 W/m²	0.2 W/ft²
Total end-use load (unocc. period)	1.2 W/m²	0.1 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	59%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.14
Plug Loads	EUI	kWh/ft².yr	0.64
		MJ/m².yr	24.92

FOOD SERVICE EQUIPMENT

5

Provide description below:

Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr		EUI	kWh/ft².yr	
	MJ/m².yr			MJ/m².yr	

REFRIGERATION

Provide description below:

EUI		
	kWh/ft².yr	
	MJ/m².yr	

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS: Small Non-Food Retail Baseline
SIZE: < 100 kW
VINTAGE: New
REGION: Labrador Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane Boilers Stan.	Fuel Oil / Propane Boilers High	Fuel Oil / Propane Packaged Rooftop	Electric A/A HP	Electric W. S. HP	Electric H/R Chiller	Electric Resistance	Total
System Present (%)							100%	100%
Eff./COP	75%	80%	75%	3.20	3.50	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.25	1.33	0.31	0.29	0.22	1.00	

Peak Heating Load	49.8	W/m²	15.8	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	408	MJ/m².yr	10.5	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	10.5		10.5
MJ/m².yr	408		408

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Recprocting Chillers Open	Recprocting Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)					100.0%			100.0%
COP	4.8	5.4	4.4	3.7	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.27	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load	89	W/m²	28	Btu/hr.ft²	426	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	81.4	MJ/m².yr	2.1	kWh/ft².yr		
Sizing Factor	1.00					
A/C Saturation (Incidence of A/C)	90.0%					

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.7		0.7
MJ/m².yr	27		27

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.90	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 17.3

Wetting Use Percentage 90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.5	0.5	0.5
MJ/m².yr	19	19	19.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Non-Food Retail	< 100 kW	New	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	5.4	L/s.m²	1.07	CFM/ft²
System Static Pressure CAV	500	Pa	2.0	wg
System Static Pressure VAV	500	Pa	2.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	88%			
Sizing Factor	1.00			
Fan Design Load CAV	5.1	W/m²	0.48	W/ft²
Fan Design Load VAV	5.1	W/m²	0.48	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	50%	50%
Comments:				

EXHAUST FANS

Washroom Exhaust	50	L/s.washroom	106	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.02	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.04	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.3	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.78	W/m²	0.17	W/ft²

Condenser Pump

Pump Design Flow		L/s.KW		U.S. gpm/Ton
Pump Design Flow per unit floor area		L/s.m²		U.S. gpm/ft²
Pump Head Pressure	45	kPa	15	ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.004	L/s.m²	0.0056	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure		kPa		ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load		W/m²		W/ft²		

Supply Fan Occ. Period	5500	hrs./year
Supply Fan Unocc. Period	3260	hrs./year
Supply Fan Energy Consumption	40.8	kWh/m².yr
Exhaust Fan Occ. Period	5500	hrs./year
Exhaust Fan Unocc. Period	3260	hrs./year
Exhaust Fan Energy Consumption	2.0	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.3	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	4.0
	MJ/m².yr	155.2

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Non-Food Retail	< 100 kW	New	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	25.6 kWh/ft².yr	989.8 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	7.0	271.7
ARCHITECTURAL LIGHTING	0.5	19.1
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.6	24.9
HVAC FANS & PUMPS	4.0	155.2
REFRIGERATION		
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.5	19.1
COMPUTER SERVERS	0.1	4.4
ELEVATORS/ESCALATORS		
OUTDOOR LIGHTING	0.9	33.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	10.5	408.2		
SPACE COOLING	0.6	24.2		
DOMESTIC HOT WATER	0.5	19.0	0.0	0.0
FOOD SERVICE EQUIPMENT				

Fuel Specific EUIs for Heating Cooling & DHW

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS: Large Accommodation Baseline | **SIZE:** > 100 kW | **VINTAGE:** New | **REGION:** Labrador Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	1,394	m²	15,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	1,500	m²	16,140	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	4			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.30								
Shading Coefficient (SC)	0.65				Typical # Stories	2			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	FCoils	IU	100% O.A	TOTAL
System Present (%)	90%				10%				100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	50	m²/person	538	ft²/person	%OA	5.22%
Occupancy Schedule Occ. Period	50%					
Occupancy Schedule Unocc. Period	80%					
Fresh Air Requirements or Outside Air	15	L/s.person	32	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1 | If Fresh Air Control Type = "2" enter % FA. to the right: | 15%

(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air) | If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation | 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	1.4			
Total Air Circulation or Design Air Flow	5.75	L/s.m²	1.13	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²	CFM/ft²
Operation occupied period	50%		
Operation unoccupied period	50%		

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	444,876	
Peak Zone Sensible Load	260,711	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	12,128	
Total air circulation or Design air	5.75	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Accommodation	> 100 kW	New	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING (SUITES)

Light Level	125	Lux	11.6	ft-candles
Floor Fraction (GLFF)	0.75			
Connected Load	7.3	W/m²	0.7	W/ft²

Occ. Period(Hrs./yr.)	2500
Unocc. Period(Hrs./yr.)	6260
Usage During Occupied Period	50%
Usage During Unoccupied Period	25%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	50	100	200	300				Total
% Distribution		75%	25%					100%
Weighted Average								**125**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	20%	50%		10%		0%	20%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI		
	kWh/ft².yr	1.4
	MJ/m².yr	56

SECONDARY LIGHTING

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.25			
Connected Load	11.4	W/m²	1.1	W/ft²

Occ. Period(Hrs./yr.)	3000
Unocc. Period(Hrs./yr.)	5760
Usage During Occupied Period	85%
Usage During Unoccupied Period	75%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	8%	15%		75%		0%	2%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI		
	kWh/ft².yr	1.8
	MJ/m².yr	71

TERTIARY LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)					Total
% Distribution					
Weighted Average					

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI		
	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING Overall LP 8.35 W/m²

EUI TOTAL		
	kWh/ft².yr	3
	MJ/m².yr	126

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.3		0.3		0.05		0.033		0.02			
Connected Load	0.3	W/m²	0.3	W/m²	0.1	W/m²	0.1	W/m²	0.1	W/m²	1.5	W/m²
	0.0	W/ft²	0.0	W/ft²	0.01	W/ft²	0.01	W/ft²	0.01	W/ft²	0.14	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		70%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		25%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2500		3000	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6260		5760	

Total end-use load (occupied period)	1.9	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	0.9	W/m²	0.1	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	48%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	0.42
		MJ/m².yr	16.11
Plug Loads	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.12

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Kitchen services

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	1.3	EUI	kWh/ft².yr	1.3
	MJ/m².yr	50.0		MJ/m².yr	50.0

REFRIGERATION

Provide description below:

Walk-in coolers/freezers, reach-in coolers/freezers, refrigerated buffet cases

EUI		
	kWh/ft².yr	0.5
	MJ/m².yr	20.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Accommodation	> 100 kW	New	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	75%	80%	75%	3.20	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.25	1.33	0.31	0.33	0.22	1.00	

Peak Heating Load	52.1	W/m²	16.5	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	421	MJ/m².yr	10.9	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	10.9
MJ/m².yr	421

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	10.9
MJ/m².yr	421

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)		20.0%			80.0%			100.0%
COP	4.7	5.4	4.4	3.5	2.9	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.29	0.34	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	79	W/m²	25	Btu/hr.ft²	476	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	49.6	MJ/m².yr	1.3	kWh/ft².yr		

Sizing Factor 0.85 Operation (occ. perio 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 80.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.6
MJ/m².yr	21

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.6
MJ/m².yr	21

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.90		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 236.6

Wetting Use Percentage 90%

All Electric EUI	
kWh/ft².yr	6.7
MJ/m².yr	260

Fuel Oil / Propane EUI	
kWh/ft².yr	6.8
MJ/m².yr	263

Market Composite EUI	
kWh/ft².yr	6.7
MJ/m².yr	260.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Large Accommodation	**> 100 kW**	**New**	**Labrador Interconnected**
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	5.7	L/s.m²	1.13	CFM/ft²
System Static Pressure CAV	300	Pa	1.2	wg
System Static Pressure VAV	300	Pa	1.2	wg
Fan Efficiency	45%			
Fan Motor Efficiency	70%			
Sizing Factor	1.00			
Fan Design Load CAV	5.5	W/m²	0.51	W/ft²
Fan Design Load VAV	5.5	W/m²	0.51	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	60%	40%	100%	

Comments:

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.03	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.05	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.3	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.022	kW/kW	0.08	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.73	W/m²	0.16	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.004	L/s.m²	0.006	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0050	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.7	W/m²	0.06	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	36.4	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	2.7	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.3	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI	kWh/ft².yr	3.7
	MJ/m².yr	142.1

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Large Accommodation	> 100 kW	New	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	28.5 kWh/ft².yr	1,102.9 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING (SUITES)	1.4	55.6
SECONDARY LIGHTING	1.8	70.8
TERTIARY LIGHTING		
OTHER PLUG LOADS	0.5	19.1
HVAC FANS & PUMPS	3.7	142.1
REFRIGERATION	0.5	20.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.4	16.1
COMPUTER SERVERS	0.1	3.7
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	10.9	421.4		
SPACE COOLING	0.4	17.1		
DOMESTIC HOT WATER	6.7	260.0	0.0	0.0
FOOD SERVICE EQUIPMENT	1.3	50.0		

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW	New	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	697	m²	7,500	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	697	m²	7,500	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	4			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	45%			
Window/Wall Ratio (WIWAR) (%)	0.30								
Shading Coefficient (SC)	0.65				Typical # Stories	1			
					Floor to Floor Height (m)	3.7	m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	FCoils	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	50	m²/person	538	ft²/person	%OA	8.55%
Occupancy Schedule Occ. Period	50%					
Occupancy Schedule Unocc. Period	80%					
Fresh Air Requirements or Outside Air	15	L/s.person	32	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) | 1

(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 15%

If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² | 0.10 CFM/ft² | 50% operation (%)

Sizing Factor	1.4			
Total Air Circulation or Design Air Flow	3.51	L/s.m²	0.69	CFM/ft²
Infiltration Rate	0.70	L/s.m²	0.14	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	122,326	
Peak Zone Sensible Load	79,537	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	3,700	
Total air circulation or Design air	3.51	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Small Accommodation	**< 100 kW**	**New**	**Labrador Interconnected**
Baseline			

LIGHTING

GENERAL LIGHTING (SUITES)

Light Level	125	Lux	11.6	ft-candles
Floor Fraction (GLFF)	0.85			
Connected Load	7.1	W/m²	0.7	W/ft²
Occ. Period(Hrs./yr.)	2500			
Unocc. Period(Hrs./yr.)	6260			
Usage During Occupied Period	50%			
Usage During Unoccupied Period	25%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	50	100	200	300				Total
% Distribution		75%	25%					100%
Weighted Average								**125**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	15%	70%		10%		0%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI kWh/ft².yr 1.6; MJ/m².yr 61

SECONDARY LIGHTING

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.15			
Connected Load	13.0	W/m²	1.2	W/ft²
Occ. Period(Hrs./yr.)	3000			
Unocc. Period(Hrs./yr.)	5760			
Usage During Occupied Period	85%			
Usage During Unoccupied Period	75%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	10%	30%		55%		0%	5%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI kWh/ft².yr 1.2; MJ/m².yr 48

EUI = Load X Hrs. X SF X GLFF

TERTIARY LIGHTING

Floor fraction check: should = 1.00 — 1.00

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	0%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)					Total
% Distribution					
Weighted Average					

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI kWh/ft².yr; MJ/m².yr

TOTAL LIGHTING — Overall LP 7.95 W/m² — EUI TOTAL kWh/ft².yr 3; MJ/m².yr 109

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.3		0.3		0.05		0.033		0.02			
Connected Load	0.3	W/m²	0.3	W/m²	0.1	W/m²	0.1	W/m²	0.1	W/m²	1.5	W/m²
	0.0	W/ft²	0.0	W/ft²	0.01	W/ft²	0.01	W/ft²	0.01	W/ft²	0.14	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		70%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		25%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2500		3000	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6260		5760	

Total end-use load (occupied period)	1.9 W/m²	0.2 W/ft²		
Total end-use load (unocc. period)	0.9 W/m²	0.1 W/ft²		
Usage during occupied period	100%			
Usage during unoccupied period	48%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	0.42
		MJ/m².yr	16.11
Plug Loads	EUI	kWh/ft².yr	0.49
		MJ/m².yr	19.12

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: — Electricity Fuel Share: 100.0%

Kitchen services

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	1.3	EUI	kWh/ft².yr	0.6
	MJ/m².yr	50.0		MJ/m².yr	25.0

REFRIGERATION

Provide description below:

Walk-in coolers/freezers, reach-in coolers/freezers, refrigerated buffet cases

EUI kWh/ft².yr 0.4; MJ/m².yr 15.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW	New	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	75%	80%	75%	3.20	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.25	1.33	0.31	0.33	0.22	1.00	

Peak Heating Load	72.1	W/m²	22.9	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	619	MJ/m².yr	16.0	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	16.0
MJ/m².yr	619

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	16.0
MJ/m².yr	619

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	4.4	3.5	2.9	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.29	0.34	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	44	W/m²	14	Btu/hr.ft²	866	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	53.7	MJ/m².yr	1.4	kWh/ft².yr		

Sizing Factor 0.85 Operation (occ. perio 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 80.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.6
MJ/m².yr	22

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	0.6
MJ/m².yr	22

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.90	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 236.6

Wetting Use Percentage 90%

All Electric EUI		Fuel Oil / Propane EUI		Market Composite EUI	
kWh/ft².yr	6.7	kWh/ft².yr	6.8	kWh/ft².yr	6.7
MJ/m².yr	260	MJ/m².yr	263	MJ/m².yr	260.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW	New	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.5	L/s.m²	0.69	CFM/ft²
System Static Pressure CAV	300	Pa	1.2	wg
System Static Pressure VAV	300	Pa	1.2	wg
Fan Efficiency	45%			
Fan Motor Efficiency	70%			
Sizing Factor	0.50			
Fan Design Load CAV	1.7	W/m²	0.16	W/ft²
Fan Design Load VAV	1.7	W/m²	0.16	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	60%	40%	100%	
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.3	L/s.m²	0.06	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.4	L/s.m²	0.08	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	0.5			
Exhaust Fan Connected Load	0.3	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.022	kW/kW	0.08	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.95	W/m²	0.09	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.002	L/s.m²	0.003	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	0.5			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.002	L/s.m²	0.0028	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.5					
Pump Connected Load	0.2	W/m²	0.02	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	11.1	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	2.3	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.3	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	1.3
	MJ/m².yr	49.4

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Small Accommodation	< 100 kW	New	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	30.0 kWh/ft².yr	1,160.3 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr	END USE:	Electricity kWh/ft².yr	Electricity MJ/m².yr	Fuel Oil / Propane kWh/ft².yr	Fuel Oil / Propane MJ/m².yr
GENERAL LIGHTING (SUITES)	1.6	60.8					
SECONDARY LIGHTING	1.2	48.1	SPACE HEATING	16.0	618.6		
TERTIARY LIGHTING			SPACE COOLING	0.5	17.5		
OTHER PLUG LOADS	0.5	19.1	DOMESTIC HOT WATER	6.7	260.0	0.0	0.0
HVAC FANS & PUMPS	1.3	49.4	FOOD SERVICE EQUIPMENT	0.6	25.0		
REFRIGERATION	0.4	15.0					
MISCELLANEOUS	0.1	5.0					
BLOCK HEATERS	0.1	5.0					
COMPUTER EQUIPMENT	0.4	16.1					
COMPUTER SERVERS	0.1	3.7					
ELEVATORS							
OUTDOOR LIGHTING	0.4	17.0					

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	New	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	8,829	m²	95,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	2,943	m²	31,667	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	2			
					Percent Conditioned Space	100%			
					Percent Conditioned Space	45%			
Window/Wall Ratio (WIWAR) (%)	0.20				Defined as Exterior Zone				
Shading Coefficient (SC)	0.65				Typical # Stories	3			
					Floor to Floor Height (m)	4.3	m	14.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	FCoils	IU	100% O.A	TOTAL
System Present (%)	50%				50%				100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	30	m²/person	323	ft²/person	%OA	13.43%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period	75%					
Fresh Air Requirements or Outside Air	35	L/s.person	74	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3): 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 15%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² 0.10 CFM/ft²; 50% operation (%)

Sizing Factor	5			
Total Air Circulation or Design Air Flow	8.69	L/s.m²	1.71	CFM/ft²
Infiltration Rate	0.40	L/s.m²	0.08	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA): L/s.m² CFM/ft²
Operation occupied period: 50%
Operation unoccupied period: 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	#######	
Peak Zone Sensible Load	698,518	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R.H	13.2	ft³/lbm
Design CFM	32,495	
Total air circulation or Design air flo	8.69	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	24	°C	75.2	°F	16.5	°C	61.7	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	22	°C	71.6	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	New	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING (PATIENT ROOMS)

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (GLFF)	0.40			
Connected Load	9.4	W/m²	0.9	W/ft²
Occ. Period(Hrs./yr.)	8760			
Unocc. Period(Hrs./yr.)				
Usage During Occupied Period	40%			
Usage During Unoccupied Period				
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	50	100	200	300				Total
% Distribution				100%				100%
Weighted Average								300
	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	3%	10%		85%		0%	2%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	1.2
	MJ/m².yr	47

SECONDARY LIGHTING (NURSING STATIONS, EXAMINATION ROOMS, LABORATORIES, ICU, RECOVERY)

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (ALFF)	0.60			
Connected Load	15.2	W/m²	1.4	W/ft²
Occ. Period(Hrs./yr.)	8760			
Unocc. Period(Hrs./yr.)				
Usage During Occupied Period	65%			
Usage During Unoccupied Period				
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Light Level (Lux)	300	500	700	1000				Total
% Distribution		100%						100%
Weighted Average								500
	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	3%	5%		90%		0%	2%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	4.8
	MJ/m².yr	186

EUI = Load X Hrs. X SF X GLFF

TERTIARY LIGHTING (CORRIDORS, OTHER)

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²
Occ. Period(Hrs./yr.)	4000			
Unocc. Period(Hrs./yr.)	4760			
Usage During Occupied Period	100%			
Usage During Unoccupied Period	100%			
Fixture Cleaning:				
Incidence of Practice				
Interval		years		
Relamping Strategy & Incidence of Practice	Group	Spot		

Floor fraction check: should = 1.00 | 1.00

Light Level (Lux)								Total
% Distribution								
Weighted Average								
	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)	5%	5%		90%			0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	88	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LPD 12.84 W/m²

EUI TOTAL	kWh/ft².yr	6
	MJ/m².yr	234

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	54.55		51		100		200		217			
Density (device/occupant)	0.48		0.48		0.02		0.02		0.04			
Connected Load	0.9	W/m²	0.8	W/m²	0.1	W/m²	0.1	W/m²	0.3	W/m²	3.85	W/m²
	0.1	W/ft²	0.1	W/ft²	0.01	W/ft²	0.01	W/ft²	0.02	W/ft²	0.36	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		90%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		25%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2600		4100	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6160		4660	

Total end-use load (occupied period)	5.4	W/m²	0.5	W/ft²
Total end-use load (unocc. period)	2.2	W/m²	0.2	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	40%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2"

Computer Servers	EUI	kWh/ft².yr	0.21
		MJ/m².yr	8.10
Computer Equipment	EUI	kWh/ft².yr	0.90
		MJ/m².yr	35.00
Plug Loads	EUI	kWh/ft².yr	1.74
		MJ/m².yr	67.29

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: Electricity Fuel Share: 100.0%

Commercial food services

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	3.1	EUI	kWh/ft².yr	2.1
	MJ/m².yr	120.0		MJ/m².yr	80.0

REFRIGERATION

Provide description below:

Walk-in coolers/freezers, reach-in coolers/freezers, refrigerated buffet cases

EUI	kWh/ft².yr	0.4
	MJ/m².yr	15.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	New	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	75%	88%	95%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.14	1.05	0.59	0.33	0.22	1.00	

Peak Heating Load: 25.2 W/m² — 8.0 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load): 198 MJ/m².yr — 5.1 kWh/ft².yr
Sizing Factor: 1.00

Electric Fuel Share: 100.0% — Fuel Oil / Propane Fuel Share: — Oil Fuel Share:

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	5.1
MJ/m².yr	198
Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	
Market Composite EUI	
kWh/ft².yr	5.1
MJ/m².yr	198

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)		50.0%			50.0%			100.0%
COP	4.7	6.1	4.4	3.6	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.16	0.23	0.28	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	14.0	°C	57.2	°F

Peak Cooling Load: 60 W/m² — 19 Btu/hr.ft² — 629 ft²/Ton
Seasonal Cooling Load (Tertiary Load): 64.6 MJ/m².yr — 1.7 kWh/ft².yr

Sizing Factor: 0.65 — Operation (occ. perio 3000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C): 80.0%

Electric Fuel Share: 100.0% — Fuel Oil / Propane Fuel Share:

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	0.6
MJ/m².yr	24
Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	
Market Composite EUI	
kWh/ft².yr	0.6
MJ/m².yr	24

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	88.000	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.90	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 118.3

Wetting Use Percentage: 90%

All Electric EUI		Fuel Oil / Propane EUI		Market Composite EUI	
kWh/ft².yr	3.4	kWh/ft².yr	3.4	kWh/ft².yr	3.4
MJ/m².yr	130	MJ/m².yr	131	MJ/m².yr	130.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	New	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	8.7	L/s.m²	1.71	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	55%			
Fan Motor Efficiency	89%			
Sizing Factor	1.00			
Fan Design Load CAV	13.3	W/m²	1.24	W/ft²
Fan Design Load VAV	13.3	W/m²	1.24	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	80%	20%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.5	L/s.m²	0.10	CFM/ft²
Total Building Exhaust	0.6	L/s.m²	0.11	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.8	W/m²	0.07	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.017	kW/kW	0.06	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.99	W/m²	0.09	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.003	L/s.m²	0.005	U.S. gpm/ft²
Pump Head Pressure	100	kPa	33	ft
Pump Efficiency	60%			
Pump Motor Efficiency	88%			
Sizing Factor	1.0			
Pump Connected Load	0.60	W/m²	0.06	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0038	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	60%					
Pump Motor Efficiency	88%					
Sizing Factor	0.8					
Pump Connected Load	0.4	W/m²	0.04	W/ft²		

Supply Fan Occ. Period	4000	hrs./year
Supply Fan Unocc. Period	4760	hrs./year
Supply Fan Energy Consumption	93.3	kWh/m².yr
Exhaust Fan Occ. Period	4000	hrs./year
Exhaust Fan Unocc. Period	4760	hrs./year
Exhaust Fan Energy Consumption	5.7	kWh/m².yr
Condenser Pump Energy Consumption	0.7	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.3	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	9.3
	MJ/m².yr	360.1

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Health Care	All	New	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	30.9 kWh/ft².yr	1,195.1 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING (PATIENT RO	1.2	47.2
SECONDARY LIGHTING (NURSING	4.8	186.3
TERTIARY LIGHTING (CORRIDORS		
OTHER PLUG LOADS	1.7	67.3
HVAC FANS & PUMPS	9.3	360.1
REFRIGERATION	0.4	15.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.9	35.0
COMPUTER SERVERS	0.2	8.1
ELEVATORS	0.1	3.9
OUTDOOR LIGHTING	0.9	34.9

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	5.1	198.3		
SPACE COOLING	0.5	19.0		
DOMESTIC HOT WATER	3.4	130.0	0.0	0.0
FOOD SERVICE EQUIPMENT	2.1	80.0		

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
School	All	New	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F
Window/Wall Ratio (WIWAR) (%)	0.15			
Shading Coefficient (SC)	0.65			

Typical Building Size	3,717	m²	40,000	ft²
Typical Footprint (m²)	3,717	m²	40,000	ft²
Footprint Aspect Ratio (L:W)	5			
Percent Conditioned Space	100%			
Percent Conditioned Space Defined as Exterior Zone	50%			
Typical # Stories	1			
Floor to Floor Height (m)	3.7	m	12.2	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	90%				10%				100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	10	m²/person	108	ft²/person
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	4	L/s.person	8	CFM/person

%OA 8.74%

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 34%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² 0.10 CFM/ft²; 50% operation (%)

Sizing Factor	2			
Total Air Circulation or Design Air Flow	4.58	L/s.m²	0.90	CFM/ft²
Infiltration Rate	0.42	L/s.m²	0.08	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	764,589	
Peak Zone Sensible Load	387,634	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	18,033	
Total air circulation or Design air	4.58	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	21	°C	69.8	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	19.5	°C	67.1	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
School	All	New	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.85			
Connected Load	12.9	W/m²	1.2	W/ft²

Occ. Period(Hrs./yr.)	2000
Unocc. Period(Hrs./yr.)	6760
Usage During Occupied Period	85%
Usage During Unoccupied Period	15%

Light Level (Lux)	300	500	700	1000	Total
% Distribution		100%			100%
Weighted Average					**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				100%		0%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI kWh/ft².yr 2.8; MJ/m².yr 107

SECONDARY LIGHTING

Light Level	400	Lux	37.2	ft-candles
Floor Fraction (ALFF)	0.15			
Connected Load	16.5	W/m²	1.5	W/ft²

Occ. Period(Hrs./yr.)	2000
Unocc. Period(Hrs./yr.)	6760
Usage During Occupied Period	90%
Usage During Unoccupied Period	15%

Light Level (Lux)	400	500	700	1000	Total
% Distribution	100%				100%
Weighted Average					**400**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	10%	20%		10%	20%	30%	10%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI kWh/ft².yr 0.6; MJ/m².yr 25

EUI = Load X Hrs. X SF X GLFF

TERTIARY LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	2500
Unocc. Period(Hrs./yr.)	6260
Usage During Occupied Period	100%
Usage During Unoccupied Period	

Light Level (Lux)					Total
% Distribution					
Weighted Average					

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI kWh/ft².yr; MJ/m².yr

TOTAL LIGHTING Overall LP 13.46 W/m² EUI TOTAL kWh/ft².yr 3; MJ/m².yr 132

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	55		51		100		200		217			
Density (device/occupant)	0.05		0.05		0.02		0.02		0.01			
Connected Load	0.3	W/m²	0.3	W/m²	0.2	W/m²	0.4	W/m²	0.1	W/m²	0.2	W/m²
	0.0	W/ft²	0.0	W/ft²	0.02	W/ft²	0.04	W/ft²	0.01	W/ft²	0.02	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		100%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		50%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2000		3000	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6760		5760	

Total end-use load (occupied period)	1.3	W/m²	0.1	W/ft²
Total end-use load (unocc. period)	0.8	W/m²	0.1	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	59%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	0.54
		MJ/m².yr	21.01
Plug Loads	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.23

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Cafeteria

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	0.2	EUI	kWh/ft².yr	0.1
	MJ/m².yr	8.0		MJ/m².yr	4.0

REFRIGERATION

Provide description below:

Unknown

EUI kWh/ft².yr 0.1; MJ/m².yr 3.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.0
		MJ/m².yr	2
Miscellaneous	EUI	kWh/ft².yr	0.0
		MJ/m².yr	2

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
School	All	New	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)							100%	100%
Eff./COP	73%	83%	75%	2.60	3.10	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.37	1.20	1.33	0.38	0.32	0.22	1.00	

Peak Heating Load	42.9	W/m²	13.6	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	313	MJ/m².yr	8.1	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

EUI	kWh/ft².yr	MJ/m².yr
All Electric EUI	8.1	313
Fuel Oil / Propane EUI		
Market Composite EUI	8.1	313

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers Standard	Centrifugal Chillers HE	Screw Chillers	Reciprocating Chillers Open	Reciprocating Chillers DX	Absorption Chillers W. H.	Absorption Chillers CW	Total
System Present (%)					100.0%			100.0%
COP	2.5	5.4	4.4	3.6	3	0.9	1	
Performance (1 / COP) (kW/kW)	0.40	0.19	0.23	0.28	0.33	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	60	W/m²	19	Btu/hr.ft²	628	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	74.8	MJ/m².yr	1.9	kWh/ft².yr		

Sizing Factor 1.00 Operation (occ. perio 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 10.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

EUI	kWh/ft².yr	MJ/m².yr
All Electric EUI	0.9	34
Fuel Oil / Propane EUI		
Market Composite EUI	0.9	34

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.90	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 17.3

Wetting Use Percentage 90%

EUI	kWh/ft².yr	MJ/m².yr
All Electric EUI	0.5	19
Fuel Oil / Propane EUI	0.5	19
Market Composite EUI	0.5	19.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
School	All	New	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	4.6	L/s.m²	0.90	CFM/ft²
System Static Pressure CAV	300	Pa	1.2	wg
System Static Pressure VAV	300	Pa	1.2	wg
Fan Efficiency	60%			
Fan Motor Efficiency	88%			
Sizing Factor	1.00			
Fan Design Load CAV	2.6	W/m²	0.24	W/ft²
Fan Design Load VAV	2.6	W/m²	0.24	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	25%	75%	25%	75%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.03	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.21	W/m²	0.11	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.003	L/s.m²	0.005	U.S. gpm/ft²
Pump Head Pressure	45	kPa	15	ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load	0.36	W/m²	0.03	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0038	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	33	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.5	W/m²	0.05	W/ft²		

Supply Fan Occ. Period	2000	hrs./year
Supply Fan Unocc. Period	6760	hrs./year
Supply Fan Energy Consumption	9.6	kWh/m².yr
Exhaust Fan Occ. Period	2000	hrs./year
Exhaust Fan Unocc. Period	6760	hrs./year
Exhaust Fan Energy Consumption	0.8	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.5	kWh/m².yr
Circulating Pump Yearly Operation	3000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	1.0
	MJ/m².yr	39.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
School	All	New	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **14.5** kWh/ft².yr **562.7** MJ/m².yr **Fuel Oil / Propane:** **0.0** kWh/ft².yr **0.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	2.8	107.3
SECONDARY LIGHTING	0.6	25.1
TERTIARY LIGHTING		
OTHER PLUG LOADS	0.1	4.2
HVAC FANS & PUMPS	1.0	39.0
REFRIGERATION	0.1	3.0
MISCELLANEOUS	0.0	1.5
BLOCK HEATERS	0.0	1.5
COMPUTER EQUIPMENT	0.5	21.0
COMPUTER SERVERS	0.1	3.7
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	8.1	312.9		
SPACE COOLING	0.1	3.4		
DOMESTIC HOT WATER	0.5	19.0	0.0	0.0
FOOD SERVICE EQUIPMENT	0.1	4.0		

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
University/College	All	New	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	6,506 m²	70,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	3,253 m²	35,000	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	7		
					Percent Conditioned Space	100%		
					Percent Conditioned Space Defined as Exterior Zone	50%		
Window/Wall Ratio (WIWAR) (%)	0.30							
Shading Coefficient (SC)	0.65				Typical # Stories	2		
					Floor to Floor Height (m)	3.7 m	12.0	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	50%				50%				100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	14 m²/person	151 ft²/person	%OA	18.38%
Occupancy Schedule Occ. Period	90%			
Occupancy Schedule Unocc. Period				
Fresh Air Requirements or Outside Air	10 L/s.person	21 CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right: 34%
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation 0.5 L/s.m² 0.10 CFM/ft²
50% operation (%)

Sizing Factor	1.6	
Total Air Circulation or Design Air Flow	3.89 L/s.m²	0.77 CFM/ft²
Infiltration Rate	0.40 L/s.m²	0.08 CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA) L/s.m² CFM/ft²
Operation occupied period 50%
Operation unoccupied period 50%

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	#######	
Peak Zone Sensible Load	719,746	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	33,483	
Total air circulation or Design air	3.89	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	22	°C	71.6	°F	16	°C	60.8	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
University/College	All	New	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	500	Lux	46.5	ft-candles
Floor Fraction (GLFF)	0.90			
Connected Load	11.9	W/m²	1.1	W/ft²

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	90%
Usage During Unoccupied Period	20%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	300	500	700	1000	Total
% Distribution		100%			100%
Weighted Average					**500**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				95%	4%	1%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	4.5
	MJ/m².yr	175

SECONDARY LIGHTING

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.10			
Connected Load	9.6	W/m²	0.9	W/ft²

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	100%
Usage During Unoccupied Period	50%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	300	500	700	1000	Total
% Distribution	100%				100%
Weighted Average					**300**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	3%	15%		80%		0%	2%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI	kWh/ft².yr	0.6
	MJ/m².yr	22

EUI = Load X Hrs. X SF X GLFF

TERTIARY LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)					Total
% Distribution					
Weighted Average					

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%				100%	0%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING — Overall LP 11.65 W/m²

EUI TOTAL	kWh/ft².yr	5
	MJ/m².yr	197

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	54.55	51	100	200	217	
Density (device/occupant)	0.31	0.31	0.02	0.02	0.01	
Connected Load	1.2 W/m²	1.1 W/m²	0.1 W/m²	0.3 W/m²	0.1 W/m²	1.3 W/m²
	0.1 W/ft²	0.1 W/ft²	0.01 W/ft²	0.03 W/ft²	0.01 W/ft²	0.12 W/ft²
Diversity Occupied Period	90%	90%	90%	90%	100%	100%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2600	2000
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6160	6760

Total end-use load (occupied period)	3.9 W/m²	0.4 W/ft²
Total end-use load (unocc. period)	2.2 W/m²	0.2 W/ft²
Usage during occupied period	100%	
Usage during unoccupied period	55%	

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

	EUI		
Computer Servers	EUI	kWh/ft².yr	0.10
		MJ/m².yr	3.68
Computer Equipment	EUI	kWh/ft².yr	1.34
		MJ/m².yr	51.73
Plug Loads	EUI	kWh/ft².yr	0.65
		MJ/m².yr	25.18

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft².yr	0.5	EUI	kWh/ft².yr	0.4
	MJ/m².yr	20.0		MJ/m².yr	15.0

REFRIGERATION

Provide description below:

Unknown

EUI	kWh/ft².yr	0.5
	MJ/m².yr	20.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS: University/College Baseline | **SIZE:** All | **VINTAGE:** New | **REGION:** Labrador Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers		Packaged	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
	Stan.	High	Unit					
System Present (%)							100%	100%
Eff./COP	75%	83%	95%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.20	1.05	0.59	0.33	0.22	1.00	

Peak Heating Load	41.6	W/m²	13.2	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	445	MJ/m².yr	11.5	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

All Electric EUI	
kWh/ft².yr	11.5
MJ/m².yr	445

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	11.5
MJ/m².yr	445

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		Screw	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE	Chillers	Open	DX	W. H.	CW	
System Present (%)		25.0%			75.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.7	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.37	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	78	W/m²	25	Btu/hr.ft²	483	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	85.9	MJ/m².yr	2.2	kWh/ft².yr		

Sizing Factor 1.00 Operation (occ. perio 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 70.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

All Electric EUI	
kWh/ft².yr	1.0
MJ/m².yr	39

Fuel Oil / Propane EUI	
kWh/ft².yr	
MJ/m².yr	

Market Composite EUI	
kWh/ft².yr	1.0
MJ/m².yr	39

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.90		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 22.8

Wetting Use Percentage 90%

All Electric EUI		Fuel Oil / Propane EUI		Market Composite EUI	
kWh/ft².yr	0.6	kWh/ft².yr	0.7	kWh/ft².yr	0.6
MJ/m².yr	25	MJ/m².yr	25	MJ/m².yr	25.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
University/College	All	New	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.9	L/s.m²	0.77	CFM/ft²
System Static Pressure CAV	750	Pa	3.0	wg
System Static Pressure VAV	750	Pa	3.0	wg
Fan Efficiency	60%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	6.1	W/m²	0.56	W/ft²
Fan Design Load VAV	6.1	W/m²	0.56	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	50%	50%	100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	50%	50%	50%	50%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.01	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.03	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.57	W/m²	0.15	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.004	L/s.m²	0.006	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0050	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	100	kPa	50	ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load	0.7	W/m²	0.06	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	28.6	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.3	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.5	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	2.8
	MJ/m².yr	109.8

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
University/College	All	New	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES:	Electricity:	24.5 kWh/ft².yr	947.2 MJ/m².yr	Fuel Oil / Propane:	0.0 kWh/ft².yr	0.0 MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	4.5	175.2
SECONDARY LIGHTING	0.6	22.1
TERTIARY LIGHTING		
OTHER PLUG LOADS	0.7	25.2
HVAC FANS & PUMPS	2.8	109.8
REFRIGERATION	0.5	20.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	1.3	51.7
COMPUTER SERVERS	0.1	3.7
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	11.5	445.1		
SPACE COOLING	0.7	27.6		
DOMESTIC HOT WATER	0.6	25.0	0.0	0.0
FOOD SERVICE EQUIPMENT	0.4	15.0		

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All	New	Labrador Interconnected
Baseline			

CONSTRUCTION

Wall U value (W/m².°C)	0.28	W/m².°C	0.05	Btu/hr.ft² .°F	Typical Building Size	1,859	m²	20,000	ft²
Roof U value (W/m².°C)	0.19	W/m².°C	0.03	Btu/hr.ft² .°F	Typical Footprint (m²)	1,859	m²	20,000	ft²
Glazing U value (W/m².°C)	2.80	W/m².°C	0.49	Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1			
					Percent Conditioned Space	100%			
					Percent Conditioned Space Defined as Exterior Zone	40%			
Window/Wall Ratio (WIWAR) (%)	0.05								
Shading Coefficient (SC)	0.80				Typical # Stories	1			
					Floor to Floor Height (m)	6.1	m	19.9	ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	100%								100%
Min. Air Flow (%)					50%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	100	m²/person	1076	ft²/person	%OA	10.74%
Occupancy Schedule Occ. Period	90%					
Occupancy Schedule Unocc. Period						
Fresh Air Requirements or Outside Air	20	L/s.person	42	CFM/person		

Fresh Air Control Type *(enter a 1, 2 or 3): 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)

If Fresh Air Control Type = "2" enter % FA. to the right:
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation: 0.5 L/s.m² 0.10 CFM/ft²; 50% operation (%)

Sizing Factor	1			
Total Air Circulation or Design Air Flow	1.86	L/s.m²	0.37	CFM/ft²
Infiltration Rate	0.40	L/s.m²	0.08	CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)		L/s.m²		CFM/ft²
Operation occupied period	50%			
Operation unoccupied period	50%			

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	234,761	
Peak Zone Sensible Load	157,585	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	7,331	
Total air circulation or Design air	1.86	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional		PI / PID	Total
Control Mode				
	Fixed Discharge		Reset	
Control Strategy				

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	22	°C	71.6	°F	13	°C	55.4	°F
Summer Humidity (%)	50%				100%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	16	°C	60.8	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year:

Incidence of Annual Room Controls Maintenance:

Incidence of Annual HVAC Controls Maintenance:

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All	New	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	400	Lux	37.2	ft-candles
Floor Fraction (GLFF)	0.95			
Connected Load	9.1	W/m²	0.8	W/ft²

Occ. Period(Hrs./yr.)	3500
Unocc. Period(Hrs./yr.)	5260
Usage During Occupied Period	100%
Usage During Unoccupied Period	15%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	300	500	700	1000				Total
% Distribution	50%	50%						100%
Weighted Average								**400**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				15%	15%	70%		100.0%
CU	0.7	0.7	0.6	0.6	0.7	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI		
	kWh/ft².yr	3.5
	MJ/m².yr	134

SECONDARY LIGHTING

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.05			
Connected Load	9.4	W/m²	0.9	W/ft²

Occ. Period(Hrs./yr.)	3000
Unocc. Period(Hrs./yr.)	5760
Usage During Occupied Period	100%
Usage During Unoccupied Period	15%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	300	500	700	1000				Total
% Distribution	100%							100%
Weighted Average								**300**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	3%	10%		85%		0%	2%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

EUI = Load X Hrs. X SF X GLFF

EUI		
	kWh/ft².yr	0.2
	MJ/m².yr	7

TERTIARY LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m²		W/ft²

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%
Fixture Cleaning:	
Incidence of Practice	
Interval	years
Relamping Strategy & Incidence of Practice	Group / Spot

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)		0%					0%	0.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

EUI		
	kWh/ft².yr	
	MJ/m².yr	

TOTAL LIGHTING

Overall LP 9.13 W/m²

EUI TOTAL		
	kWh/ft².yr	3.6
	MJ/m².yr	140

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers		Monitors		Printers		Copiers		Servers		Plug Loads	
Measured Power (W/device)	54.55		51		100		200		217			
Density (device/occupant)	0.59		0.59		0.03		0.03		0.06			
Connected Load	0.3	W/m²	0.3	W/m²	0.0	W/m²	0.1	W/m²	0.1	W/m²	2	W/m²
	0.0	W/ft²	0.0	W/ft²	0.00	W/ft²	0.01	W/ft²	0.01	W/ft²	0.19	W/ft²
Diversity Occupied Period	90%		90%		90%		90%		100%		90%	
Diversity Unoccupied Period	50%		50%		50%		50%		100%		25%	
Operation Occ. Period (hrs./year)	2000		2000		2000		2000		2000		3500	
Operation Unocc. Period (hrs./year)	6760		6760		6760		6760		6760		5260	

Total end-use load (occupied period)	2.6	W/m²	0.2	W/ft²
Total end-use load (unocc. period)	1.0	W/m²	0.1	W/ft²
Usage during occupied period	100%			
Usage during unoccupied period	39%			

to see notes (cells with red indicator in upper right corner, type "SHIFT F2")

	EUI		
Computer Servers	EUI	kWh/ft².yr	0.11
		MJ/m².yr	4.42
Computer Equipment	EUI	kWh/ft².yr	0.34
		MJ/m².yr	13.30
Plug Loads	EUI	kWh/ft².yr	0.83
		MJ/m².yr	32.15

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: | Electricity Fuel Share: 100.0%

	Fuel Oil / Propane EUI		All Electric EUI	
EUI	kWh/ft².yr		kWh/ft².yr	
	MJ/m².yr		MJ/m².yr	

REFRIGERATION

Provide description below:
Large refrigeration storage

EUI		
	kWh/ft².yr	1.5
	MJ/m².yr	60.0

BLOCK HEATERS & MISCELLANEOUS

	EUI		
Block Heaters	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5
Miscellaneous	EUI	kWh/ft².yr	0.1
		MJ/m².yr	5

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All	New	Labrador Interconnected
Baseline			

SPACE HEATING

Heating Plant Type

	Hot Water System: Boiler	Hot Water System: Unit Heater	Hot Water System: Packaged Rooftop	Hot Water System: A/A HP	Hot Water System: W. S. HP	Hot Water System: H/R Chiller	Electric Resistance	Total
System Present (%)							100%	100%
Eff./COP	75%	75%	95%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.33	1.33	1.05	0.59	0.33	0.22	1.00	

Peak Heating Load	37.3	W/m²	11.8	Btu/hr.ft²
Seasonal Heating Load (Tertiary Load)	310	MJ/m².yr	8.0	kWh/ft².yr
Sizing Factor	1.00			

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share Oil Fuel Share

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	8.0		8.0
MJ/m².yr	310		310

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers: Standard	Centrifugal Chillers: HE	Screw Chillers	Reciprocating Chillers: Open	Reciprocating Chillers: DX	Absorption Chillers: W. H.	Absorption Chillers: CW	Total
System Present (%)					100.0%			100.0%
COP	4.7	5.4	4.4	3.6	2.9	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.23	0.28	0.34	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

Chilled Water	7	°C	44.6	°F
Condenser Water	30	°C	86	°F
Supply Air	13.0	°C	55.4	°F

Peak Cooling Load	37	W/m²	12	Btu/hr.ft²	1022	ft²/Ton
Seasonal Cooling Load (Tertiary Load)	29.4	MJ/m².yr	0.8	kWh/ft².yr		

Sizing Factor 1.00 Operation (occ. perio 4000 hrs/year Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C) 10.0%

Electric Fuel Share 100.0% Fuel Oil / Propane Fuel Share

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.3		0.3
MJ/m².yr	12		12

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Std. Tank	PV Tank	Cond. Tnk	Std. Boiler	Cnd. Boil.
System Present (%)					0.00%
Eff./COP	0.550	0.600	0.900	0.750	0.900

	Fossil	Elec. Res.
Fuel Share	0%	100%
Blended Efficiency	0.90	0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load) 18.2

Wetting Use Percentage 90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.5	0.5	0.5
MJ/m².yr	20	20	20.0

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All	New	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	1.9	L/s.m²	0.37	CFM/ft²
System Static Pressure CAV	300	Pa	1.2	wg
System Static Pressure VAV	300	Pa	1.2	wg
Fan Efficiency	60%			
Fan Motor Efficiency	80%			
Sizing Factor	1.00			
Fan Design Load CAV	1.2	W/m²	0.11	W/ft²
Fan Design Load VAV	1.2	W/m²	0.11	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	100%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	50%	50%	50%	50%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.1	L/s.m²	0.02	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.2	L/s.m²	0.04	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	25%			
Fan Motor Efficiency	75%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.3	W/m²	0.03	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	0.74	W/m²	0.07	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.002	L/s.m²	0.003	U.S. gpm/ft²
Pump Head Pressure		kPa		ft
Pump Efficiency	50%			
Pump Motor Efficiency	80%			
Sizing Factor	1.0			
Pump Connected Load		W/m²		W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.002	L/s.m²	0.0023	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure		kPa		ft		
Pump Efficiency	50%					
Pump Motor Efficiency	80%					
Sizing Factor	0.8					
Pump Connected Load		W/m²		W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	7.1	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.7	kWh/m².yr
Condenser Pump Energy Consumption		kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.2	kWh/m².yr
Circulating Pump Yearly Operation	7000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	0.8
	MJ/m².yr	32.4

COMMERCIAL SECTOR BUILDING PROFILE

NEW BUILDINGS:	SIZE:	VINTAGE:	REGION:
Warehouse/Wholesale	All	New	Labrador Interconnected
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **16.5** kWh/ft².yr **641.0** MJ/m².yr **Fuel Oil / Propane:** **0.0** kWh/ft².yr **0.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	3.5	133.8
SECONDARY LIGHTING	0.2	6.5
TERTIARY LIGHTING		
OTHER PLUG LOADS	0.8	32.1
HVAC FANS & PUMPS	0.8	32.4
REFRIGERATION	1.5	60.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.3	13.3
COMPUTER SERVERS	0.1	4.4
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	8.0	310.2		
SPACE COOLING	0.0	1.2		
DOMESTIC HOT WATER	0.5	20.0	0.0	0.0
FOOD SERVICE EQUIPMENT				

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Restaurant Baseline
SIZE: All
VINTAGE: New
REGION: Labrador Interconnected

CONSTRUCTION

Wall U value (W/m².°C)	0.28 W/m².°C	0.05 Btu/hr.ft² .°F	Typical Building Size	929 m²	10,000 ft²
Roof U value (W/m².°C)	0.19 W/m².°C	0.03 Btu/hr.ft² .°F	Typical Footprint (m²)	929 m²	10,000 ft²
Glazing U value (W/m².°C)	2.80 W/m².°C	0.49 Btu/hr.ft² .°F	Footprint Aspect Ratio (L:W)	1	
			Percent Conditioned Space	100%	
			Percent Conditioned Space Defined as Exterior Zone	45%	
Window/Wall Ratio (WIWAR) (%)	0.36		Typical # Stories	1	
Shading Coefficient (SC)	0.58		Floor to Floor Height (m)	3.7 m	12.0 ft

VENTILATION SYSTEM, BUILDING CONTROLS & INDOOR CONDITIONS

Ventilation System Type

	CAV	CAVR	DDMZ	DDMZVV	VAV	VAVR	IU	100% O.A	TOTAL
System Present (%)	60%							40%	100%
Min. Air Flow (%)					60%				

(Minimum Throttled Air Volume as Percent of Full Flow)

Occupancy or People Density	20 m²/person	215 ft²/person	%OA 10.83%
Occupancy Schedule Occ. Period	90%		
Occupancy Schedule Unocc. Period			
Fresh Air Requirements or Outside Air	8 L/s.person	16 CFM/person	

Fresh Air Control Type *(enter a 1, 2 or 3) 1
(1 = mixed air control, 2 = Fixed fresh air, 3 100% fresh air)
If Fresh Air Control Type = "2" enter % FA. to the right:
If Fresh Air Control Type = "3" enter Make-up Air Ventilation and operation — L/s.m² — CFM/ft² — operation (%)

Sizing Factor	1.3	
Total Air Circulation or Design Air Flow	3.46 L/s.m²	0.68 CFM/ft²
Infiltration Rate	0.40 L/s.m²	0.08 CFM/ft²

(air infiltration is assumed to occur during unoccupied hours only if the ventilation system shuts down)

Separate Make-up air unit (100% OA)	L/s.m²	CFM/ft²
Operation occupied period	50%	
Operation unoccupied period	50%	

Economizer

	Enthalpy Based		Dry-Bulb Based		Total
Incidence of Use			100%		100%
Switchover Point		KJ/kg.	18	°C	
		Btu/lbm	64.4	°F	

Summary of Design Parameters		
Peak Design Cooling Load	191,742	
Peak Zone Sensible Load	112,725	
Room air enthalpy	28.2	Btu/lbm
Discharge air enthalpy	23.4	Btu/lbm
Specific volume of air at 55F & 100% R	13.2	ft³/lbm
Design CFM	5,244	
Total air circulation or Design air	3.46	l/s.m²

Controls Type

System Present (%)	HVAC Equipment	Room Controls
All Pneumatic		
DDC/Pneumatic		
All DDC		
Total (should add-up to 100%)		

Control mode

	Proportional	PI / PID	Total
Control Mode			
	Fixed Discharge	Reset	
Control Strategy			

Indoor Design Conditions

	Room				Supply Air			
Summer Temperature	24	°C	75.2	°F	14	°C	57.2	°F
Summer Humidity (%)	50%				98%			
Enthalpy	65.5	KJ/kg.	28.2	Btu/lbm	54.5	KJ/kg.	23.4	Btu/lbm
Winter Occ. Temperature	21	°C	69.8	°F	15	°C	59	°F
Winter Occ. Humidity	30%				45%			
Enthalpy	53	KJ/kg.	22.8	Btu/lbm	45.5	KJ/kg.	19.6	Btu/lbm
Winter Unocc. Temperature	21	°C	69.8	°F				
Winter Unocc. Humidity	30%							
Enthalpy	50	KJ/kg.	21.5	Btu/lbm				

Damper Maintenance

	Incidence (%)	Frequency (years)
Control Arm Adjustment		
Lubrication		
Blade Seal Replacement		

Air Filter Cleaning — Changes/Year

Incidence of Annual Room Controls Maintenance

Incidence of Annual HVAC Controls Maintenance

Annual Maintenance Tasks	Incidence (%)
Calibration of Transmitters	
Calibration of Panel Gauges	
Inspection of Auxiliary Devices	
Inspection of Control Devices	

Annual Maintenance Tasks	Incidence (%)
Inspection/Calibration of Room Thermostat	
Inspection of PE Switches	
Inspection of Auxiliary Devices	
Inspection of Control Devices (Valves, (Dampers, VAV Boxes)	

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All	New	Labrador Interconnected
Baseline			

LIGHTING

GENERAL LIGHTING

Light Level	400	Lux	37.2	ft-candles
Floor Fraction (GLFF)	0.50			
Connected Load	10.3	W/m^2	1.0	W/ft^2

Occ. Period(Hrs./yr.)	4300
Unocc. Period(Hrs./yr.)	4460
Usage During Occupied Period	100%
Usage During Unoccupied Period	10%

Light Level (Lux)	400	550	650					Total
% Distribution	100%							100%
Weighted Average								**400**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)				100.0%				100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	88	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI kWh/ft^2.yr 2.3
MJ/m^2.yr 88

ARCHITECTURAL LIGHTING

Light Level	300	Lux	27.9	ft-candles
Floor Fraction (ALFF)	0.50			
Connected Load	21.2	W/m^2	2.0	W/ft^2

Occ. Period(Hrs./yr.)	4300
Unocc. Period(Hrs./yr.)	4460
Usage During Occupied Period	100%
Usage During Unoccupied Period	10%

Light Level (Lux)	200	300	400	500				Total
% Distribution			100%					100%
Weighted Average								**400**

	INC	CFL	T12	T8	HID	T5HO	LED	TOTAL
System Present (%)	30%	50%					20%	100.0%
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.80	0.80	
Efficacy (L/W)	15	50	72	84	65	95	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI kWh/ft^2.yr 4.7
MJ/m^2.yr 181

EUI = Load X Hrs. X SF X GLFF

SPECIAL PURPOSE LIGHTING

Light Level		Lux		ft-candles
Floor Fraction (HBLFF)				
Connected Load		W/m^2		W/ft^2

Floor fraction check: should = 1.00 | 1.00

Occ. Period(Hrs./yr.)	4000
Unocc. Period(Hrs./yr.)	4760
Usage During Occupied Period	0%
Usage During Unoccupied Period	100%

Light Level (Lux)	300	500	700	1000				Total
% Distribution								
Weighted Average								

	INC	CFL	T12	T8		MH	HPS	TOTAL
System Present (%)								
CU	0.7	0.7	0.6	0.6	0.6	0.6	0.6	
LLF	0.65	0.65	0.75	0.80	0.80	0.55	0.55	
Efficacy (L/W)	15	50	72	84	88	65	90	

Fixture Cleaning:
Incidence of Practice
Interval years

Relamping Strategy & Incidence of Practice: Group | Spot

EUI kWh/ft^2.yr
MJ/m^2.yr

TOTAL LIGHTING Overall LP 15.75 W/m^2

EUI TOTAL kWh/ft^2.yr 7
MJ/m^2.yr 269

OFFICE EQUIPMENT & PLUG LOADS

Equipment Type	Computers	Monitors	Printers	Copiers	Servers	Plug Loads
Measured Power (W/device)	55	51	100	200	217	
Density (device/occupant)	0.16	0.16	0.01		0.06	
Connected Load	0.4 W/m^2	0.4 W/m^2	0.1 W/m^2	W/m^2	0.1 W/m^2	1.15 W/m^2
	0.0 W/ft^2	0.0 W/ft^2	0.00 W/ft^2	W/ft^2	0.01 W/ft^2	0.11 W/ft^2
Diversity Occupied Period	80%	80%	80%	80%	100%	80%
Diversity Unoccupied Period	50%	50%	50%	50%	100%	50%
Operation Occ. Period (hrs./year)	2000	2000	2000	2000	2000	4100
Operation Unocc. Period (hrs./year)	6760	6760	6760	6760	6760	4660

Total end-use load (occupied period)	1.8 W/m^2	0.2 W/ft^2
Total end-use load (unocc. period)	1.2 W/m^2	0.1 W/ft^2
Usage during occupied period	100%	
Usage during unoccupied period	65%	

Computer Servers	EUI	kWh/ft^2.yr	0.11
		MJ/m^2.yr	4.42
Computer Equipment	EUI	kWh/ft^2.yr	0.41
		MJ/m^2.yr	16.00
Plug Loads	EUI	kWh/ft^2.yr	0.60
		MJ/m^2.yr	23.23

FOOD SERVICE EQUIPMENT

Provide description below: Fuel Oil / Propane Fuel Share: Electricity Fuel Share: 100.0%

Lunch room/cafeteria/restaurant

Fuel Oil / Propane EUI			All Electric EUI		
EUI	kWh/ft^2.yr	0.1	EUI	kWh/ft^2.yr	34.3
	MJ/m^2.yr	5.0		MJ/m^2.yr	1330.0

REFRIGERATION

Provide description below:

Lunch room/cafeteria/restaurant

EUI kWh/ft^2.yr 16.8
MJ/m^2.yr 650.0

BLOCK HEATERS & MISCELLANEOUS

Block Heaters	EUI	kWh/ft^2.yr	0.1
		MJ/m^2.yr	5
Miscellaneous	EUI	kWh/ft^2.yr	0.1
		MJ/m^2.yr	5

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS: Restaurant Baseline | **SIZE:** All | **VINTAGE:** New | **REGION:** Labrador Interconnected

SPACE HEATING

Heating Plant Type

	Fuel Oil / Propane			Electric				
	Boilers Stan.	Boilers High	Packaged Unit	A/A HP	W. S. HP	H/R Chiller	Resistance	Total
System Present (%)							100%	100%
Eff./COP	70%	80%	70%	1.70	3.00	4.50	1.00	
Performance (1 / Eff.) (kW/kW)	1.43	1.25	1.43	0.59	0.33	0.22	1.00	

Peak Heating Load: 51.4 W/m² | 16.3 Btu/hr.ft²
Seasonal Heating Load (Tertiary Load): 427 MJ/m².yr | 11.0 kWh/ft².yr
Sizing Factor: 1.00

Electric Fuel Share: 100.0% | Fuel Oil / Propane Fuel Share: | Oil Fuel Share:

Boiler Maintenance

Annual Maintenance Tasks	Incidence (%)
Fire Side Inspection	75%
Water Side Inspection for Scale Buildup	100%
Inspection of Controls & Safeties	100%
Inspection of Burner	100%
Flue Gas Analysis & Burner Set-up	90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	11.0		11.0
MJ/m².yr	427		427

SPACE COOLING

A/C Plant Type

	Centrifugal Chillers		WSHP	Reciprocating Chillers		Absorption Chillers		Total
	Standard	HE		Open	DX	W. H.	CW	
System Present (%)					100.0%			100.0%
COP	4.7	5.4	3.5	3.5	2.6	0.9	1	
Performance (1 / COP) (kW/kW)	0.21	0.19	0.29	0.29	0.38	1.11	1.00	
Additional Refrigerant Related Information								

Control Mode

Incidence of Use	Fixed Setpoint	Reset
Chilled Water		
Condenser Water		

Setpoint

	°C	°F
Chilled Water	7	44.6
Condenser Water	30	86
Supply Air	14.0	57.2

Peak Cooling Load: 60 W/m² | 19 Btu/hr.ft² | 626 ft²/Ton
Seasonal Cooling Load (Tertiary Load): 65.7 MJ/m².yr | 1.7 kWh/ft².yr

Sizing Factor: 1.00 | Operation (occ. period) 3000 hrs/year | Note value cannot be less than 2,900 hrs/year)

A/C Saturation (Incidence of A/C): 90.0%

Electric Fuel Share: 100.0% | Fuel Oil / Propane Fuel Share:

Chiller Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect Control, Safeties & Purge Unit		
Inspect Coupling, Shaft Sealing and Bearings		
Megger Motors		
Condenser Tube Cleaning		
Vibration Analysis		
Eddy Current Testing		
Spectrochemical Oil Analysis		

Cooling Tower/Air Cooled Condenser Maintenan

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspection/Clean Spray Nozzles		
Inspect/Service Fan/Fan Motors		
Megger Motors		
Inspect/Verify Operation of Controls		

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	0.7		0.7
MJ/m².yr	29		29

DOMESTIC HOT WATER

Service Hot Water Plant Type

Fossil Fuel SHW	Tank				Boiler
System Present (%)					0%
Eff./COP	0.65				0.75

	Fossil		Elec. Res.
Fuel Share	0%		100%
Blended Efficiency	0.75		0.91

Service Hot Water load (MJ/m².yr) (Tertiary Load): 700.0

Wetting Use Percentage: 90%

	All Electric EUI	Fuel Oil / Propane EUI	Market Composite EUI
kWh/ft².yr	19.9	24.1	19.9
MJ/m².yr	769	933	769.2

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	SIZE:	VINTAGE:	REGION:
Restaurant	All	New	Labrador Interconnected
Baseline			

HVAC FANS & PUMPS

SUPPLY FANS

System Design Air Flow	3.5	L/s.m²	0.68	CFM/ft²
System Static Pressure CAV	350	Pa	1.4	wg
System Static Pressure VAV	350	Pa	1.4	wg
Fan Efficiency	52%			
Fan Motor Efficiency	85%			
Sizing Factor	1.00			
Fan Design Load CAV	2.7	W/m²	0.25	W/ft²
Fan Design Load VAV	2.7	W/m²	0.25	W/ft²

Ventilation and Exhaust Fan Operation & Control

	Ventilation Fan		Exhaust Fan	
Control	Fixed	Variable Flow	Fixed	Variable Flow
Incidence of Use	60%		100%	
Operation	Continuous	Scheduled	Continuous	Scheduled
Incidence of Use	75%	25%	75%	25%
Comments:				

EXHAUST FANS

Washroom Exhaust	100	L/s.washroom	212	CFM/washroom
Washroom Exhaust per gross unit area	0.2	L/s.m²	0.04	CFM/ft²
Other Exhaust (Smoking/Conference)	0.1	L/s.m²	0.02	CFM/ft²
Total Building Exhaust	0.3	L/s.m²	0.06	CFM/ft²
Exhaust System Static Pressure	250	Pa	1.0	wg
Fan Efficiency	40%			
Fan Motor Efficiency	80%			
Sizing Factor	1.0			
Exhaust Fan Connected Load	0.2	W/m²	0.02	W/ft²

AUXILIARY COOLING EQUIPMENT (Condenser Pump and Cooling Tower/Condenser Fans)

Average Condenser Fan Power Draw	0.020	kW/kW	0.07	kW/Ton
(Cooling Tower/Evap. Condenser/ Air Cooled Condenser)	1.19	W/m²	0.11	W/ft²

Condenser Pump

Pump Design Flow	0.053	L/s.KW	3.0	U.S. gpm/Ton
Pump Design Flow per unit floor area	0.003	L/s.m²	0.005	U.S. gpm/ft²
Pump Head Pressure	90	kPa	30	ft
Pump Efficiency	55%			
Pump Motor Efficiency	90%			
Sizing Factor	1.0			
Pump Connected Load	0.58	W/m²	0.05	W/ft²

CIRCULATING PUMP (Heating & Cooling)

Pump Design Flow @ 5 °C (10 °F) delta T	0.003	L/s.m²	0.0038	U.S. gpm/ft²	2.4	U.S. gpm/Ton
Pump Head Pressure	150	kPa	50	ft		
Pump Efficiency	55%					
Pump Motor Efficiency	90%					
Sizing Factor	0.5					
Pump Connected Load	0.4	W/m²	0.04	W/ft²		

Supply Fan Occ. Period	3500	hrs./year
Supply Fan Unocc. Period	5260	hrs./year
Supply Fan Energy Consumption	12.2	kWh/m².yr
Exhaust Fan Occ. Period	3500	hrs./year
Exhaust Fan Unocc. Period	5260	hrs./year
Exhaust Fan Energy Consumption	1.8	kWh/m².yr
Condenser Pump Energy Consumption	0.3	kWh/m².yr
Cooling Tower /Condenser Fans Energy Consumption	0.4	kWh/m².yr
Circulating Pump Yearly Operation	5000	hrs./year
Circulating Pump Energy Consumption		kWh/m².yr

Fans and Pumps Maintenance

Annual Maintenance Tasks	Incidence (%)	Frequency (years)
Inspect/Service Fans & Motors		
Inspect/Adjust Belt Tension on Fan Belts		
Inspect/Service Pump & Motors		

EUI		
	kWh/ft².yr	1.4
	MJ/m².yr	53.0

COMMERCIAL SECTOR BUILDING PROFILE

EXISTING BUILDINGS:	**SIZE:**	**VINTAGE:**	**REGION:**
Restaurant	**All**	**New**	**Labrador Interconnected**
Baseline			

EUI SUMMARY

TOTAL ALL END-USES: **Electricity:** **92.8** kWh/ft².yr **3,594.3** MJ/m².yr **Fuel Oil / Propane:** **0.0** kWh/ft².yr **0.0** MJ/m².yr

END USE:	kWh/ft².yr	MJ/m².yr
GENERAL LIGHTING	2.3	88.3
ARCHITECTURAL LIGHTING	4.7	180.8
SPECIAL PURPOSE LIGHTING		
OTHER PLUG LOADS	0.6	23.2
HVAC FANS & PUMPS	1.4	53.0
REFRIGERATION	16.8	650.0
MISCELLANEOUS	0.1	5.0
BLOCK HEATERS	0.1	5.0
COMPUTER EQUIPMENT	0.4	16.0
COMPUTER SERVERS	0.1	4.4
ELEVATORS		
OUTDOOR LIGHTING	0.4	17.0

END USE:	Electricity		Fuel Oil / Propane	
	kWh/ft².yr	MJ/m².yr	kWh/ft².yr	MJ/m².yr
SPACE HEATING	11.0	426.7		
SPACE COOLING	0.7	25.7		
DOMESTIC HOT WATER	19.9	769.2	0.0	0.0
FOOD SERVICE EQUIPMENT	34.3	1,330.0		

Terms Used in Building Profile Summaries

Profile Term	Explanation
Building envelope	Defines the thermal characteristics of a building's exterior components
U-value	The rate of heat loss, in Btu per hour per square foot per degree Fahrenheit (BTU/hr. f^2.^oF) through walls, roofs and windows. The U-value is the reciprocal of the R-value
Shading coefficient (SC)	Is a measure of the total amount of heat passing through the glazing compared with that through a single clear glass
Window-to-wall ratio	Defines the ratio of window to insulated exterior wall area
General lighting	Defines the lighting types that are used within the main areas of a building, e.g., for a School, the area is classrooms and the lighting type is fluorescent; for a Food Retail store, the main area is the retail floor.
LPD	Lighting power density expressed in terms of W/ft^2
Lux	The amount of visible light per square meter incident on a surface (lumen/m^2)
Inc	Incandescent lamps
CFL	Compact fluorescent lamps
T12	T12 fluorescent lamps with magnetic ballasts
T8	T8 fluorescent lamps with electronic ballasts
MH	Metal halide lamps
HPS	High-pressure sodium lamps
HID	High-intensity discharge lighting includes both MH and HPS
T5HO	T5 High Output fluorescent lamps
LED	Light Emitting Diode lamps
Secondary lighting	Defines the lighting types that are used within the secondary areas of a building, e.g., for a School, the secondary areas are corridors, lobbies, foyers, etc.
Outdoor lighting	Defines the outdoor lighting including parking lot and façade
Overall LPD	The total floor weighted LPD that includes general, secondary, and outdoor
Fans	Defines the mix of air handling systems
CAV	Constant air volume
VAV	Variable air volume
Space heating	Defines the mix of heating equipment types found within the stock of buildings
ASHP	Air-source heat pump
WSHP	Water-source heat pump
Resistance	Electric resistance heating equipment including boilers and baseboard heaters
Fuel Oil / Propane	Fossil fuel fired equipment, including space heating, domestic hot water heating, and cooking equipment
Space cooling	Defines the mix of cooling equipment types found within the stock of buildings
Centrifugal	Standard centrifugal chillers with a full load performance of 0.75 kW/ton
Centri HE	High-efficiency centrifugal chillers assumed to have a performance of <0.65 kW/ton
Recip open	Semi-hermetic reciprocating chillers
DX	Direct expansion cooling equipment that use small tonnage hermetic compressors

Appendix D Background-Section 6: Reference Case Peak Load

Introduction

The following exhibits show the Reference Case peak load profiles for each region.

Exhibit 126 Electric Peak Loads, by Milestone Year, End Use and Sub sector Type, Island Interconnected Region (MW)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Large Office	2014	-	3.7	0.7	2.3	0.2	0.4	9.3	7.0	0.4	1.1	0.6	0.1	2.4	3.8	30.2	-	62.3
	2017	-	3.9	0.7	2.3	0.2	0.4	9.4	7.3	0.4	1.2	0.6	0.1	2.4	3.9	30.9	-	63.8
	2020	-	4.1	0.7	2.4	0.2	0.4	9.5	7.7	0.4	1.2	0.6	0.1	2.4	4.1	31.9	-	65.9
	2023	-	4.4	0.8	2.6	0.2	0.4	9.8	8.2	0.5	1.3	0.6	0.1	2.4	4.3	33.2	-	68.8
	2026	-	4.6	0.8	2.6	0.2	0.5	9.9	8.6	0.5	1.4	0.6	0.1	2.4	4.5	34.2	-	70.8
	2029	-	4.8	0.9	2.7	0.2	0.5	10.0	9.0	0.5	1.5	0.6	0.2	2.4	4.6	35.3	-	73.2
Small Office	2014	-	3.0	0.5	1.9	-	-	6.9	3.0	0.3	0.9	0.5	0.1	0.9	3.0	23.8	-	45.0
	2017	-	3.1	0.6	2.0	-	-	6.9	3.2	0.3	1.0	0.5	0.1	0.9	3.0	24.2	-	45.8
	2020	-	3.4	0.6	2.1	-	-	7.1	3.5	0.4	1.0	0.5	0.1	0.9	3.2	25.3	-	47.9
	2023	-	3.6	0.6	2.2	-	-	7.2	3.7	0.4	1.1	0.5	0.1	0.9	3.3	26.2	-	49.8
	2026	-	3.7	0.7	2.3	-	-	7.3	3.9	0.4	1.1	0.5	0.1	0.9	3.4	26.8	-	51.1
	2029	-	3.9	0.7	2.3	-	-	7.4	4.2	0.4	1.2	0.5	0.1	0.9	3.5	27.5	-	52.6
Large Non-food Retail	2014	-	0.3	0.1	0.6	-	1.4	5.9	4.3	0.2	0.4	0.5	0.7	0.6	1.2	10.9	-	26.9
	2017	-	0.3	0.1	0.7	-	1.5	5.9	4.4	0.2	0.4	0.5	0.7	0.6	1.2	11.1	-	27.3
	2020	-	0.3	0.1	0.7	-	1.6	6.1	4.6	0.2	0.4	0.5	0.7	0.6	1.3	11.5	-	28.5
	2023	-	0.4	0.1	0.7	-	1.6	6.2	4.8	0.2	0.5	0.5	0.8	0.6	1.3	11.9	-	29.5
	2026	-	0.4	0.1	0.8	-	1.7	6.2	4.9	0.2	0.5	0.5	0.8	0.6	1.4	12.2	-	30.2
	2029	-	0.4	0.1	0.8	-	1.8	6.3	5.1	0.2	0.5	0.5	0.8	0.6	1.4	12.5	-	31.0
Small Non-food Retail	2014	-	0.4	0.1	1.0	-	-	7.1	4.5	0.2	0.6	0.7	-	0.8	1.8	15.6	-	32.7
	2017	-	0.4	0.1	1.0	-	-	7.1	4.5	0.2	0.6	0.7	-	0.7	1.8	15.8	-	33.0
	2020	-	0.5	0.1	1.0	-	-	7.2	4.7	0.2	0.6	0.7	-	0.7	1.9	16.5	-	34.2
	2023	-	0.5	0.1	1.1	-	-	7.3	4.9	0.2	0.6	0.7	-	0.8	2.0	17.2	-	35.4
	2026	-	0.5	0.1	1.1	-	-	7.4	5.1	0.3	0.7	0.7	-	0.8	2.0	17.7	-	36.3
	2029	-	0.5	0.1	1.1	-	-	7.5	5.2	0.3	0.7	0.7	-	0.7	2.1	18.3	-	37.3
Food Retail	2014	-	0.3	0.1	1.2	-	3.3	2.9	1.8	0.1	0.4	0.3	10.0	0.5	0.6	7.5	-	28.9
	2017	-	0.4	0.1	1.3	-	3.3	2.9	1.8	0.1	0.4	0.3	10.1	0.5	0.6	7.5	-	29.2
	2020	-	0.4	0.1	1.3	-	3.5	2.9	1.9	0.1	0.4	0.3	10.5	0.5	0.6	7.8	-	30.3
	2023	-	0.4	0.1	1.4	-	3.6	3.0	1.9	0.1	0.4	0.4	10.9	0.5	0.6	8.0	-	31.4
	2026	-	0.4	0.1	1.4	-	3.7	3.0	2.0	0.1	0.4	0.4	11.2	0.5	0.7	8.2	-	32.1
	2029	-	0.4	0.1	1.5	-	3.8	3.1	2.0	0.1	0.5	0.4	11.5	0.5	0.7	8.3	-	32.9

Exhibit 126 Electric Peak Loads, by Milestone Year, End Use and Sub sector Type, Island Interconnected Region (MW) (cont'd…)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Large Accomodation	2014	-	0.2	0.0	5.6	0.0	1.2	1.0	0.9	0.1	0.2	0.1	0.2	1.1	0.4	5.2	-	16.3
	2017	-	0.2	0.0	5.7	0.0	1.2	1.0	0.9	0.1	0.2	0.1	0.2	1.1	0.4	5.3	-	16.6
	2020	-	0.2	0.0	6.0	0.0	1.2	1.1	0.9	0.1	0.2	0.1	0.2	1.1	0.5	5.6	-	17.4
	2023	-	0.2	0.0	6.3	0.0	1.2	1.1	1.0	0.1	0.2	0.2	0.2	1.2	0.5	5.9	-	18.1
	2026	-	0.2	0.0	6.5	0.0	1.3	1.1	1.0	0.1	0.2	0.1	0.2	1.2	0.5	6.0	-	18.6
	2029	-	0.2	0.0	6.8	0.0	1.3	1.1	1.0	0.1	0.2	0.1	0.2	1.2	0.5	6.3	-	19.2
Small Accomodation	2014	-	0.1	0.0	2.6	-	0.3	0.6	0.2	0.0	0.1	0.1	0.1	0.3	0.2	2.8	-	7.3
	2017	-	0.1	0.0	2.7	-	0.3	0.6	0.2	0.0	0.1	0.1	0.1	0.3	0.2	2.8	-	7.4
	2020	-	0.1	0.0	2.8	-	0.3	0.6	0.2	0.0	0.1	0.1	0.1	0.3	0.2	2.9	-	7.7
	2023	-	0.1	0.0	2.9	-	0.3	0.6	0.2	0.1	0.1	0.1	0.1	0.3	0.2	3.0	-	8.0
	2026	-	0.1	0.0	3.0	-	0.3	0.6	0.2	0.1	0.1	0.1	0.1	0.3	0.2	3.1	-	8.2
	2029	-	0.1	0.0	3.1	-	0.3	0.6	0.3	0.1	0.1	0.1	0.1	0.3	0.2	3.2	-	8.4
Healthcare	2014	-	0.5	0.1	3.1	0.1	3.1	0.7	3.6	0.1	0.9	0.5	0.2	2.9	0.9	16.2	-	32.9
	2017	-	0.5	0.1	3.1	0.1	3.2	0.7	3.6	0.1	1.0	0.5	0.2	2.9	0.9	16.3	-	33.1
	2020	-	0.5	0.1	3.2	0.1	3.3	0.7	3.8	0.1	1.0	0.5	0.2	2.9	0.9	16.7	-	33.9
	2023	-	0.5	0.1	3.4	0.1	3.3	0.7	3.9	0.1	1.1	0.5	0.2	2.9	0.9	17.1	-	34.9
	2026	-	0.6	0.1	3.5	0.1	3.4	0.7	4.0	0.2	1.1	0.5	0.2	2.9	0.9	17.4	-	35.6
	2029	-	0.6	0.1	3.7	0.1	3.5	0.7	4.1	0.2	1.1	0.5	0.2	2.9	1.0	17.8	-	36.3
Schools	2014	-	1.1	0.2	2.0	-	0.5	9.3	1.3	0.2	0.2	0.8	0.1	1.5	0.1	25.7	-	43.1
	2017	-	1.2	0.2	2.1	-	0.5	9.3	1.3	0.2	0.2	0.8	0.1	1.5	0.1	26.1	-	43.6
	2020	-	1.2	0.2	2.2	-	0.6	9.5	1.4	0.2	0.2	0.8	0.1	1.5	0.1	27.4	-	45.5
	2023	-	1.3	0.2	2.3	-	0.6	9.7	1.5	0.2	0.3	0.8	0.1	1.5	0.2	28.7	-	47.4
	2026	-	1.4	0.2	2.4	-	0.6	9.8	1.5	0.2	0.3	0.8	0.1	1.5	0.2	29.7	-	48.7
	2029	-	1.4	0.3	2.5	-	0.6	9.9	1.6	0.2	0.3	0.8	0.1	1.5	0.2	30.9	-	50.3
Universities and Colleges	2014	-	1.5	0.1	0.4	0.1	1.1	6.4	5.4	0.3	0.7	0.5	0.4	0.8	0.5	3.8	-	22.0
	2017	-	1.6	0.1	0.5	0.1	1.1	6.4	5.4	0.3	0.8	0.4	0.4	0.8	0.5	3.9	-	22.2
	2020	-	1.6	0.1	0.5	0.1	1.1	6.3	5.5	0.3	0.8	0.4	0.4	0.7	0.6	4.2	-	22.7
	2023	-	1.7	0.1	0.5	0.1	1.1	6.3	5.6	0.3	0.8	0.4	0.4	0.7	0.6	4.4	-	23.1
	2026	-	1.7	0.1	0.6	0.1	1.1	6.2	5.7	0.3	0.8	0.4	0.4	0.7	0.7	4.5	-	23.5
	2029	-	1.8	0.1	0.6	0.1	1.2	6.2	5.7	0.3	0.9	0.4	0.4	0.7	0.7	4.7	-	23.8
Warehouse/Wholesale	2014	-	0.2	0.1	0.7	-	-	3.6	0.6	0.2	0.6	0.3	1.0	0.5	0.0	7.8	-	15.6
	2017	-	0.2	0.1	0.8	-	-	3.6	0.6	0.2	0.6	0.3	1.0	0.5	0.0	8.0	-	15.8
	2020	-	0.3	0.1	0.8	-	-	3.7	0.6	0.2	0.6	0.3	1.1	0.5	0.0	8.4	-	16.5
	2023	-	0.3	0.1	0.9	-	-	3.7	0.6	0.2	0.7	0.3	1.1	0.5	0.0	8.7	-	17.1
	2026	-	0.3	0.1	0.9	-	-	3.8	0.6	0.2	0.7	0.3	1.2	0.5	0.1	9.0	-	17.5
	2029	-	0.3	0.1	0.9	-	-	3.8	0.7	0.2	0.7	0.3	1.2	0.5	0.1	9.3	-	18.0

Exhibit 126 Electric Peak Loads, by Milestone Year, End Use and Sub sector Type, Island Interconnected Region (MW) (cont'd…)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Restaurants	2014	-	0.1	0.0	7.1	-	12.6	0.3	0.5	0.0	0.1	0.1	2.0	1.2	0.4	3.6	-	27.9
	2017	-	0.1	0.0	7.2	-	12.8	0.3	0.5	0.0	0.1	0.1	2.0	1.2	0.4	3.7	-	28.4
	2020	-	0.1	0.0	7.6	-	13.5	0.3	0.6	0.0	0.1	0.1	2.1	1.2	0.4	4.0	-	29.9
	2023	-	0.1	0.0	7.9	-	14.0	0.3	0.6	0.0	0.1	0.1	2.2	1.2	0.4	4.3	-	31.2
	2026	-	0.1	0.0	8.1	-	14.4	0.3	0.6	0.0	0.1	0.1	2.2	1.2	0.4	4.5	-	32.1
	2029	-	0.1	0.0	8.4	-	14.9	0.3	0.6	0.0	0.1	0.1	2.3	1.2	0.4	4.7	-	33.2
Large Other Buildings	2014	-	1.0	0.2	2.9	0.1	3.0	4.9	3.2	0.2	0.6	0.5	1.9	1.5	1.0	13.6	-	34.5
	2017	-	1.1	0.2	3.0	0.1	3.0	4.9	3.3	0.2	0.6	0.5	1.9	1.5	1.0	13.8	-	35.0
	2020	-	1.1	0.2	3.1	0.1	3.2	4.9	3.5	0.2	0.7	0.5	2.0	1.5	1.1	14.5	-	36.5
	2023	-	1.2	0.2	3.3	0.1	3.3	5.0	3.6	0.2	0.7	0.5	2.1	1.5	1.1	15.0	-	37.8
	2026	-	1.2	0.2	3.4	0.1	3.4	5.1	3.7	0.2	0.7	0.5	2.1	1.5	1.2	15.4	-	38.7
	2029	-	1.3	0.2	3.5	0.1	3.5	5.1	3.8	0.2	0.8	0.5	2.2	1.5	1.2	15.9	-	39.8
Small Other Buildings	2014	-	0.9	0.2	2.6	0.0	2.7	4.7	2.7	0.2	0.6	0.5	1.8	1.2	0.9	13.0	-	31.9
	2017	-	0.9	0.2	2.5	0.0	2.6	4.6	2.7	0.2	0.6	0.5	1.8	1.2	0.9	12.9	-	31.7
	2020	-	1.0	0.2	2.6	0.0	2.7	4.6	2.8	0.2	0.6	0.4	1.8	1.2	1.0	13.2	-	32.3
	2023	-	1.0	0.2	2.7	0.0	2.8	4.6	2.9	0.2	0.7	0.4	1.9	1.2	1.0	13.7	-	33.3
	2026	-	1.1	0.2	2.8	0.0	2.9	4.6	2.9	0.2	0.7	0.4	1.9	1.2	1.0	14.1	-	34.1
	2029	-	1.1	0.2	2.9	0.0	2.9	4.7	3.0	0.2	0.7	0.4	2.0	1.2	1.1	14.4	-	34.9
Other Institutional	2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-Buildings	2014	-	-	-	-	-	-	-	-	30.5	-	-	-	-	-	-	-	30.5
	2017	-	-	-	-	-	-	-	-	30.9	-	-	-	-	-	-	-	30.9
	2020	-	-	-	-	-	-	-	-	32.0	-	-	-	-	-	-	-	32.0
	2023	-	-	-	-	-	-	-	-	32.9	-	-	-	-	-	-	-	32.9
	2026	-	-	-	-	-	-	-	-	33.6	-	-	-	-	-	-	-	33.6
	2029	-	-	-	-	-	-	-	-	34.3	-	-	-	-	-	-	-	34.3
Street Lighting	2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.9	4.9
	2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.8	4.8
	2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.8	4.8
	2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.8	4.8
	2026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.8	4.8
	2029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.8	4.8
Grand Total	2014	0.0	13.4	2.3	34.0	0.5	29.6	63.6	39.0	33.0	7.4	6.0	18.5	16.1	14.9	179.6	4.9	462.7
	2017	0.0	13.9	2.4	34.6	0.5	30.0	63.3	39.7	33.5	7.6	5.8	18.7	16.0	15.1	182.5	4.8	468.5
	2020	0.0	14.7	2.5	36.4	0.5	31.2	64.4	41.5	34.7	8.1	5.9	19.5	16.0	15.8	189.7	4.8	485.9
	2023	0.0	15.6	2.7	38.1	0.5	32.4	65.5	43.3	35.8	8.5	5.9	20.2	16.1	16.6	197.3	4.8	503.4
	2026	0.0	16.3	2.8	39.4	0.6	33.3	66.0	44.7	36.5	8.9	5.8	20.8	16.1	17.1	202.8	4.8	515.9
	2029	0.0	17.0	2.9	40.9	0.6	34.3	66.7	46.2	37.3	9.3	5.8	21.4	16.2	17.7	209.1	4.8	530.3

Exhibit 127 Electric Peak Loads, by Milestone Year, End Use and Sub sector Type, Labrador Interconnected Region (MW)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Small Office	2014	0.0	0.1	0.0	0.0	-	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	0.5	-	0.8
	2017	0.0	0.1	0.0	0.0	-	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	0.5	-	0.8
	2020	0.0	0.1	0.0	0.0	-	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	0.5	-	0.9
	2023	0.0	0.1	0.0	0.0	-	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	0.5	-	0.9
	2026	0.0	0.1	0.0	0.0	-	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	0.5	-	0.9
	2029	0.0	0.1	0.0	0.0	-	-	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	0.5	-	0.9
Large Non-food Retail	2014	0.0	0.0	0.0	0.1	-	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.9	-	1.8
	2017	0.0	0.0	0.0	0.1	-	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.9	-	1.8
	2020	0.0	0.0	0.0	0.1	-	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.9	-	1.8
	2023	0.0	0.0	0.0	0.1	-	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.9	-	1.8
	2026	0.0	0.0	0.0	0.1	-	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.9	-	1.8
	2029	0.0	0.0	0.0	0.1	-	0.1	0.4	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.9	-	1.9
Small Non-food Retail	2014	0.0	0.0	0.0	0.1	-	-	0.7	0.2	0.0	0.1	0.1	-	0.1	0.0	2.2	-	3.6
	2017	0.0	0.0	0.0	0.1	-	-	0.7	0.2	0.0	0.1	0.1	-	0.1	0.0	2.2	-	3.6
	2020	0.0	0.0	0.0	0.1	-	-	0.7	0.2	0.0	0.1	0.1	-	0.1	0.0	2.3	-	3.7
	2023	0.0	0.0	0.0	0.1	-	-	0.7	0.2	0.0	0.1	0.1	-	0.1	0.1	2.4	-	3.7
	2026	0.0	0.0	0.0	0.1	-	-	0.7	0.2	0.0	0.1	0.1	-	0.1	0.1	2.4	-	3.8
	2029	0.0	0.0	0.0	0.1	-	-	0.7	0.2	0.0	0.1	0.1	-	0.1	0.1	2.5	-	3.9
Food Retail	2014	0.0	0.0	0.0	0.1	-	0.2	0.2	0.0	0.0	0.0	0.0	0.5	0.0	0.0	1.6	-	2.6
	2017	0.0	0.0	0.0	0.1	-	0.2	0.1	0.0	0.0	0.0	0.0	0.5	0.0	0.0	1.6	-	2.6
	2020	0.0	0.0	0.0	0.1	-	0.2	0.1	0.0	0.0	0.0	0.0	0.5	0.0	0.0	1.6	-	2.6
	2023	0.0	0.0	0.0	0.1	-	0.2	0.1	0.1	0.0	0.0	0.0	0.5	0.0	0.0	1.6	-	2.6
	2026	0.0	0.0	0.0	0.1	-	0.2	0.1	0.1	0.0	0.0	0.0	0.5	0.0	0.0	1.6	-	2.6
	2029	0.0	0.0	0.0	0.1	-	0.2	0.1	0.1	0.0	0.0	0.0	0.5	0.0	0.0	1.6	-	2.6
Large Accomodation	2014	0.0	0.0	0.0	0.6	-	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.7	-	1.8
	2017	0.0	0.0	0.0	0.6	-	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.7	-	1.8
	2020	0.0	0.0	0.0	0.6	-	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.7	-	1.8
	2023	0.0	0.0	0.0	0.6	-	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.7	-	1.8
	2026	0.0	0.0	0.0	0.6	-	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.7	-	1.8
	2029	0.0	0.0	0.0	0.6	-	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.7	-	1.8
Small Accomodation	2014	0.0	0.0	0.0	0.1	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-	0.2
	2017	0.0	0.0	0.0	0.1	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-	0.2
	2020	0.0	0.0	0.0	0.1	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-	0.2
	2023	0.0	0.0	0.0	0.1	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-	0.2
	2026	0.0	0.0	0.0	0.1	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-	0.3
	2029	0.0	0.0	0.0	0.1	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-	0.3
Healthcare	2014	0.1	0.1	0.0	0.7	0.0	0.4	0.1	0.5	0.0	0.1	0.1	0.0	0.4	0.0	0.8	-	3.4
	2017	0.1	0.1	0.0	0.6	0.0	0.3	0.1	0.4	0.0	0.1	0.1	0.0	0.3	0.0	0.6	-	2.6
	2020	0.1	0.1	0.0	0.6	0.0	0.3	0.1	0.4	0.0	0.1	0.1	0.0	0.3	0.0	0.6	-	2.6
	2023	0.1	0.1	0.0	0.6	0.0	0.3	0.1	0.4	0.0	0.1	0.0	0.0	0.3	0.0	0.6	-	2.6
	2026	0.1	0.1	0.0	0.6	0.0	0.3	0.1	0.4	0.0	0.1	0.0	0.0	0.3	0.0	0.6	-	2.6
	2029	0.1	0.1	0.0	0.6	0.0	0.4	0.1	0.4	0.0	0.1	0.0	0.0	0.3	0.0	0.6	-	2.6

Exhibit 127 Electric Peak Loads, by Milestone Year, End Use and Sub sector Type, Labrador Interconnected Region (MW) (cont'd…)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Schools	2014	0.0	0.1	0.0	0.1	-	0.0	0.5	0.1	0.0	0.0	0.0	0.0	0.1	0.0	1.8	-	2.8
	2017	0.0	0.1	0.0	0.1	-	0.0	0.5	0.1	0.0	0.0	0.0	0.0	0.1	0.0	1.8	-	2.8
	2020	0.0	0.1	0.0	0.1	-	0.0	0.5	0.1	0.0	0.0	0.0	0.0	0.1	0.0	1.8	-	2.9
	2023	0.0	0.1	0.0	0.1	-	0.0	0.5	0.1	0.0	0.0	0.0	0.0	0.1	0.0	1.8	-	2.9
	2026	0.0	0.1	0.0	0.1	-	0.0	0.5	0.1	0.0	0.0	0.0	0.0	0.1	0.0	1.9	-	2.9
	2029	0.0	0.1	0.0	0.1	-	0.0	0.5	0.1	0.0	0.0	0.0	0.0	0.1	0.0	1.9	-	2.9
Universities and Colleges	2014	0.0	0.0	0.0	0.0	-	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	-	0.7
	2017	0.0	0.0	0.0	0.0	-	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	-	0.7
	2020	0.0	0.0	0.0	0.0	-	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	-	0.7
	2023	0.0	0.0	0.0	0.0	-	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	-	0.7
	2026	0.0	0.0	0.0	0.0	-	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	-	0.7
	2029	0.0	0.0	0.0	0.0	-	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	-	0.7
Warehouse/Wholesale	2014	0.0	0.0	0.0	0.1	-	-	0.3	0.1	0.0	0.0	0.0	0.1	0.0	0.0	1.1	-	1.7
	2017	0.0	0.0	0.0	0.1	-	-	0.3	0.1	0.0	0.0	0.0	0.1	0.0	0.0	1.1	-	1.7
	2020	0.0	0.0	0.0	0.1	-	-	0.3	0.1	0.0	0.0	0.0	0.1	0.0	0.0	1.1	-	1.7
	2023	0.0	0.0	0.0	0.1	-	-	0.3	0.1	0.0	0.0	0.0	0.1	0.0	0.0	1.1	-	1.7
	2026	0.0	0.0	0.0	0.1	-	-	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	1.1	-	1.8
	2029	0.0	0.0	0.0	0.1	-	-	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	1.1	-	1.8
Restaurants	2014	0.0	0.0	0.0	0.7	-	1.2	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.3	-	2.5
	2017	0.0	0.0	0.0	0.7	-	1.2	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.3	-	2.5
	2020	0.0	0.0	0.0	0.7	-	1.2	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.3	-	2.5
	2023	0.0	0.0	0.0	0.7	-	1.2	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.3	-	2.5
	2026	0.0	0.0	0.0	0.7	-	1.2	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.3	-	2.6
	2029	0.0	0.0	0.0	0.7	-	1.2	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.3	-	2.6
Large Other Buildings	2014	0.1	0.2	0.0	2.0	0.0	1.8	1.4	1.0	0.0	0.3	0.2	0.7	0.7	0.1	6.1	-	14.8
	2017	0.1	0.2	0.0	2.1	0.0	1.8	1.3	1.0	0.0	0.3	0.2	0.7	0.7	0.1	6.1	-	14.8
	2020	0.1	0.2	0.0	2.1	0.0	1.8	1.3	1.0	0.0	0.3	0.2	0.7	0.7	0.1	6.2	-	14.8
	2023	0.1	0.2	0.0	2.1	0.0	1.8	1.3	1.0	0.0	0.3	0.2	0.7	0.7	0.1	6.2	-	14.8
	2026	0.1	0.2	0.0	2.1	0.0	1.8	1.3	1.0	0.0	0.3	0.2	0.7	0.7	0.1	6.2	-	14.8
	2029	0.1	0.2	0.0	2.1	0.0	1.8	1.3	1.0	0.0	0.3	0.2	0.7	0.7	0.1	6.2	-	14.8
Small Other Buildings	2014	0.1	0.2	0.0	1.0	0.0	1.0	1.1	0.6	0.0	0.2	0.1	0.4	0.4	0.1	4.3	-	9.6
	2017	0.1	0.2	0.0	1.0	0.0	1.0	1.1	0.6	0.0	0.2	0.1	0.4	0.4	0.1	4.3	-	9.6
	2020	0.1	0.2	0.0	1.1	0.0	1.0	1.1	0.6	0.0	0.2	0.1	0.4	0.4	0.1	4.4	-	9.8
	2023	0.1	0.2	0.0	1.1	0.0	1.1	1.1	0.6	0.0	0.2	0.1	0.4	0.4	0.1	4.5	-	10.0
	2026	0.1	0.2	0.0	1.1	0.0	1.1	1.1	0.7	0.0	0.2	0.1	0.4	0.4	0.1	4.6	-	10.2
	2029	0.1	0.2	0.0	1.1	0.0	1.1	1.1	0.7	0.0	0.2	0.1	0.5	0.4	0.1	4.7	-	10.4

Exhibit 127 Electric Peak Loads, by Milestone Year, End Use and Sub sector Type, Labrador Interconnected Region (MW) (cont'd…)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Other Institutional	2014	0.2	0.2	-	0.9	-	0.2	2.2	1.3	0.1	0.3	0.2	0.2	0.7	0.1	2.7	-	9.2
	2017	0.2	0.2	-	0.9	-	0.2	2.2	1.3	0.1	0.3	0.2	0.2	0.7	0.1	9.0	-	15.5
	2020	0.2	0.2	-	0.9	-	0.2	2.1	1.3	0.1	0.3	0.2	0.2	0.7	0.1	13.5	-	20.0
	2023	0.2	0.2	-	0.9	-	0.2	2.1	1.3	0.1	0.3	0.2	0.2	0.7	0.1	13.5	-	20.0
	2026	0.2	0.2	-	0.9	-	0.2	2.1	1.3	0.1	0.4	0.2	0.2	0.7	0.1	13.5	-	20.0
	2029	0.2	0.2	-	0.9	-	0.2	2.1	1.3	0.1	0.4	0.2	0.2	0.6	0.1	13.6	-	20.0
Non-Buildings	2014	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	0.8
	2017	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	0.8
	2020	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	0.8
	2023	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	0.8
	2026	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	0.8
	2029	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	0.8
Street Lighting	2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	0.2
	2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3
	2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3
	2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3
	2026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3
	2029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3
Grand Total	2014	0.6	0.9	0.1	6.6	0.0	5.0	7.2	4.1	0.9	1.1	0.8	2.2	2.8	0.5	23.4	0.2	56.4
	2017	0.6	0.9	0.1	6.4	0.0	5.0	7.0	4.1	0.9	1.1	0.8	2.2	2.6	0.4	29.6	0.3	62.0
	2020	0.6	0.9	0.1	6.5	0.0	5.0	7.0	4.1	1.0	1.1	0.8	2.2	2.6	0.5	34.4	0.3	67.0
	2023	0.6	1.0	0.1	6.5	0.0	5.1	6.9	4.2	1.0	1.2	0.7	2.2	2.6	0.5	34.6	0.3	67.4
	2026	0.6	1.0	0.2	6.6	0.0	5.1	6.8	4.2	1.0	1.2	0.7	2.2	2.5	0.5	34.8	0.3	67.8
	2029	0.6	1.0	0.2	6.7	0.0	5.2	6.8	4.3	1.0	1.2	0.7	2.3	2.5	0.5	35.1	0.3	68.2

Exhibit 128 Electric Peak Loads, by Milestone Year, End Use and Sub sector Type, Isolated Region (MW)

Sub-Sector	Year	Block Heaters	Computer Equipment	Computer Servers	Domestic Hot Water	Elevator	Food Service Equipment	General Lighting	HVAC Fans & Pumps	Miscellaneous Equipment	Other Plug Loads	Outdoor Lighting	Refrigeration	Secondary Lighting	Space Cooling	Space Heating	Street Lighting	Grand Total
Labrador Isolated C/I Buildings	2014	0.1	0.2	-	0.1	-	0.2	1.2	0.2	-	0.1	0.1	0.4	0.2	-	0.2	-	3.0
	2017	0.1	0.2	-	0.1	-	0.2	1.2	0.2	-	0.1	0.1	0.4	0.2	-	0.2	-	2.9
	2020	0.1	0.2	-	0.1	-	0.2	1.3	0.2	-	0.1	0.1	0.5	0.3	-	0.2	-	3.3
	2023	0.1	0.2	-	0.1	-	0.2	1.3	0.2	-	0.1	0.1	0.5	0.3	-	0.3	-	3.4
	2026	0.1	0.2	-	0.1	-	0.2	1.4	0.2	-	0.1	0.1	0.5	0.3	-	0.3	-	3.6
	2029	0.1	0.2	-	0.1	-	0.2	1.4	0.3	-	0.1	0.1	0.5	0.3	-	0.3	-	3.7
Island Isolated C/I Buildings	2014	-	0.0	-	-	-	0.0	0.1	0.0	-	0.0	0.0	0.0	0.0	-	-	-	0.2
	2017	-	0.0	-	-	-	0.0	0.1	0.0	-	0.0	0.0	0.0	0.0	-	-	-	0.2
	2020	-	0.0	-	-	-	0.0	0.1	0.0	-	0.0	0.0	0.0	0.0	-	-	-	0.3
	2023	-	0.0	-	-	-	0.0	0.1	0.0	-	0.0	0.0	0.0	0.0	-	-	-	0.3
	2026	-	0.0	-	-	-	0.0	0.1	0.0	-	0.0	0.0	0.0	0.0	-	-	-	0.3
	2029	-	0.0	-	-	-	0.0	0.1	0.0	-	0.0	0.0	0.1	0.0	-	-	-	0.3
Street Lighting	2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1
	2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1
	2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1
	2023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1
	2026	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1
	2029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1
Grand Total	2014	0.1	0.2	-	0.1	-	0.2	1.3	0.2	-	0.1	0.1	0.4	0.3	-	0.2	0.1	3.3
	2017	0.1	0.2	-	0.1	-	0.2	1.3	0.2	-	0.1	0.1	0.4	0.3	-	0.2	0.1	3.2
	2020	0.1	0.2	-	0.1	-	0.2	1.4	0.2	-	0.1	0.1	0.5	0.3	-	0.2	0.1	3.7
	2023	0.1	0.2	-	0.1	-	0.2	1.5	0.3	-	0.1	0.1	0.5	0.3	-	0.3	0.1	3.8
	2026	0.1	0.2	-	0.1	-	0.3	1.5	0.3	-	0.2	0.1	0.6	0.3	-	0.3	0.1	3.9
	2029	0.1	0.2	-	0.1	-	0.3	1.5	0.3	-	0.2	0.1	0.6	0.3	-	0.3	0.1	4.1

Appendix E Background-Section 7: Technology Assessment: Energy Efficiency Measures

Introduction

The following exhibits show the full list of energy efficiency and peak demand measures that were considered for analysis, with comments for the measures not included in this study.

Exhibit 129 Full List of Potential Energy Efficiency Measures for the Commercial Sector

Energy Efficiency Measures	Include	Comments
LIGHTING		General comment: ensure resolution of technology aligns with baseline; need to group
LED Screw-In Lamps	x	
LED High Bay Fixtures	x	MH baseline
LED Tubular Lamps	x	T8 baseline since T12 are being phased out
LED Troffers	x	
LED Outdoor Fixtures	x	To include representative lighting fixture for outdoor applications
LED Exit Signs	x	
LED Downlight Fixture or Retrofit Kit		Potential to be captured by LED Screw-In Lamps measure
Lighting Controls		More descriptive measures included below
High Performance T8 Fixtures	x	T8 baseline since T12 are being phased out
Low Ballast-Factor T8 systems		Removed since this is now the baseline (i.e. T12 being phased out)
T5HO Fixtures	x	For high bay (>16 ft) applications
Occupancy Sensors (Lighting)	x	
Dimming Control (Daylighting)	x	
Lighting Controls (Outdoor)	x	
Billboard lighting		Exclude since this is very specific
CFLs		To exclude since this is a transition technology (i.e. LEDs capture opportunity)
HVAC		
High-Efficiency Air Source Heat Pumps	x	
Ductless Mini-Split Heat Pumps	x	
Ground Source Heat Pumps	x	Institutional sector is presently main market due to long payback
Hotel Occupancy Sensors	x	Consider only for hotels and expand to include lighting. Originally HVAC Occupancy Sensors.
Demand Control Ventilation (DCV)	x	
High Efficiency HVAC Air Filters		Very specific measure beyond resolution of baseline
VFDs on HVAC Motors	x	
Ventilation Heat Recovery	x	
Air Curtains		Included under building envelope category
Radiant Infrared Heaters	x	
High Efficiency Chillers	x	
High Efficiency RTUs	x	
Adjustable Speed Drives		Same as VFDs measure included above
Premium Efficiency Motors	x	
Advanced Building Automation Systems	x	
Building Recommissioning	x	

Exhibit 129 Full List of Potential Energy Efficiency Measures for the Commercial Sector (cont'd…)

Energy Efficiency Measures	Include	Comments
Programmable Thermostats	x	
Demand Control Kitchen Ventilation (DCKV)	x	Specific to sub sectors with commercial kitchens
REFRIGERATION		General Comment: There is a lot of very specific measures that are beyond resolution of baseline
LED Refrigerated Display Case Lighting	x	Moved from Lighting end use
Air Curtains		Included under building envelope category
Variable Speed Drives		Generally not added to existing compressor motors
Cooler Night Covers	x	
Refrigerated Cases with Doors	x	Original measure was focused on adding doors to existing display cases, which is not common
ECM Motors and Evaporator Fan Motor Controllers	x	Included ECM motors as well
Freezer Defrost Controllers	x	
Outside Air Economizers for Walk-In Coolers		Not a mature or commonly implemented measure
Refrigerated Vending Machine Controllers	x	Vending Miser
High Efficiency Compressors	x	Usually not practical as a retrofit
ECM Evaporator Fan Motor		Merged with evaporator fan motor controllers measure
Automatic Door Closers (Walk-In Coolers)	x	
Door Gaskets		Excluded since there is a very wide range of savings
VSD Screw Compressors		Covered by high efficiency compressors measure
Refrigeration Heat Recovery	x	Focus on arenas
Refrigeration Controls	x	To be represented by floating head pressure controls
Refrigeration Free Cooling		Not a mature or commonly implemented measure
CEE-Rated Refrigerators and Freezers	x	May be difficult to get cost data
High efficiency supermarket refrigeration		Covered by other measures
DOMESTIC HOT WATER		
On-Demand Water Heaters	x	To consider only for hotels
High-Efficiency Water Heaters		Not available -- ENERGY STAR electric water heaters are actually HPWHs
Heat Pump Water Heaters	x	
Efficient CIP Systems (Clean In Place)		Excluded since this is an industrial measure
Low-Flow Pre-Rinse Spray Valves	x	To consider only for sub sector with commercial kitchens
Low-Flow Faucet Aerators	x	
Low-Flow Showerheads	x	To consider only for hotels
Drainwater Heat Recovery	x	To consider only for hotels
Tankless Water Heaters		Excluded since this is identical to on-demand water heaters
PROCESS		
Compressed Air - air entraining nozzles		Excluded since this is an industrial measure
APPLIANCES (ENERGY STAR)		
ENERGY STAR Dishwashers	x	To consider only for sub sector with commercial kitchens

Exhibit 129 Full List of Potential Energy Efficiency Measures for the Commercial Sector (cont'd…)

Energy Efficiency Measures	Include	Comments
Hot Food Holding Cabinets		Excluded since this is a very specific application
Commercial Clothes Washers		To be considered by residential sector
High-Efficiency Cooking Equipment	x	Measure added to capture other specific measures
Fryers		Too specific -- general measure added above
Griddles		Too specific -- general measure added above
Steam Cookers		Too specific -- general measure added above
Convection Ovens		Too specific -- general measure added above
High-Efficiency Ice makers		Exclude since there is no incremental cost for ENERGY STAR ice makers
Combination Oven		Too specific -- general measure added above
Induction Ranges		Too specific -- general measure added above
Clothes Dryers		Excluded since there is no ENERGY STAR category for clothes dryer. Better technology (e.g. microwave and heat pumps) is still many years away.
Vending Machines		Excluded since this is covered by VendingMiser measure
BUILDING ENVELOPE		
Roof Insulation	x	
Wall Insulation	x	
ENERGY STAR Windows		Covered below
High Performance Glazing Systems	x	
Door Systems		Too specific and covered by measures immediately above and below
Air Curtains	x	Focus on sub sectors with loading docks and/or doors that are opening and closing often
Skylights		Excluded since this is too specific and not very common
Slab/Floor Insulation		Included in new construction measures
COMPUTER EQUIPMENT (ENERGY STAR)		
ENERGY STAR Computers	x	
ENERGY STAR Office Equipment	x	
Energy-Efficient Server Technologies	x	To consider enterprise servers, since these are more wide-spread throughout building stock
NEW CONSTRUCTION		
New Construction (25% More Efficient)	x	
New Construction (40% More Efficient)	x	
STREET LIGHTING		
Electrodeless Induction Lighting		Considering LED street lighting instead
Dimming Controls		Considering LED street lighting instead
LED Street Lighting	x	Not including controls

Exhibit 130 Full List of Potential Peak Demand Measures for the Commercial Sector

Peak Demand Measures	Include	Comments
HVAC		
Building Automated Controls		Demand impacts covered by EE measures
Electric Thermal Storage	x	
Space Heating Controls	x	To consider utility controlled load switch
Load Shifting (Preheating)		See electric thermal storage measure
VFDs		Demand impacts covered by EE measure
HVAC Fans and Pumps	x	
DOMESTIC HOT WATER		
Electric DHW Controls	x	To consider utility controlled load switch
LIGHTING		
Street Lighting and Parking Lot Lighting Controls		Demand impacts covered by EE measures
Lighting Controls	x	Control of non-critical loads
REFRIGERATION		
Refrigeration Controls	x	Control of non-critical loads
OTHER		
Soft Starters		Industrial measure (i.e. for large motors)
Plug Load Controls		Not relevant to commercial sector
Kitchen and Laundry Load Controls		Demand impacts covered by EE measures
Fuel Switching		Outside of study scope
Curtailment		Outside of study scope

Appendix F Background-Section 8: Economic Potential: Electric Energy Forecast

Introduction

The following three exhibits provide the economic potential energy efficiency results for the island Interconnected, Labrador Interconnected, and Isolated regions, respectively. The three exhibits following those provide the economic potential load reduction results for the Island Interconnected, Labrador Interconnected and Isolated regions respectively. The latter three exhibits do not include the load reduction associated with energy efficiency measures, which were already presented by region in Exhibit 52.

Exhibit 131 Total Economic Potential Electricity Savings by End Use, Sub sector and Milestone Year, Island Interconnected (MWh/yr.)

Subsector	Milestone Years	Space Heating	General Lighting	HVAC Fans & Pumps	Refrigeration	Domestic Hot Water	Computer Equipment	Secondary Lighting	Outdoor Lighting	Street Lighting	Space Cooling	Other Plug Loads	Food Service Equipment	Computer Servers	TOTAL
Large Office	2017	35,396	21,111	14,702	112	2,009	7,233	4,890	1,856	-	2,385	2,000	-	643	**92,337**
	2020	40,728	20,671	15,130	118	2,047	9,231	4,640	2,251	-	2,430	2,048	-	1,093	**100,389**
	2023	47,060	20,538	15,984	132	2,129	9,532	4,441	2,669	-	2,563	2,101	-	1,114	**108,262**
	2026	51,318	25,502	16,999	148	2,227	9,797	4,260	2,988	-	2,728	2,149	-	1,135	**119,251**
	2029	58,110	25,654	18,382	170	2,363	10,076	4,119	2,902	-	2,967	2,199	-	1,156	**128,099**
Small Office	2017	43,695	15,509	6,925	-	1,486	5,876	1,806	1,509	-	2,370	211	-	523	**79,910**
	2020	44,071	15,207	7,141	-	1,618	7,533	1,710	1,830	-	2,393	226	-	889	**82,619**
	2023	45,395	15,168	7,670	-	1,794	7,766	1,634	2,175	-	2,497	240	-	907	**85,245**
	2026	45,364	18,334	8,223	-	1,973	7,974	1,560	2,432	-	2,606	251	-	924	**89,642**
	2029	47,874	19,050	8,975	-	2,145	8,191	1,497	2,357	-	2,767	263	-	941	**94,060**
Large Non-food Retail	2017	9,064	16,499	9,307	2,188	453	561	1,346	1,372	-	936	774	-	-	**42,500**
	2020	10,503	16,111	9,430	2,213	466	721	1,282	1,667	-	942	789	-	-	**44,124**
	2023	12,172	15,965	9,764	2,294	496	744	1,236	1,988	-	981	804	-	-	**46,444**
	2026	13,875	15,841	10,122	2,380	529	765	1,192	2,230	-	1,024	819	-	-	**48,778**
	2029	15,705	15,864	10,614	2,502	573	787	1,158	2,174	-	1,087	835	-	-	**51,299**
Small Non-food Retail	2017	16,763	14,887	7,117	-	690	809	1,812	1,984	-	1,078	-	-	-	**45,139**
	2020	17,976	14,504	7,281	-	705	1,034	1,723	2,405	-	1,090	-	-	-	**46,719**
	2023	19,461	14,304	7,585	-	734	1,066	1,648	2,843	-	1,130	-	-	-	**48,770**
	2026	20,405	17,157	7,962	-	769	1,094	1,579	3,176	-	1,185	-	-	-	**53,328**
	2029	22,336	17,218	8,479	-	818	1,124	1,523	3,070	-	1,267	-	-	-	**55,836**
Food Retail	2017	6,396	9,878	3,832	32,765	855	651	927	1,014	-	466	746	163	-	**57,693**
	2020	7,290	9,650	3,872	32,955	872	833	894	1,232	-	467	761	326	-	**59,151**
	2023	8,394	9,545	3,992	33,738	915	857	878	1,472	-	480	776	488	-	**61,536**
	2026	9,494	9,451	4,122	34,589	961	880	864	1,654	-	494	790	543	-	**63,843**
	2029	10,667	9,433	4,303	35,824	1,024	903	860	1,618	-	517	805	543	-	**66,497**
Large Accomodation	2017	8,938	4,578	1,930	360	6,323	327	2,200	438	-	342	356	58	-	**25,850**
	2020	9,283	4,444	1,954	363	6,725	419	2,096	531	-	344	363	58	-	**26,579**
	2023	9,799	4,344	2,022	374	7,268	432	2,036	632	-	358	370	58	-	**27,692**
	2026	10,331	4,245	2,096	386	7,828	443	1,981	707	-	373	377	58	-	**28,824**
	2029	10,955	4,167	2,199	403	8,478	456	1,954	686	-	397	384	58	-	**30,135**
Small Accomodation	2017	4,595	2,328	331	0	3,245	155	627	208	-	89	169	-	-	**11,749**
	2020	4,707	2,251	338	2	3,443	198	596	252	-	90	173	-	-	**12,050**
	2023	4,896	2,185	355	7	3,696	204	577	298	-	96	176	-	-	**12,491**
	2026	5,095	2,121	375	13	3,959	209	560	333	-	103	179	-	-	**12,946**
	2029	5,336	2,064	401	20	4,258	215	550	321	-	113	183	-	-	**13,461**
Healthcare	2017	36,357	1,653	13,606	162	2,216	1,076	3,668	1,446	-	685	136	155	126	**61,285**
	2020	36,898	1,616	13,706	168	2,427	1,372	3,533	1,747	-	683	139	310	213	**62,811**
	2023	37,698	1,598	13,914	179	2,688	1,410	3,461	2,056	-	691	141	465	218	**64,521**
	2026	38,491	1,800	14,172	193	2,972	1,444	3,418	2,286	-	705	144	517	222	**66,364**
	2029	39,517	1,856	14,532	212	3,248	1,480	3,429	2,192	-	728	147	517	226	**68,083**

Exhibit 131 Total Economic Potential Electricity Savings by End Use, Sub sector and Milestone Year, Island Interconnected (MWh/yr.) (cont'd…)

Subsector	Milestone Years	Space Heating	General Lighting	HVAC Fans & Pumps	Refrigeration	Domestic Hot Water	Computer Equipment	Secondary Lighting	Outdoor Lighting	Street Lighting	Space Cooling	Other Plug Loads	Food Service Equipment	Computer Servers	TOTAL
Schools	2017	42,862	16,399	2,197	110	2,092	2,184	2,885	2,440	-	60	291	-	-	**71,520**
	2020	43,806	16,176	2,234	115	2,124	2,796	2,752	2,954	-	66	297	-	-	**73,319**
	2023	45,191	16,074	2,307	123	2,177	2,883	2,647	3,480	-	76	302	-	-	**75,262**
	2026	46,690	16,023	2,395	133	2,240	2,961	2,555	3,871	-	89	308	-	-	**77,266**
	2029	48,389	16,166	2,520	147	2,325	3,043	2,636	3,718	-	106	314	-	-	**79,363**
Universities and Colleges	2017	2,543	19,772	16,991	774	461	2,919	1,381	1,325	-	390	940	-	105	**47,602**
	2020	2,909	19,335	17,037	777	471	3,711	1,319	1,596	-	400	959	-	178	**48,693**
	2023	3,555	18,937	17,113	784	486	3,798	1,262	1,867	-	419	977	-	181	**49,379**
	2026	4,380	18,677	17,315	808	524	3,883	1,221	2,073	-	475	996	-	185	**50,537**
	2029	5,381	18,416	17,514	832	561	3,968	1,182	1,972	-	530	1,014	-	188	**51,559**
Warehouse/Wholesale	2017	8,606	11,033	658	852	526	517	423	911	-	16	-	-	-	**23,543**
	2020	10,286	10,757	677	862	533	662	392	1,098	-	17	-	-	-	**25,284**
	2023	12,266	10,620	720	930	560	682	370	1,300	-	19	-	-	-	**27,467**
	2026	14,067	10,669	759	989	584	700	347	1,445	-	21	-	-	-	**29,581**
	2029	15,992	10,567	808	1,071	616	719	489	1,387	-	24	-	-	-	**31,673**
Restaurants	2017	6,203	971	815	1,675	6,327	122	3,637	178	-	218	-	623	-	**20,767**
	2020	6,567	955	835	1,770	6,457	156	3,484	217	-	222	-	1,245	-	**21,907**
	2023	7,121	950	868	1,946	6,683	161	3,351	256	-	230	-	1,868	-	**23,433**
	2026	7,840	949	908	2,157	6,950	165	3,224	286	-	241	-	2,075	-	**24,796**
	2029	8,530	957	962	2,451	7,315	169	3,116	277	-	258	-	2,075	-	**26,109**
Large Other Buildings	2017	17,479	12,612	7,954	338	3,232	1,966	2,796	1,386	-	786	1,172	-	-	**49,721**
	2020	19,417	12,323	8,060	410	3,271	2,515	2,663	1,678	-	794	1,195	-	-	**52,326**
	2023	21,647	12,101	8,224	521	3,336	2,589	2,548	1,976	-	813	1,218	-	-	**54,974**
	2026	24,822	12,093	8,604	783	3,494	2,657	2,493	2,222	-	872	1,241	-	-	**59,281**
	2029	27,617	12,087	8,985	1,044	3,652	2,726	2,440	2,149	-	932	1,264	-	-	**62,897**
Small Other Buildings	2017	17,883	8,799	4,372	-	1,648	1,795	2,288	1,387	-	547	-	-	-	**38,719**
	2020	18,884	8,508	4,417	30	1,666	2,287	2,165	1,671	-	546	-	-	-	**40,174**
	2023	20,163	8,294	4,521	104	1,710	2,351	2,060	1,962	-	557	-	-	-	**41,722**
	2026	21,613	9,848	4,750	270	2,235	2,411	1,989	2,192	-	593	-	-	-	**45,901**
	2029	23,378	9,778	5,003	455	2,439	2,472	1,927	2,104	-	635	-	-	-	**48,192**
Street Lighting	2017	-	-	-	-	-	-	-	-	17,083	-	-	-	-	**17,083**
	2020	-	-	-	-	-	-	-	-	16,530	-	-	-	-	**16,530**
	2023	-	-	-	-	-	-	-	-	15,941	-	-	-	-	**15,941**
	2026	-	-	-	-	-	-	-	-	15,311	-	-	-	-	**15,311**
	2029	-	-	-	-	-	-	-	-	14,638	-	-	-	-	**14,638**
Grand Total	2017	256,779	156,029	90,735	39,336	31,564	26,192	30,686	17,455	17,083	10,367	6,796	998	1,397	**685,417**
	2020	273,325	152,508	92,111	39,782	32,827	33,467	29,250	21,127	16,530	10,483	6,950	1,938	2,373	**712,673**
	2023	294,817	150,623	95,040	41,131	34,672	34,476	28,149	24,974	15,941	10,911	7,105	2,879	2,419	**743,138**
	2026	313,786	162,711	98,802	42,849	37,244	35,383	27,243	27,896	15,311	11,510	7,255	3,192	2,464	**785,647**
	2029	339,787	163,279	103,678	45,132	39,815	36,329	26,880	26,929	14,638	12,328	7,406	3,192	2,510	**821,902**

Exhibit 132 Total Economic Potential Electricity Savings by End Use, Sub sector and Milestone Year, Labrador Interconnected (MWh/yr.)

Subsector	Milestone Years	Space Heating	General Lighting	HVAC Fans & Pumps	Domestic Hot Water	Outdoor Lighting	Secondary Lighting	Computer Equipment	Refrigeration	Other Plug Loads	Space Cooling	Food Service Equipment	Computer Servers	TOTAL
Small Office	2017	380	130	45	29	30	36	119	-	4	14	-	11	**798**
	2020	437	187	45	29	37	34	153	-	4	14	-	18	**958**
	2023	456	186	45	36	43	33	156	-	5	14	-	19	**992**
	2026	479	185	46	39	47	31	160	-	5	14	-	19	**1,025**
	2029	506	186	47	41	45	29	164	-	5	15	-	19	**1,056**
Large Non-food Retail	2017	639	705	289	36	99	65	41	69	56	12	-	-	**2,011**
	2020	802	706	290	36	119	62	52	87	57	12	-	-	**2,223**
	2023	970	688	293	37	138	58	53	111	58	12	-	-	**2,419**
	2026	1,351	672	296	37	152	55	54	112	59	13	-	-	**2,800**
	2029	1,501	656	300	37	144	53	55	112	60	13	-	-	**2,931**
Small Non-food Retail	2017	1,507	1,186	291	70	190	125	79	-	-	27	-	-	**3,474**
	2020	2,254	1,375	297	70	229	119	100	-	-	27	-	-	**4,472**
	2023	2,387	1,400	306	71	268	113	103	-	-	28	-	-	**4,678**
	2026	2,679	1,391	320	73	297	109	106	-	-	30	-	-	**5,005**
	2029	3,704	1,381	338	75	284	105	108	-	-	32	-	-	**6,027**
Food Retail	2017	1,773	312	77	54	58	24	37	737	42	6	-	-	**3,120**
	2020	2,245	378	106	54	69	30	48	918	43	7	19	-	**3,918**
	2023	2,455	369	107	54	81	36	49	1,192	44	7	28	-	**4,423**
	2026	2,671	361	108	55	89	35	50	1,194	45	7	32	-	**4,646**
	2029	2,891	354	109	55	84	34	51	1,198	46	7	32	-	**4,860**
Large Accomodation	2017	816	356	121	665	42	196	27	0	34	13	-	-	**2,270**
	2020	868	343	121	730	51	185	34	0	35	12	-	-	**2,380**
	2023	923	349	123	770	59	174	35	15	36	12	-	-	**2,497**
	2026	978	336	124	804	65	164	36	15	36	12	-	-	**2,572**
	2029	1,570	324	126	838	61	154	36	15	37	12	-	-	**3,173**
Small Accomodation	2017	129	60	9	92	6	16	4	0	5	2	-	-	**321**
	2020	132	58	9	102	7	15	5	0	5	2	-	-	**334**
	2023	137	58	9	108	8	14	5	0	5	2	-	-	**345**
	2026	237	56	10	113	9	13	5	0	5	2	-	-	**450**
	2029	243	55	10	120	8	13	5	0	5	2	-	-	**460**
Healthcare	2017	334	17	916	371	160	181	121	-	15	7	18	14	**2,153**
	2020	870	107	1,240	431	192	174	153	0	15	18	35	24	**3,259**
	2023	1,036	105	1,245	469	223	168	156	0	16	18	53	24	**3,513**
	2026	1,196	102	1,252	500	246	162	160	0	16	18	58	25	**3,735**
	2029	1,350	130	1,261	522	232	158	163	1	16	18	58	25	**3,933**

Exhibit 132 Total Economic Potential Electricity Savings by End Use, Sub sector and Milestone Year, Labrador Interconnected (MWh/yr.) (cont'd…)

Subsector	Milestone Years	Space Heating	General Lighting	HVAC Fans & Pumps	Domestic Hot Water	Outdoor Lighting	Secondary Lighting	Computer Equipment	Refrigeration	Other Plug Loads	Space Cooling	Food Service Equipment	Computer Servers	TOTAL
Schools	2017	1,463	359	220	139	134	40	122	-	16	3	-	-	**2,496**
	2020	1,535	354	220	139	161	38	155	0	16	3	-	-	**2,621**
	2023	2,132	413	219	144	188	83	158	0	17	3	-	-	**3,357**
	2026	2,206	839	242	145	207	78	161	0	17	3	-	-	**3,898**
	2029	2,283	828	242	146	196	74	165	0	17	3	-	-	**3,955**
Universities and Colleges	2017	379	225	152	29	21	10	48	0	15	6	-	2	**886**
	2020	499	241	153	29	26	10	60	0	15	6	-	3	**1,041**
	2023	669	236	154	30	30	10	62	7	16	6	-	3	**1,220**
	2026	738	231	154	30	33	9	63	7	16	6	-	3	**1,289**
	2029	809	227	155	30	31	9	64	7	16	6	-	3	**1,356**
Warehouse/Wholesale	2017	886	205	69	48	67	20	38	-	-	1	-	-	**1,334**
	2020	1,162	655	70	48	80	18	49	1	-	1	-	-	**2,084**
	2023	1,446	639	74	49	94	25	50	56	-	1	-	-	**2,433**
	2026	2,292	625	76	49	103	23	51	57	-	1	-	-	**3,278**
	2029	2,584	612	78	50	98	22	52	59	-	1	-	-	**3,557**
Restaurants	2017	190	42	33	366	16	294	11	35	-	4	59	-	**1,050**
	2020	505	57	33	368	19	281	14	37	-	4	118	-	**1,436**
	2023	526	56	34	612	23	268	15	126	-	4	177	-	**1,841**
	2026	597	56	34	619	25	256	15	131	-	4	197	-	**1,934**
	2029	731	55	35	629	24	244	15	138	-	5	197	-	**2,071**
Large Other Buildings	2017	5,808	1,595	1,856	1,330	562	990	419	1	500	59	-	-	**13,119**
	2020	7,843	1,900	1,877	1,853	674	938	532	3	510	59	-	-	**16,189**
	2023	10,863	2,307	1,886	1,857	785	887	543	8	520	58	-	-	**19,714**
	2026	12,039	2,247	1,898	1,862	862	839	553	13	530	58	-	-	**20,902**
	2029	13,660	2,189	1,913	1,869	814	792	564	21	539	58	-	-	**22,419**
Small Other Buildings	2017	3,604	1,249	976	625	394	583	332	0	-	46	-	-	**7,810**
	2020	3,881	1,479	997	631	475	556	425	8	-	47	-	-	**8,499**
	2023	5,790	1,831	1,019	641	556	534	435	21	-	48	-	-	**10,875**
	2026	8,295	1,808	1,050	656	615	515	446	40	-	50	-	-	**13,476**
	2029	9,032	1,794	1,090	947	586	501	457	65	-	53	-	-	**14,527**
Other Institutional	2017	9,842	-	1,179	546	547	22	258	-	-	19	-	-	**12,412**
	2020	17,828	-	1,208	546	631	19	350	-	-	18	-	-	**20,600**
	2023	23,123	29	1,239	550	716	24	357	4	-	18	-	-	**26,061**
	2026	28,089	2,627	2,411	554	798	27	364	7	-	47	-	-	**34,924**
	2029	30,009	2,600	2,439	559	847	32	371	11	-	47	-	-	**36,916**
Grand Total	2017	27,750	6,441	6,232	4,398	2,327	2,602	1,655	842	687	218	76	27	**53,255**
	2020	40,861	7,841	6,665	5,067	2,770	2,478	2,130	1,054	700	230	172	45	**70,014**
	2023	52,913	8,667	6,754	5,429	3,212	2,425	2,177	1,540	714	232	258	46	**84,367**
	2026	63,845	11,537	8,022	5,537	3,548	2,317	2,223	1,577	728	265	286	47	**99,933**
	2029	70,873	11,391	8,143	5,918	3,453	2,220	2,270	1,627	741	272	286	48	**107,242**

Exhibit 133 Total Economic Potential Electricity Savings by End Use, Sub sector and Milestone Year, Isolated (MWh/yr.)

Subsector	Milestone Years	General Lighting	Refrigeration	Outdoor Lighting	Secondary Lighting	Computer Equipment	HVAC Fans & Pumps	Other Plug Loads	Domestic Hot Water	TOTAL
Labrador Isolated C/I Buildings	2017	2,812	647	542	431	306	277	157	49	**5,223**
	2020	2,864	1,034	529	428	405	310	160	53	**5,783**
	2023	2,895	1,427	516	423	418	343	164	56	**6,241**
	2026	2,951	1,610	507	425	431	384	167	59	**6,534**
	2029	3,013	1,702	502	434	443	436	170	64	**6,763**
Island Isolated C/I Buildings	2017	263	61	51	42	29	26	15	-	**486**
	2020	270	98	50	42	38	30	15	-	**542**
	2023	274	135	49	42	39	33	15	-	**587**
	2026	280	153	48	42	41	37	16	-	**616**
	2029	287	162	48	43	42	42	16	-	**641**
Grand Total	2017	3,075	708	593	473	334	303	172	49	**5,709**
	2020	3,134	1,131	579	470	443	340	176	53	**6,325**
	2023	3,169	1,562	565	465	457	375	179	56	**6,828**
	2026	3,231	1,763	555	468	471	421	182	59	**7,150**
	2029	3,300	1,864	549	477	485	478	186	64	**7,403**

Exhibit 134 Economic Potential Load Reduction by End Use, Sub sector and Milestone Year, Island Interconnected (MW)

Sub sector	Milestone Year	Domestic Hot Water	HVAC Fans & Pumps	Refrigeration	Secondary Lighting	Space Heating	Grand Total
Large Office	2017	0	0	0	1	0	1
	2020	0	3	0	1	2	5
	2023	0	3	0	1	2	5
	2026	0	3	0	1	2	5
	2029	0	3	0	1	2	5
Small Office	2017	0	0	0	0	0	0
	2020	0	0	0	0	1	1
	2023	0	0	0	0	1	1
	2026	0	0	0	0	1	1
	2029	0	0	0	0	1	1
Large Non-food Retail	2017	0	0	0	0	0	0
	2020	0	2	0	0	1	2
	2023	0	2	0	0	1	2
	2026	0	2	0	0	1	2
	2029	0	2	0	0	1	2
Small Non-food Retail	2017	0	0	0	0	0	0
	2020	0	0	0	0	1	1
	2023	0	0	0	0	1	1
	2026	0	0	0	0	1	1
	2029	0	0	0	0	1	1
Food Retail	2017	0	0	0	0	0	0
	2020	0	1	1	0	0	2
	2023	0	1	1	0	0	2
	2026	0	1	1	0	0	2
	2029	0	1	1	0	0	2
Large Accomodation	2017	0	0	0	0	0	0
	2020	2	0	0	0	1	3
	2023	2	0	0	0	1	4
	2026	2	0	0	0	1	4
	2029	2	0	0	0	1	4
Small Accomodation	2017	0	0	0	0	0	0
	2020	1	0	0	0	0	1
	2023	1	0	0	0	0	1
	2026	1	0	0	0	0	1
	2029	1	0	0	0	0	1

Exhibit 134 Economic Potential Load Reduction by End Use, Sub sector and Milestone Year, Island Interconnected (MW) (cont'd…)

Sub sector	Milestone Year	Domestic Hot Water	HVAC Fans & Pumps	Refrigeration	Secondary Lighting	Space Heating	Grand Total
Healthcare	2017	0	0	0	0	0	0
	2020	1	1	0	0	1	4
	2023	2	1	0	0	1	4
	2026	2	1	0	0	1	4
	2029	2	1	0	0	1	4
Schools	2017	0	0	0	0	0	0
	2020	0	1	0	0	1	2
	2023	0	1	0	0	1	2
	2026	0	1	0	0	1	2
	2029	0	1	0	0	1	2
Universities and Colleges	2017	0	0	0	0	0	0
	2020	0	1	0	0	0	2
	2023	0	1	0	0	0	2
	2026	0	2	0	0	0	2
	2029	0	2	0	0	0	2
Warehouse/Wholesale	2017	0	0	0	0	0	0
	2020	0	0	0	0	1	1
	2023	0	0	0	0	0	1
	2026	0	0	0	0	0	1
	2029	0	0	0	0	0	1
Restaurants	2020	3	0	0	0	0	4
	2023	3	0	0	0	0	4
	2026	4	0	0	0	0	4
	2029	4	0	0	0	0	4
Large Other Buildings	2017	0	0	0	0	0	0
	2020	1	1	0	0	1	3
	2023	1	1	0	0	1	4
	2026	1	1	0	0	1	4
	2029	1	1	0	0	1	4
Small Other Buildings	2017	0	0	0	0	0	0
	2020	1	0	0	0	1	2
	2023	1	0	0	0	1	2
	2026	1	0	0	0	1	2
	2029	1	0	0	0	1	2
Grand Total	2017	0	0	0	3	0	3
	2020	10	9	1	3	11	34
	2023	11	10	1	3	11	35
	2026	11	10	1	3	11	36
	2029	11	10	1	3	11	36

Exhibit 135 Economic Potential Load Reduction by End Use, Sub sector and Milestone Year, Labrador Interconnected (MW)

Sub sector	Milestone Year	Domestic Hot Water	HVAC Fans & Pumps	Refrigeration	Secondary Lighting	Space Heating	Grand Total
	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
Small Office	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0
	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
Large Non-food Retail	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0
	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
Small Non-food Retail	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0
	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
Food Retail	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0
	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
Large Accomodation	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0
	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
Small Accomodation	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0
	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
Healthcare	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0
	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
Schools	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0

Exhibit 135 Economic Potential Load Reduction by End Use, Sub sector and Milestone Year, Labrador Interconnected (MW) (cont'd…)

Sub sector	Milestone Year	Domestic Hot Water	HVAC Fans & Pumps	Refrigeration	Secondary Lighting	Space Heating	Grand Total
Universities and Colleges	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0
Warehouse/Wholesale	2017	0	0	0	0	0	0
	2020	0	0	0	0	0	0
	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0
Restaurants	2020	0	0	0	0	0	0
	2023	0	0	0	0	0	0
	2026	0	0	0	0	0	0
	2029	0	0	0	0	0	0
Large Other Buildings	2017	0	0	0	0	0	0
	2020	1	0	0	0	0	2
	2023	1	0	0	0	0	2
	2026	1	0	0	0	0	2
	2029	1	0	0	0	0	2
Small Other Buildings	2017	0	0	0	0	0	0
	2020	1	0	0	0	0	1
	2023	1	0	0	0	0	1
	2026	1	0	0	0	0	1
	2029	1	0	0	0	0	1
Other Institutional	2017	0	0	0	0	0	0
	2020	0	1	0	0	1	2
	2023	0	1	0	0	1	1
	2026	0	0	0	0	1	1
	2029	0	0	0	0	1	1
Grand Total	2017	0	0	0	1	0	1
	2020	2	1	0	1	2	7
	2023	2	1	0	1	2	6
	2026	2	1	0	1	2	6
	2029	2	1	0	1	2	6

Exhibit 136 Economic Potential Load Reduction by End Use, Sub sector and Milestone Year, Isolated (MW)

Building Category	Milestone Year	Domestic Hot Water	HVAC Fans & Pumps	Secondary Lighting	Space Heating	Grand Total
Labrador Isolated C/I Buildings	2017	0.0	0.0	0.1	0.0	0.1
	2020	0.0	0.0	0.1	0.0	0.1
	2023	0.0	0.0	0.1	0.0	0.1
	2026	0.0	0.0	0.1	0.0	0.1
	2029	0.0	0.0	0.1	0.0	0.1
Island Isolated C/I Buildings	2017	0.0	0.0	0.0	0.0	0.0
	2020	0.0	0.0	0.0	0.0	0.0
	2023	0.0	0.0	0.0	0.0	0.0
	2026	0.0	0.0	0.0	0.0	0.0
	2029	0.0	0.0	0.0	0.0	0.0
Grand Total	2017	0.0	0.0	0.1	0.0	0.1
	2020	0.0	0.0	0.1	0.0	0.1
	2023	0.0	0.0	0.1	0.0	0.2
	2026	0.0	0.0	0.1	0.0	0.2
	2029	0.0	0.0	0.1	0.0	0.2

Appendix G Background-Section 10: Achievable Workshop Action Profile Slides

Opportunities for Today's Workshop

	Primary End Use	Percent of 2029 Economic Potential Savings
LED Tubes	Lighting	3%
High-Efficiency Air Source Heat Pumps	Space Heating	15%
Evaporator Fan Upgrades	Refrigeration	1%
VFDs on HVAC Motors	HVAC Fans and Pumps	3%
Advanced BAS	Multiple	4%
High Performance New Construction	Multiple	7%
PC Power Management	Computer Equipment	1%
Glazing	Space Heating	3%
Electric Thermal Storage Systems	Space Heating - Demand	0%

Commercial Opportunity 1:

LED Tubes

Solid state lighting using light emitting diodes as a source of illumination.

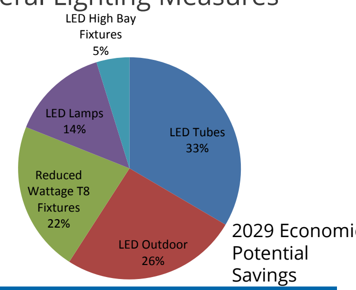
Relamping existing T8 fixtures with LED tubes that can operate using the existing ballast.

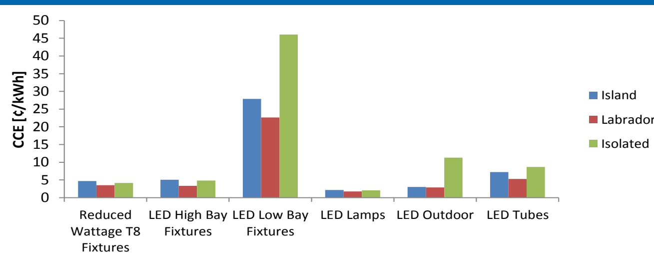
Commercial Opportunity 1:

LED Tubes

Comparison with Other General Lighting Measures

	Economic Potential Savings (MWh)	Passes Economic Test in Regions
Reduced Wattage T8 Fixtures	20,938	All
LED High Bay Fixtures	4,567	All
LED Low Bay Fixtures	0	None
LED Lamps	13,501	All
LED Outdoor	24,443	All
LED Tubes	31,915	All





Commercial Opportunity 1:

LED Tubes

Assumptions

Focus Building Type	Office
Focus Region	Island
Typical Application:	
Cost	$23.81
Useful Life	11.8 years
Savings:	
General lighting	31%

Commercial Opportunity 1:

LED Tubes

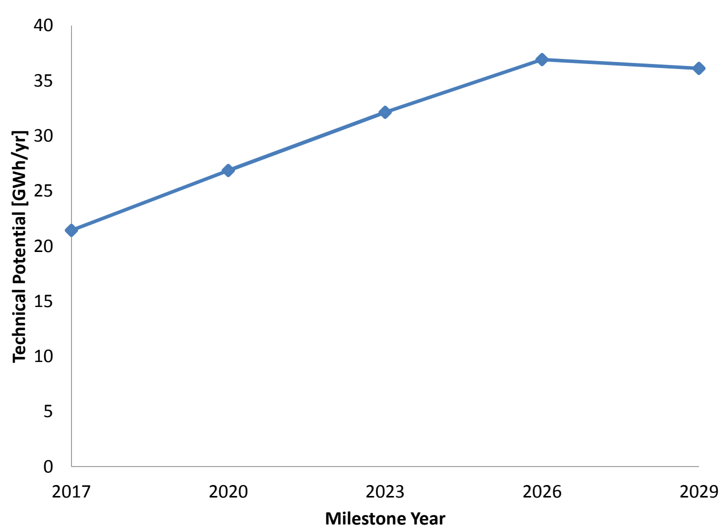
Economic Indicators

Simple Payback (L. Office - Island)	5.0 years
Average CCE (¢/kWh):	
Island	7.23
Labrador	5.30
Isolated	8.65
Basis	Incremental
Eligibility Timeline	At replacement
Eligible participants:	
Floor Area / # of Facilities by 2029	12,400,000 ft^2 / 230
Principal region	Island

Commercial Opportunity 1:

LED Tubes

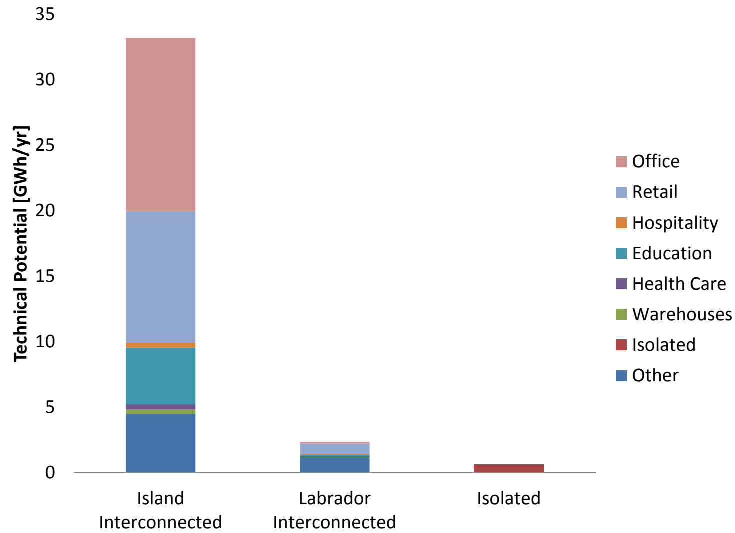
Technical Potential Growth



Commercial Opportunity 1:

LED Tubes

2029 Technical Potential Breakdown



Commercial Opportunity 2:

Air Source Heat Pumps

Cold climate air source heat pumps (ASHPs) utilise the vapour compression cycle to transfer heat from the outside air to the interior during the heating season.

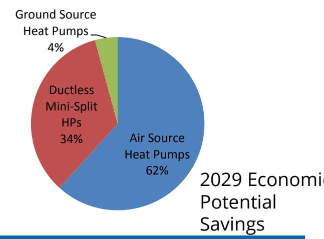
Replace RTUs equipped with electric resistance heat with models equipped with CEE qualified ASHPs.

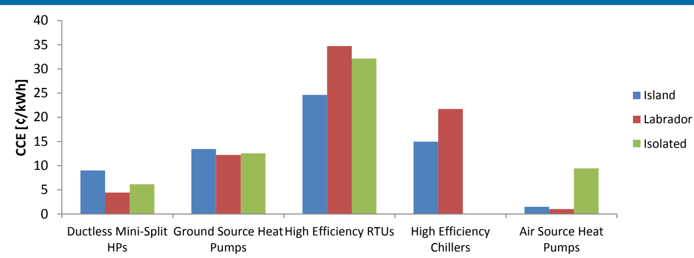
Commercial Opportunity 2:

Air Source Heat Pumps

Comparison with Other Space Heating Measures

	2029 Economic Potential Savings (MWh)	Passes Economic Test in Regions
Ductless Mini-Split HPs	78,928	All
Ground Source Heat Pumps	9,816	Isolated
High Efficiency RTUs	0	None
High Efficiency Chillers	0	None
Air Source Heat Pumps	143,163	All





Commercial Opportunity 2:

Air Source Heat Pumps

Assumptions

Focus Building Type	L. Office
Focus Region	Island
Typical Application:	
Cost	$1,500
Useful Life	15 years
Savings:	
Space heating	45%

Commercial Opportunity 2:

Air Source Heat Pumps

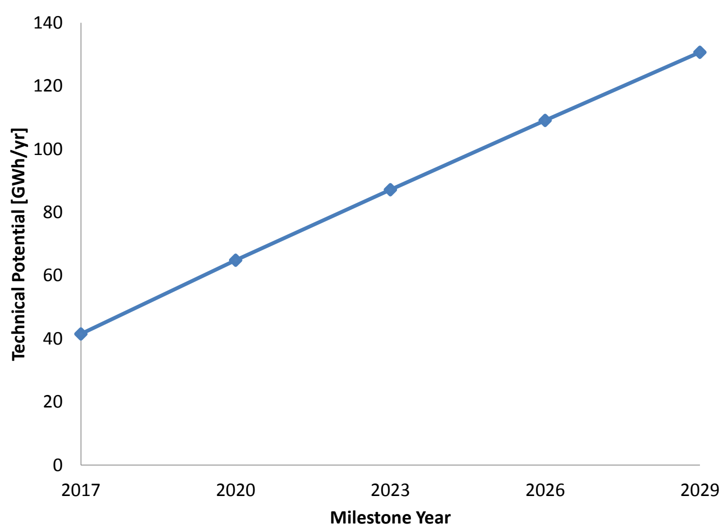
Economic Indicators

Simple Payback (L. Office - Island)	0.8 years
Average CCE (¢/kWh):	
Island	1.47
Labrador	1.02
Isolated	9.41
Basis	Incremental
Eligibility Timeline	At replacement
Eligible participants:	
Floor Area / # of Facilities by 2029	12,400,000 ft^2 / 240
Principal region	Island

Commercial Opportunity 2:

Air Source Heat Pumps

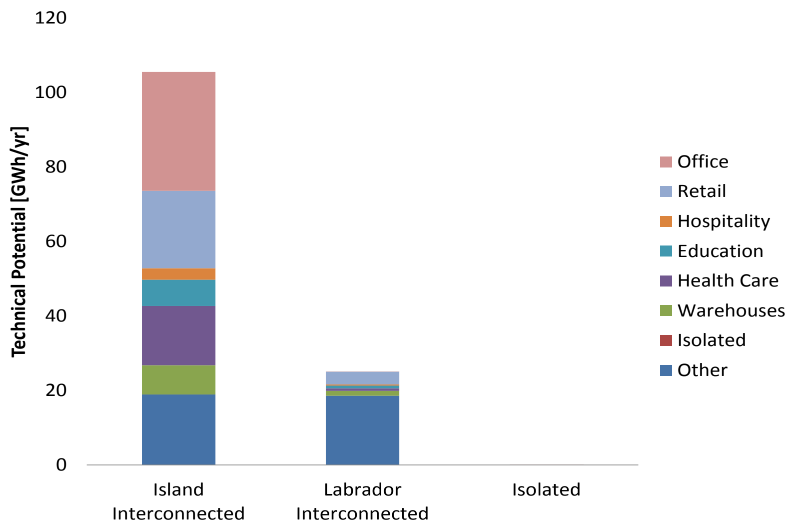
Technical Potential Growth



Commercial Opportunity 2:

Air Source Heat Pumps

2029 Technical Potential Breakdown



Commercial Opportunity 3:

Evaporator Fan Upgrades

Electrically commutated motors (ECMs) are more efficient than shaded pole evaporator fan motors and emit less waste heat.

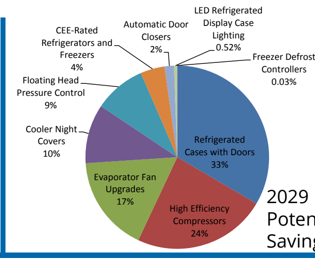
Replace existing evaporator fan motors for walk in coolers with ECMs.

Commercial Opportunity 3:

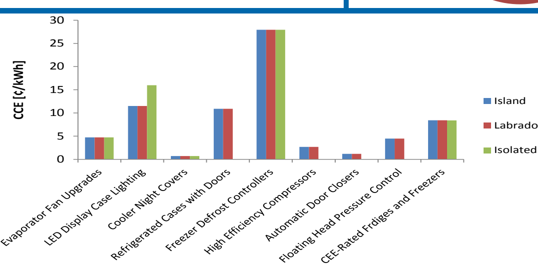
Evaporator Fan Upgrades

Comparison with Other Refrigeration Measures

	2029 Economic Potential Savings (MWh)	Passes Economic Test in Regions
LED Refrigerated Display Case Lighting	207	Island, Isolated
Cooler Night Covers	4,188	All
Refrigerated Cases with Doors	13416	Island
Freezer Defrost Controllers	14	Isolated
High Efficiency Compressors	9431	Island, Labrador
Automatic Door Closers	667	Island, Labrador
Floating Head Pressure Control	3660	Island, Labrador
CEE-Rated Refrigerators and Freezers	1,714	Island, Labrador
Evaporator Fan Upgrades	6804	All



2029 Economic Potential Savings



Commercial Opportunity 3:

Evaporater Fan Upgrades

Assumptions

Focus Building Type	Food Retail
Focus Region	Island
Typical Application:	
Cost	$460
Useful Life	16 years
Savings:	
Refrigeration	6%

Commercial Opportunity 3:

Evaporator Fan Upgrades

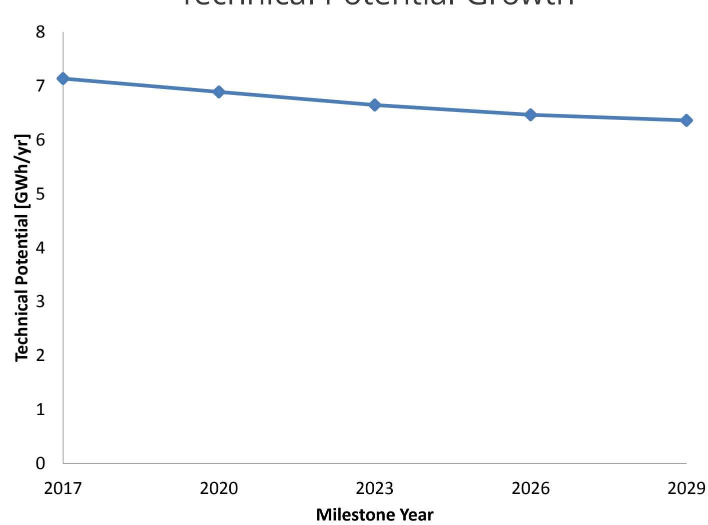
Economic Indicators

Simple Payback (Food Retail - Island)	4.7 years
Average CCE (¢/kWh):	
Island	4.73
Labrador	4.73
Isolated	4.73
Basis	Full
Eligibility Timeline	Immediate
Eligible participants:	
Floor Area / # of Facilities by 2029	3,400,000 ft^2 / 540
Principal region	Island

Commercial Opportunity 3:

Evaporator Fan Upgrades

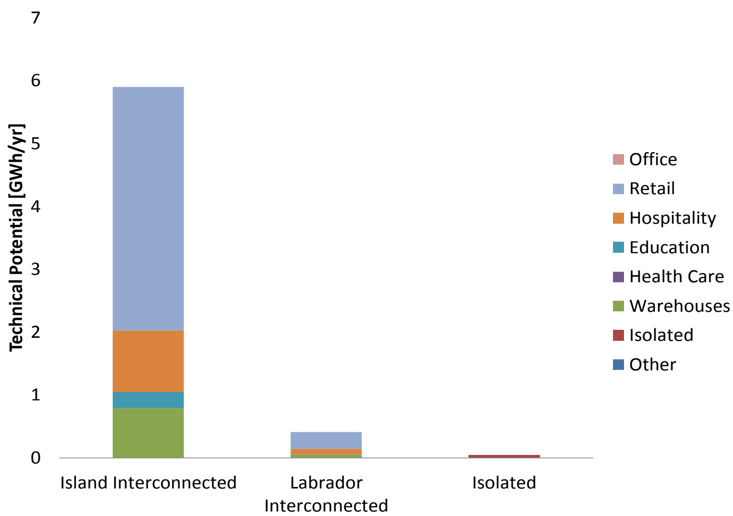
Technical Potential Growth



Commercial Opportunity 3:

Evaporator Fan Upgrades

2029 Technical Potential Breakdown



Commercial Opportunity 4:

VFDs on HVAC Motors

Variable frequency drives (VFDs) allow induction motor driven loads such as fans and pumps to operate at varying speed in response to changing load requirements.

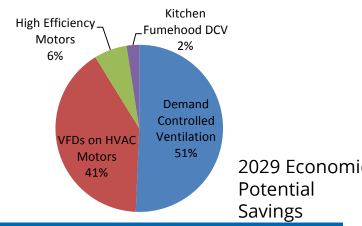
Variable flow air systems and variable volume pumping systems are ideal candidates for retrofit.

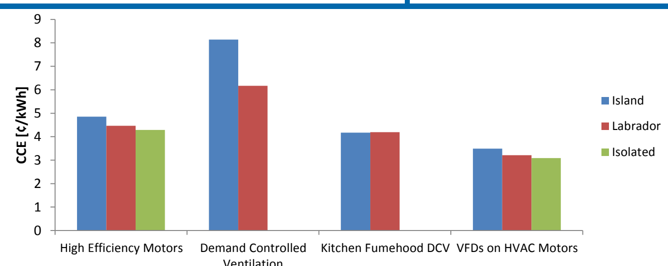
Commercial Opportunity 4:

VFDs on HVAC Motors

Comparison with Other HVAC Fans & Pumps Measures

	2029 Economic Potential Savings (MWh)	Passes Economic Test in Regions
High Efficiency Motors	3,795	All
Demand Controlled Ventilation	30,243	Island, Labrador
Kitchen Fumehood DCV	1,453	Island, Labrador
VFDs on HVAC Motors	24,205	All





Commercial Opportunity 4:

VFDs on HVAC Motors

Assumptions

Focus Building Type	L. Office
Focus Region	Island
Typical Application:	
Cost	$4,820
Useful Life	15 years
Savings:	
HVAC fans & pumps	11%

Commercial Opportunity 4:

VFDs on HVAC Motors

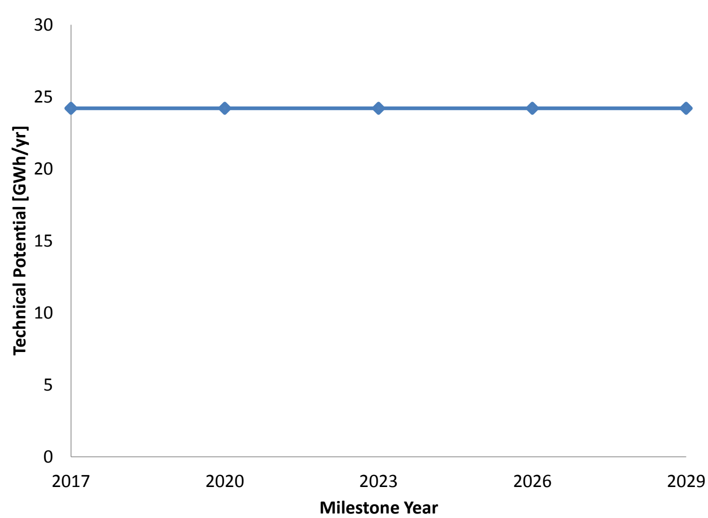
Economic Indicators

Simple Payback (L. Office - Island)	3.2 years
Average CCE (¢/kWh):	
Island	3.49
Labrador	3.21
Isolated	3.09
Basis	Full
Eligibility Timeline	Immediate
Eligible participants:	
Floor Area / # of Facilities by 2029	12,400,000 ft^2 / 70
Principal region	Island

Commercial Opportunity 4:

VFDs on HVAC Motors

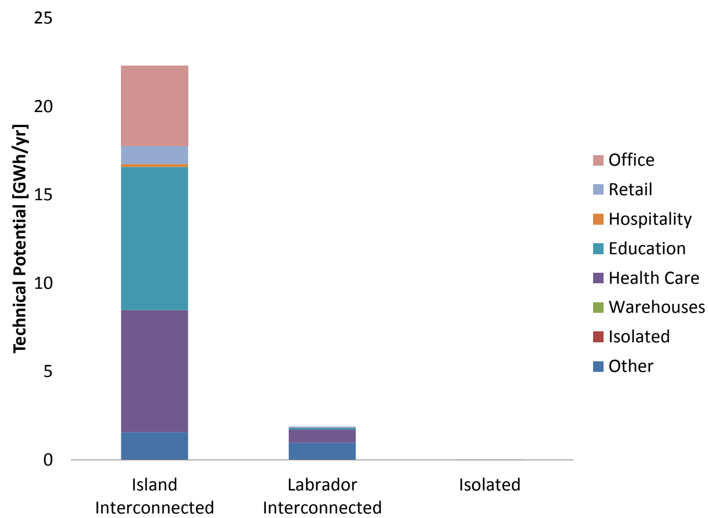
Technical Potential Growth



Commercial Opportunity 4:

VFDs on HVAC Motors

2029 Technical Potential Breakdown



Commercial Opportunity 5:

Advanced Building Automation

Advanced Building Automation Systems (BAS) incorporate diagnostic tools and self tuning controls into existing BAS functions, and expand control to additional systems such as lighting and VAV boxes.

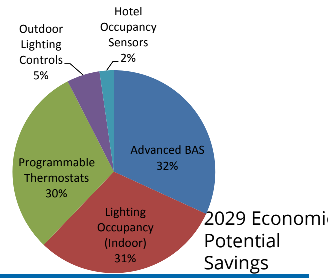
Most applicable to large, complex facilities such as office buildings, hotels, and healthcare.

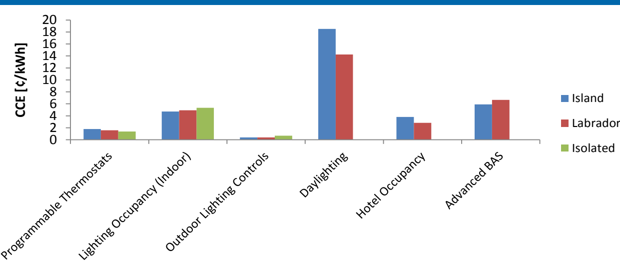
Commercial Opportunity 5:

Advanced Building Automation

Comparison with Other Controls Measures

	2029 Economic Potential Savings (MWh)	Passes Economic Test in Regions
Programmable Thermostats	37,948	All
Lighting Occupancy (Indoor)	37,999	All
Outdoor Lighting Controls	6,570	All
Daylighting Controls	0	None
Hotel Occupancy Sensors	2,864	Island, Labrador
Advanced BAS	39,870	Island, Labrador





Commercial Opportunity 5:

Advanced Building Automation

Assumptions

Focus Building Type	L. Office
Focus Region	Island
Typical Application:	
Cost	$0.90/ft²
Useful Life	15 years
Savings:	
Space heating, space cooling, general lighting, and HVAC fans & pumps	10%

Commercial Opportunity 5:

Advanced Building Automation

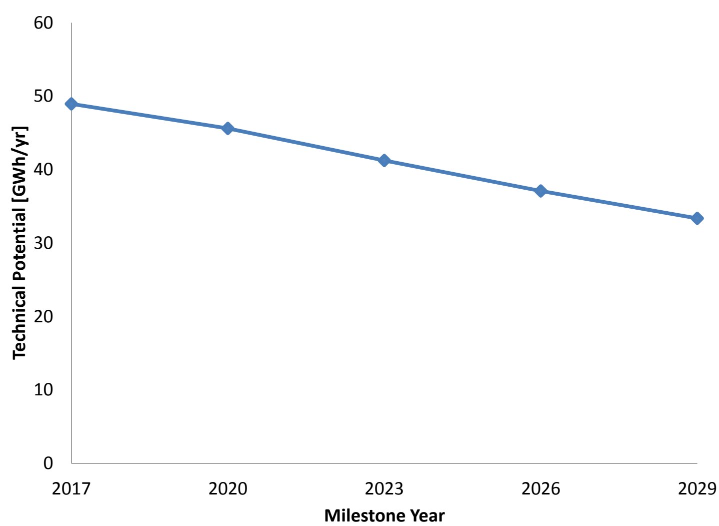
Economic Indicators

Simple Payback (L. Office - Island)	3.8 years
Average CCE (¢/kWh):	
Island	5.90
Labrador	6.64
Isolated	N/A
Basis	Full
Eligibility Timeline	Immediate
Eligible participants:	
Floor Area / # of Facilities by 2029	12,400,000 ft^2 / 250
Principal region	Island

Commercial Opportunity 5:

Advanced Building Automation

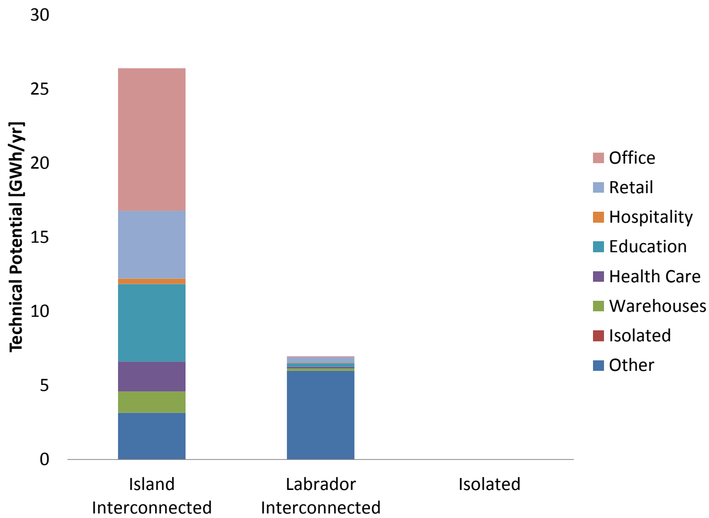
Technical Potential Growth



Commercial Opportunity 5:

Advanced Building Automation

2029 Technical Potential Breakdown



Commercial Opportunity 6:

High-Performance New Construction

Constructing a new building using an integrated design approach to lower overall energy use.

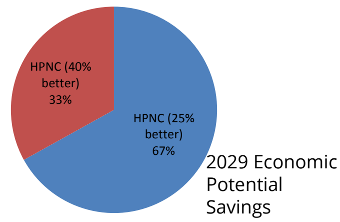
Two measures are considered: 25% and 40% better than baseline (code) construction.

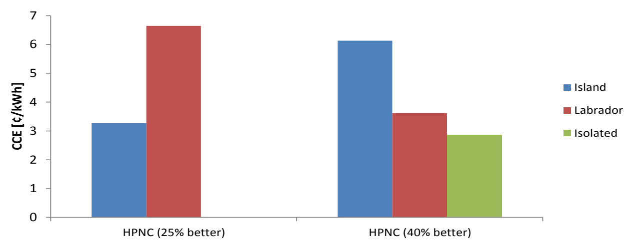
Commercial Opportunity 6:

High-Performance New Construction

Comparison with Other New Construction Measures

	2029 Economic Potential Savings (MWh)	Passes Economic Test in Regions
HPNC (25% better)	47,934	All
HPNC (40% better)	23,674	Island, Labrador





Commercial Opportunity 6:

High-Performance New Construction

Assumptions

Focus Building Type	Office
Focus Region	Island
Typical Application:	
Cost	$23.81
Useful Life	11.8 years
Savings:	
General lighting	31%

Commercial Opportunity 6:

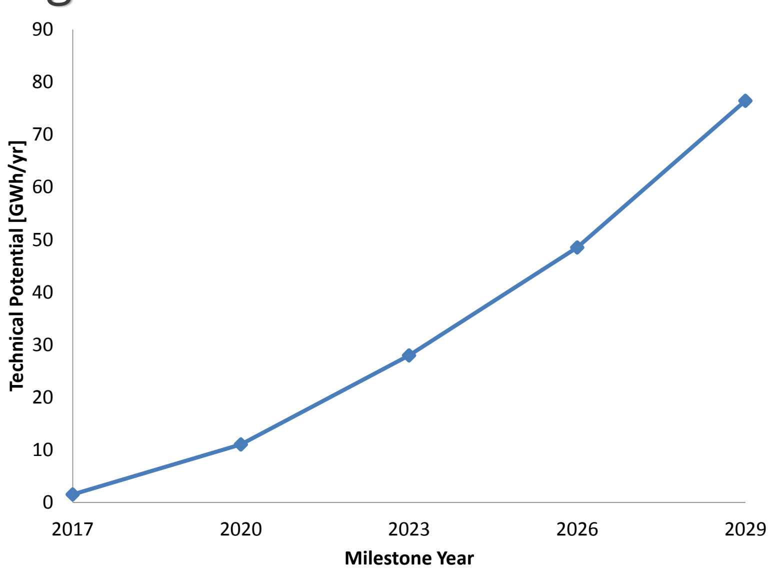
High-Performance New Construction

Economic Indicators

Simple Payback (L. Office - Island)	5.0 years
Average CCE (¢/kWh):	
Island	7.23
Labrador	5.30
Isolated	8.65
Basis	Incremental
Eligibility Timeline	At replacement
Eligible participants:	
Floor Area / # of Facilities by 2029	12,400,000 ft^2 / 230
Principal region	Island

Commercial Opportunity 6:

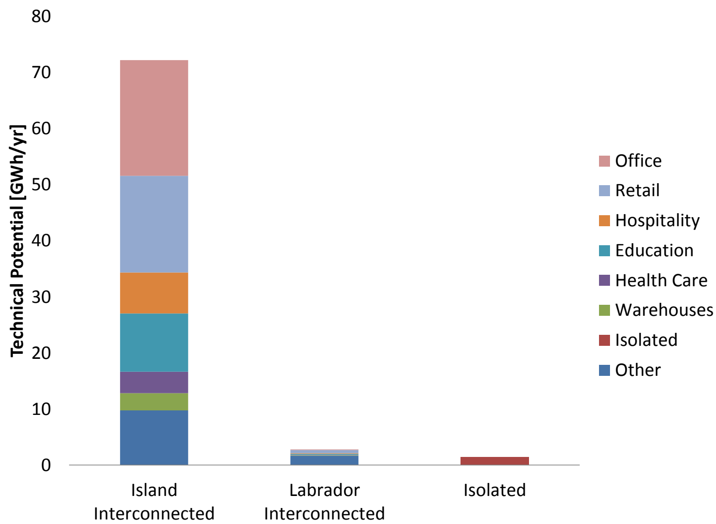
High Performance New Construction



Commercial Opportunity 6:

High-Performance New Construction

2029 Technical Potential Breakdown



Commercial Opportunity 7:

PC Power Management

Personal computers (PCs) have integrated power management systems that can shut off components when the PC is not in use but quickly return it to an active state when required.

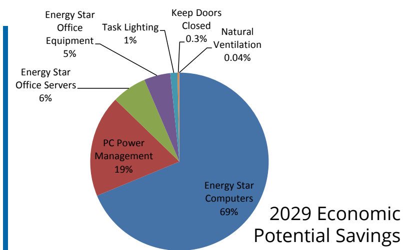
This measure involves fully utilising existing power management systems on PCs.

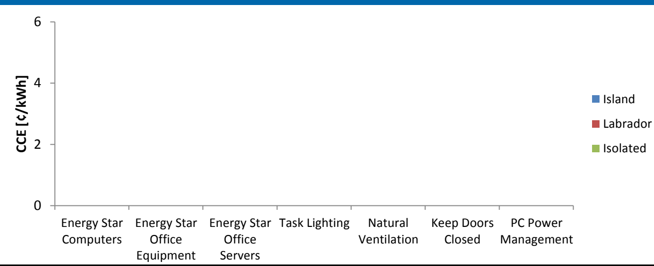
Commercial Opportunity 7:

PC Power Management

Comparison with Other Behavioural Measures

	2029 Economic Potential Savings (MWh)	Passes Economic Test in Regions
Energy Star Computers	27,803	All
Energy Star Office Equipment	1,933	All
Energy Star Office Servers	2,558	All
Task Lighting	524	All
Natural Ventilation	18	All
Keep Doors Closed	124	All
PC Power Management	7,482	All





Commercial Opportunity 7:

PC Power Management

Assumptions

Focus Building Type	L. Office
Focus Region	Island
Typical Application:	
Cost	$0
Useful Life	1 year
Savings:	
Computer Equipment	45%

Commercial Opportunity 7:

PC Power Management

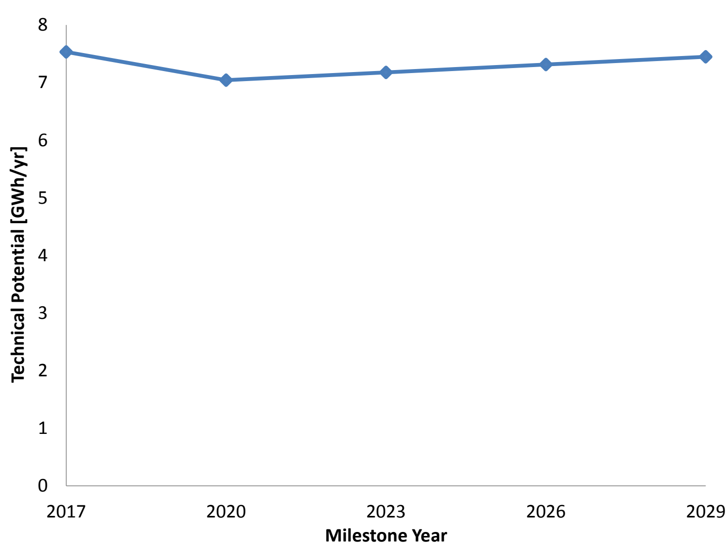
Economic Indicators

Simple Payback (L. Office - Island)	Immediate
Average CCE (¢/kWh):	
Island	0.00
Labrador	0.00
Isolated	0.00
Basis	Full
Eligibility Timeline	Immediate
Eligible participants:	
Floor Area / # of Facilities by 2029	12,400,000 ft^2 / 270
Principal region	Island

Commercial Opportunity 7:

PC Power Management

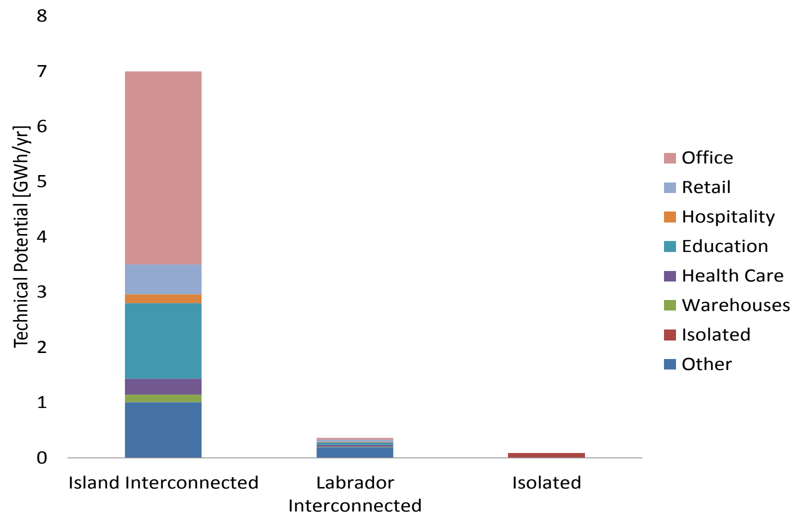
Technical Potential Growth



Commercial Opportunity 7:

PC Power Management

2029 Technical Potential Breakdown

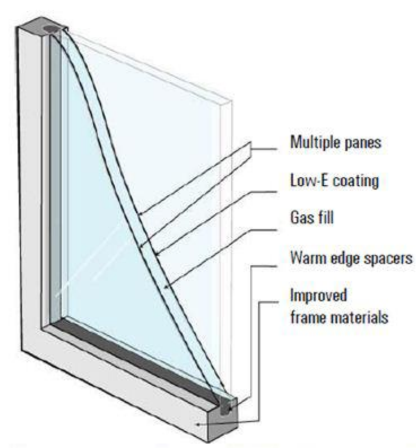


Commercial Opportunity 8:

High Performance Glazing Systems

High performance glazing systems incorporate technologies such as double or triple panes, low emissivity glass, inert gases, and well insulated frames and sashes.

Replace existing windows with high performance glazing systems.

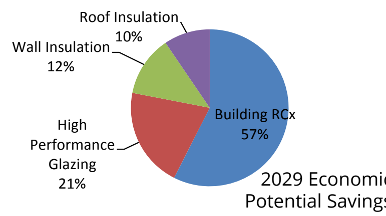


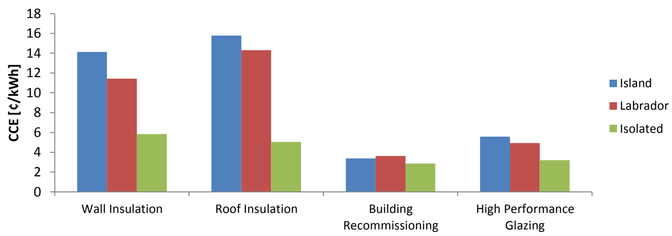
Commercial Opportunity 8:

High Performance Glazing

Comparison with Other Envelope Measures

	2029 Economic Potential Savings (MWh)	Passes Economic Test in Regions
Wall Insulation	18,068	Isolated
Roof Insulation	13,725	Isolated
Building Recommissioning	83,241	All
High Performance Glazing	29,812	All





Commercial Opportunity 8:

High Performance Glazing

Assumptions

Focus Building Type	L. Office
Focus Region	Island
Typical Application:	
Cost	$0.50/ft^2
Useful Life	20 years
Savings:	
Space heating	15%

Commercial Opportunity 8:

High Performance Glazing

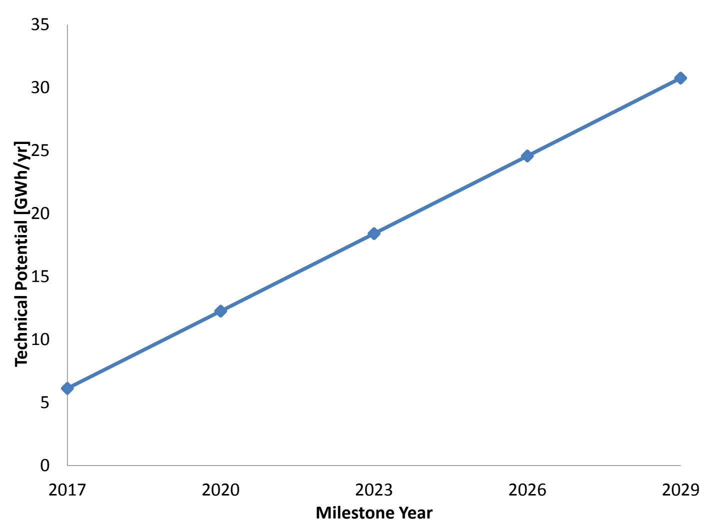
Economic Indicators

Simple Payback (L. Office - Island)	2.8 years
Average CCE (¢/kWh):	
Island	5.58
Labrador	4.92
Isolated	3.20
Basis	Incremental
Eligibility Timeline	At replacement
Eligible participants:	
Floor Area / # of Facilities by 2029	12,400,000 ft^2 / 240
Principal region	Island

Commercial Opportunity 8:

High Performance Glazing

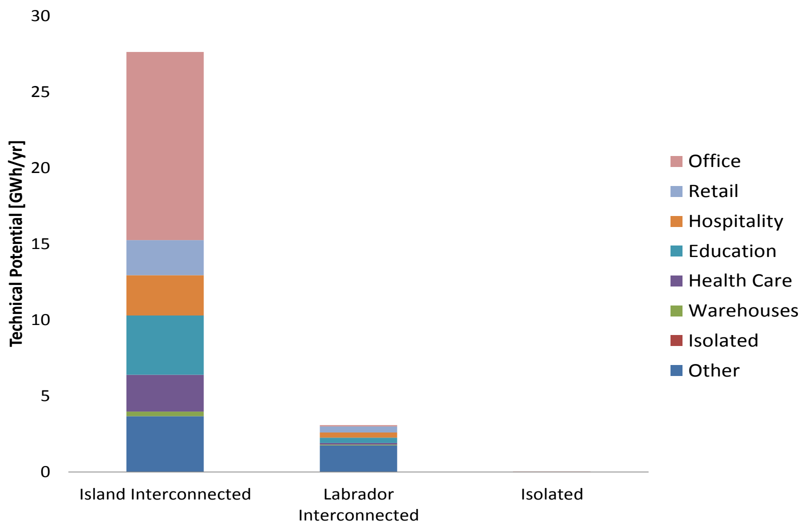
Technical Potential Growth



Commercial Opportunity 8:

High Performance Glazing

2029 Technical Potential Breakdown



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Appendix H Background-Section 10: Achievable Workshop Measure Worksheets

NL ACHIEVABLE POTENTIAL WORKSHOP - COMMERCIAL SECTOR

C1: LED Tubular Lamps

			COMMENTS
Focus Region	Island Interconnected		
Focus Sub-Sector	Large Office		
MEASURE INFORMATION			
CCE (¢/kWh)	6.2		
Simple Payback (years)	5.0		
ECONOMIC POTENTIAL			
Total Floor Space (Approx)	12,400,000		
Total Number of Sites	280		
% Eligible	80%		
# Eligible Sites Per Year	230		
# Eligible Sites By 2029	230		
PARTICIPATION RATES	**% by 2029**	**Curve**	
BAU Marketing	70%	B	
Aggressive Marketing	80%	C	
ACHIEVABLE POTENTIAL			
BAU Marketing	161		
Aggressive Marketing	184		
RELATIVE PARTICIPATION RATES (H=Higher; L=Lower; S=Same; N/A=Not Applicable)			
Other Sub-Sectors:			
Small Offices	L	Healthcare	H
Non-Food Retail	S	Schools	H
Food Retail	S	Universities	H
Large Hotels/Motels	H	Warehouses	L
Small Hotels/Motels	L	Restaurants	L
Other Regions:			
Labrador	L	Isolated	L
Related Measures:			
LED Lamps	H	LED Outdoor	H
LED Low Bay Fixtures	S	RW T8 Fixtures	L
LED High Bay Fixtures	H		
OTHER PARAMETERS			
Sensitivity to Incentives (High, Med, Low)			High
Primary Incentive Target (User, Channel Member, Both)			Both
Sensitivity to Direct Program Support (High, Med, Low)			Low
Most Critical Program Support Type(s) (e.g. Trade Ally Training, Certification, Technical Workshops, etc.)			Demos and Cases Studies

GENERAL NOTES:
- Technology is changing very rapidly and the cost is coming down quite quickly
- Province tends to use a "wait-and-see" approach to implementing EE
- Likely very limited investments in fluorescent technology in the future

BARRIERS:
- Cost is currently the primary barrier
- The lamps are quite avaialble and starting to be popular (workshop participant's firm has sold about 18-20K of them in the last quarter)
- Not very popular in NL since there are no incentives currently
- Customer awareness is a barrier (i.e. not aware that it's currently an option)
- Government in the province tends to adopt technologies like this more quickly but private sector lags
- Public tendering act limits the technology that will be implemented in some facilities (i.e. lowest cost technology must be selected)
- Some fo the lower cost products may have performance issues
- Technology hasn't been around too long. Some people may be waiting for the technology to mature.
- Difficult for utilities to get in touch with the right contacts at the commercial facilities
- LED tubes may not work as well in some fixtures
- current economic crunch is limiting uptake at the moment

STRATEGIES/PARTNERS:
- Equipment typically goes through lighting distributors
- Implementers help spread the word
- Nobody is going to the marketplace to make the case for this technology currently
- Incentives are key to the overall strategy and there is a high sensitivity to this
- Some facilities may be overlit already, which allows for a deeper savings opportunity
- Can use non-energy benefits to help sell the technology
- Government agencies are much more developed than they were 20 years ago and they can be an important partner

NL ACHIEVABLE POTENTIAL WORKSHOP - COMMERCIAL SECTOR

C2: High-Efficiency Air Source Heat Pumps

			COMMENTS
Focus Region	Island Interconnected		
Focus Sub-Sector	Food Retail		
MEASURE INFORMATION			
CCE (¢/kWh)	1.0		Incr. basis
Simple Payback (years)	0.8		
ECONOMIC POTENTIAL			
Total Floor Space (Approx)	12,400,000		
Total Number of Sites	280		
% Eligible	86%		
# Eligible Sites Per Year	20		Incr. basis
# Eligible Sites By 2029	240		
PARTICIPATION RATES	**% by 2029**	**Curve**	
BAU Marketing	20%	B	
Aggressive Marketing	60%	B	
ACHIEVABLE POTENTIAL			
BAU Marketing	48		
Aggressive Marketing	144		
RELATIVE PARTICIPATION RATES (H=Higher; L=Lower; S=Same; N/A=Not Applicable)			
Other Sub-Sectors:			
Small Offices	H	Healthcare	L
Non-Food Retail	S	Schools	S
Large Offices	L	Universities	L
Large Hotels/Motels	H	Warehouses	L
Small Hotels/Motels	L	Restaurants	S-H
Other Regions:			
Labrador	L	Isolated	L
Related Measures:			
Ductless Mini-Split HPs	H	High-Eff, RTUs	L
GSHP	L	High-Eff. Chillers	L
OTHER PARAMETERS			
Sensitivity to Incentives (High, Med, Low)			Low
Primary Incentive Target (User, Channel Member, Both)			User
Sensitivity to Direct Program Support (High, Med, Low)			Med
Most Critical Program Support Type(s) (e.g. Trade Ally Training, Certification, Technical Workshops, etc.)			Contractor training, case

GENERAL NOTES:
- Technolgy is fairly mature but existing infrastructure is fairly old
- Not many RTUs in large offices
- Savings may be too high in retail applications since lighting and internal loads create quite a bit of heat
- Variable refrigerant tehnology may make more sense in certain applications
- About 15% penetration currently, although this may be limited to smaller RTUs

BARRIERS:
- Existing infrastructure may limit the opportunity in offices
- Customers see more maintenance costs with the hours of operation for the compressors
- Not practical for many offices since RTUs aren't too common and since zoning would be required
- Awareness may be a barrier in the commercial sector
- HVAC contractors may not be pushing ASHPs
- A lost of the space is leased and landlords are putting in lowest cost equipment
- Chains from other jurisdictions have natural gas space heating and may not be aware that there is an opportunity in electric space heating

STRATEGIES/PARTNERS:
- Restaurants are adopting the technology
- Technology is being adopted to some degree without utility support (i.e. about 1 in 20 currently)

- Schools not allowed to be air conditioned

NL ACHIEVABLE POTENTIAL WORKSHOP - COMMERCIAL SECTOR

C3: ECM Motors and Evaporator Fan Motor Controllers

			COMMENTS
Focus Region	Island Interconnected		
Focus Sub-Sector	Food Retail		
MEASURE INFORMATION			
CCE (¢/kWh)	4.7		
Simple Payback (years)	4.7		
ECONOMIC POTENTIAL			
Total Floor Space (Approx)	3,300,000		
Total Number of Sites	780		
% Eligible	70%		Very small not eligible
# Eligible Sites Per Year	540		
# Eligible Sites By 2029	540		
PARTICIPATION RATES	**% by 2029**	**Curve**	
BAU Marketing	25%	B	
Aggressive Marketing	80%	B	
ACHIEVABLE POTENTIAL			
BAU Marketing	135		
Aggressive Marketing	432		
RELATIVE PARTICIPATION RATES (H=Higher; L=Lower; S=Same; N/A=Not Applicable)			
Other Sub-Sectors:			
Large Offices	N/A	Healthcare	N/A
Small Offices	N/A	Schools	N/A
Non-Food Retail	L	Universities	S
Large Hotels/Motels	S	Warehouses	H
Small Hotels/Motels	N/A	Restaurants	L
Other Regions:			
Labrador	L	Isolated	Much L
Related Measures:			
Refrigerated Display Cases with Doors	L	Floating Head Pressure Control	L
LED Refrig. Lighting	H	Defrost Controllers	L
High Eff. Compressors	S	Door Closers	L
CEE Rated Equipment	H	Night Covers	L
OTHER PARAMETERS			
Sensitivity to Incentives (High, Med, Low)			High
Primary Incentive Target (User, Channel Member, Both)			Both
Sensitivity to Direct Program Support (High, Med, Low)			High
Most Critical Program Support Type(s) (e.g. Trade Ally Training, Certification, Technical Workshops, etc.)			Awareness, direct-install in smaller facilities

GENERAL NOTES:
- Larger facilities will have pretty sophisticated equipment in place already and lots of support
- Smaller communities in Isolated regions have a lot of residential-style equipment
- Load for each evaporator fan is small but there are a lot of units and they run 24/7
- Measure isn't being implemented very oftern in many more mature units

BARRIERS:
- Awareness is one of the primary barriers
- Cost is a barrier in smaller facilities
- Payback period is long for retail facilities
- Potential landlord-tenant issues with smaller facilities as well
- Service contracts that are in place may restrict retrofits
- Technology may not be as prevelant or accessible as necessary
- There may be a perceived risk with food spoiling

STRATEGIES/PARTNERS:
- Likely going to need two different strategies; one for larger facilities and one for smaller "mom-and-pop" stores
-

NL ACHIEVABLE POTENTIAL WORKSHOP - COMMERCIAL SECTOR

C4: VFDs on HVAC Motors

			COMMENTS
Focus Region	Island Interconnected		
Focus Sub-Sector	Large Office		
MEASURE INFORMATION			
CCE (¢/kWh)	3.4		
Simple Payback (years)	3.2		
ECONOMIC POTENTIAL			
Total Floor Space (Approx)	12,400,000		
Total Number of Sites	280		
% Eligible	24%		
# Eligible Sites Per Year	70		
# Eligible Sites By 2029	70		
PARTICIPATION RATES	**% by 2029**	**Curve**	
BAU Marketing	5%	B	
Aggressive Marketing	70%	B	
ACHIEVABLE POTENTIAL			
BAU Marketing	4		
Aggressive Marketing	49		
RELATIVE PARTICIPATION RATES (H=Higher; L=Lower; S=Same; N/A=Not Applicable)			
Other Sub-Sectors:			
Small Offices	L	Healthcare	H
Non-Food Retail	S	Schools	H
Food Retail	S	Universities	H
Large Hotels/Motels	H	Warehouses	N/A
Small Hotels/Motels	N/A	Restaurants	N/A
Other Regions:			
Labrador	L	Isolated	L
Related Measures:			
High Eff. Motors	H	Kitchen DCV	L
Demand Control Ventilation	L		
OTHER PARAMETERS			
Sensitivity to Incentives (High, Med, Low)			High
Primary Incentive Target (User, Channel Member, Both)			Both
Sensitivity to Direct Program Support (High, Med, Low)			High
Most Critical Program Support Type(s) (e.g. Trade Ally Training, Certification, Technical Workshops, etc.)			Case studies, awareness, partnerships, whole building retrofits based on energy audits

GENERAL NOTES:
- Opportunity with both fans and pumps
- Awareness of the measure is quite high and it's commonly implemented
- Can be applied in constant volume systems as well in some cases

BARRIERS:
- Applies easily in a portion of facilities but significant additional retrofits are required in some cases
- Additional costs to implement in some applications
- No issue with availability on the Island
- Incentives are only currently available under the custom program, which some contractors may not be aware of
- Potential landlord-tenant issues, especially in large offices

STRATEGIES/PARTNERS:
- A prescriptive incentives would help make incentives more accessible but there are potential issues with savings being quite variable
- Bundled approach with additional retrofits would be useful in some application
- Working with controls contractors to help drum up sales and awareness
- Opportunity would likely be identified by energy audits

NL ACHIEVABLE POTENTIAL WORKSHOP - COMMERCIAL SECTOR

C5: Advanced BAS

			COMMENTS
Focus Region	Island Interconnected		
Focus Sub-Sector	Large Office		
MEASURE INFORMATION			
CCE (¢/kWh)	3.0		
Simple Payback (years)	2.5		
ECONOMIC POTENTIAL			
Total Floor Space (Approx)	12,400,000		
Total Number of Sites	280		
% Eligible	90%		
# Eligible Sites Per Year	250		
# Eligible Sites By 2029	250		
PARTICIPATION RATES	**% by 2029**	**Curve**	
BAU Marketing	20%	B	
Aggressive Marketing	70%	B	
ACHIEVABLE POTENTIAL			
BAU Marketing	50		
Aggressive Marketing	175		
RELATIVE PARTICIPATION RATES (H=Higher; L=Lower; S=Same; N/A=Not Applicable)			
Other Sub-Sectors:			
Small Offices	L	Healthcare	H
Non-Food Retail	S	Schools	S-H
Food Retail	S	Universities	L
Large Hotels/Motels	S	Warehouses	Much L
Small Hotels/Motels	N/A	Restaurants	N/A
Other Regions:			
Labrador	S	Isolated	L
Related Measures:			
Programmable Tstats	H	Daylighting	S
Lighting Occupancy (Indoor)	H	Hotel Occupancy	L
Lighting Occupancy (Outdoor	H		
OTHER PARAMETERS			
Sensitivity to Incentives (High, Med, Low)			High
Primary Incentive Target (User, Channel Member, Both)			Both
Sensitivity to Direct Program Support (High, Med, Low)			High
Most Critical Program Support Type(s) (e.g. Trade Ally Training, Certification, Technical Workshops, etc.)			Education, case studies, bundling

GENERAL NOTES:
- Cost is likely too high. Should be closer to $600 per control point on average.
- Savings are likely too conservative. Would expect 25% savings on average.

BARRIERS:
- Similar to VFDs, this isn't something that's done on its own (i.e. done as part of a more holistic retrofit)
- Doesn't require much O&M if equipment and controls are installed and commissioned properly
- Equipment can easily be flipped to manual mode rather than being tuned
- Operators do not receive enough training to be able to operate sophisticated control systems
- Potential fear of the technology for building operators
- Potential issues with negative perception due to some systems not being operated properly
- Building owners may not want sign up to a service contract
- A lot of education required to ensure that systems are being operated properly

STRATEGIES/PARTNERS:
- Ensure that equipment is being maintained and that there is a service contract in place
- Education for both operators and contractors
- Ensure that equipment is properly commissioned and that M&V is being done
- Continuous optimization may be an option (as per BC Hydro approach)
- Can be bundled with a recommissioning program

NL ACHIEVABLE POTENTIAL WORKSHOP - COMMERCIAL SECTOR

C6: High Performance New Construction

			COMMENTS
Focus Region	Island Interconnected		
Focus Sub-Sector	Large Office		
MEASURE INFORMATION			
CCE (¢/kWh)	2.6		HPNC (25% Better)
Simple Payback (years)	2.5		
ECONOMIC POTENTIAL			
Total Floor Space (Approx)	1,800,000		
Total Number of Sites	40		
% Eligible	90%		
# Eligible Sites Per Year	3		Incr. basis
# Eligible Sites By 2029	40		
PARTICIPATION RATES	**% by 2029**	**Curve**	
BAU Marketing	50%	A	
Aggressive Marketing	80%	C	
ACHIEVABLE POTENTIAL			
BAU Marketing	20		
Aggressive Marketing	32		
RELATIVE PARTICIPATION RATES (H=Higher; L=Lower; S=Same; N/A=Not Applicable)			
Other Sub-Sectors:			
Small Offices	L	Healthcare	S
Non-Food Retail	L	Schools	H
Food Retail	L	Universities	H
Large Hotels/Motels	L	Warehouses	L
Small Hotels/Motels	L	Restaurants	L
Other Regions:			
Labrador	S	Isolated	L
Related Measures:			
HPNC (40% Better)	Much L		
OTHER PARAMETERS			
Sensitivity to Incentives (High, Med, Low)			Med-Low
Primary Incentive Target (User, Channel Member, Both)			Both
Sensitivity to Direct Program Support (High, Med, Low)			Med
Most Critical Program Support Type(s) (e.g. Trade Ally Training, Certification, Technical Workshops, etc.)			Training for design community and new building owners

GENERAL NOTES:
- Much of the new construction recently has been government and they already build to a high efficiency standard
- This has pushed the local industry to a higher standard

BARRIERS:
- Cost is the primary barrier to implementation
- Building rating systems like LEED include a lot of measures that don't help with energy efficiency
- Major lost opportunity if it is missed at the time of new construction
- Free ridrship is a potential issue

STRATEGIES/PARTNERS:
- Non-energy benefits help the business case
- Buildings can be rented at a premium
- Engineering consultants are key in terms of delivery
- Workshops to deal with administrative burden and/or best way to implement without a rating system

NL ACHIEVABLE POTENTIAL WORKSHOP - COMMERCIAL SECTOR

C7: PC Power Management

			COMMENTS
Focus Region	Island Interconnected		
Focus Sub-Sector	Large Office		
MEASURE INFORMATION			
CCE (¢/kWh)	N/A		Behavioural measure
Simple Payback (years)	N/A		
ECONOMIC POTENTIAL			
Total Floor Space (Approx)	12,400,000		
Total Number of Sites	280		
% Eligible	95%		
# Eligible Sites Per Year	270		
# Eligible Sites By 2029	270		
PARTICIPATION RATES	**% by 2029**	**Curve**	
BAU Marketing	10%	B	
Aggressive Marketing	50%	B	
ACHIEVABLE POTENTIAL			
BAU Marketing	27		
Aggressive Marketing	135		
RELATIVE PARTICIPATION RATES (H=Higher; L=Lower; S=Same; N/A=Not Applicable)			
Other Sub-Sectors:			
Small Offices	S	Healthcare	L
Non-Food Retail	L	Schools	S-H
Food Retail	L	Universities	S-H
Large Hotels/Motels	L	Warehouses	L
Small Hotels/Motels	L	Restaurants	L
Other Regions:			
Labrador	S	Isolated	S
Related Measures:			
ESTAR Computers	S	Task Lighting	L
ESTAR Office Equipment	S	Natural Ventilation	L
ESTAR Servers	S	Keep Doors Closed	L
OTHER PARAMETERS			
Sensitivity to Incentives (High, Med, Low)			Low
Primary Incentive Target (User, Channel Member, Both)			User
Sensitivity to Direct Program Support (High, Med, Low)			High
Most Critical Program Support Type(s) (e.g. Trade Ally Training, Certification, Technical Workshops, etc.)			Education and marketing to IT departments and executive buy-in, lobby dashboards

GENERAL NOTES:
- Technology exists to implement power management settings

BARRIERS:
- IT department may need to push through updates during off hours
- Individuals may override power management settings that have been pushed down on them
- Remote use of work computers limits the proportion of computers that can be shut down

STRATEGIES/PARTNERS:
- Most effective to convince an IT department to implement and push down power management settings
- Education component is important to ensure persistence
- Competition (e.g. floor-by-floor) can be helpful

NL ACHIEVABLE POTENTIAL WORKSHOP - COMMERCIAL SECTOR

C8: Glazing

			COMMENTS
Focus Region	Island Interconnected		
Focus Sub-Sector	Large Office		
MEASURE INFORMATION			
CCE (¢/kWh)	2.9		Incr. measure
Simple Payback (years)	2.8		
ECONOMIC POTENTIAL			
Total Floor Space (Approx)	12,400,000		
Total Number of Sites	280		
% Eligible	85%		
# Eligible Sites Per Year	10		Incr. measure
# Eligible Sites By 2029	240		
PARTICIPATION RATES	**% by 2029**	**Curve**	
BAU Marketing	10%	B	
Aggressive Marketing	80%	C	
ACHIEVABLE POTENTIAL			
BAU Marketing	24		
Aggressive Marketing	192		
RELATIVE PARTICIPATION RATES (H=Higher; L=Lower; S=Same; N/A=Not Applicable)			
Other Sub-Sectors:			
Small Offices	L	Healthcare	H
Non-Food Retail	L	Schools	H
Food Retail	L	Universities	H
Large Hotels/Motels	S	Warehouses	L
Small Hotels/Motels	L	Restaurants	L
Other Regions:			
Labrador	H	Isolated	H
Related Measures:			
Wall Insulation	S	Recommissioning	H
Roof Insulation	S		
OTHER PARAMETERS			
Sensitivity to Incentives (High, Med, Low)			Med
Primary Incentive Target (User, Channel Member, Both)			User
Sensitivity to Direct Program Support (High, Med, Low)			High
Most Critical Program Support Type(s) (e.g. Trade Ally Training, Certification, Technical Workshops, etc.)			Education, contractor training

GENERAL NOTES:

BARRIERS:
- Argon gas may leak out of some low quality windows
- Awareness of low cost may be an issue
- Commercial customers are looking for lowest cost options
- Landlord-tenant issues (i.e. split incentive)
- Only currently covered by custom program, which has seen no uptake

STRATEGIES/PARTNERS:
- Architects and contractors would be important partners
- Need to ensure that high efficiency glazings are included in specs
- Promote non-energy benefits

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