

October 26, 2010

Hello Charles,

Attached is an information package as a follow up to the discussion we had last Wednesday regarding Island electricity supply. The attached is the presentation package we reviewed at that time plus a Follow Up section which includes additional review of:

- CPW Definition
- Economic Assumptions/Consideration
- Island Revenue Requirement (\$/MWh)
- Oil to Gas Fuel Switching
- Holyrood (LNG Fuel Option) *[Please note that we have attempted to identify issues and estimate fuel costs but this is difficult given the lack of information regarding future delivered LNG prices to NL and required investments for LNG storage/regasification and to switch Holyrood to natural gas.]*
- 2002 Pricing Terms Revisited

If you wish to discuss further please contact either myself, Wayne or Gerard. Thank you.

Paul
ext. 5728

CONFIDENTIAL
COMMERCIALLY SENSITIVE

Future Island Electricity Supply

October 2010

Review of Considerations/Findings

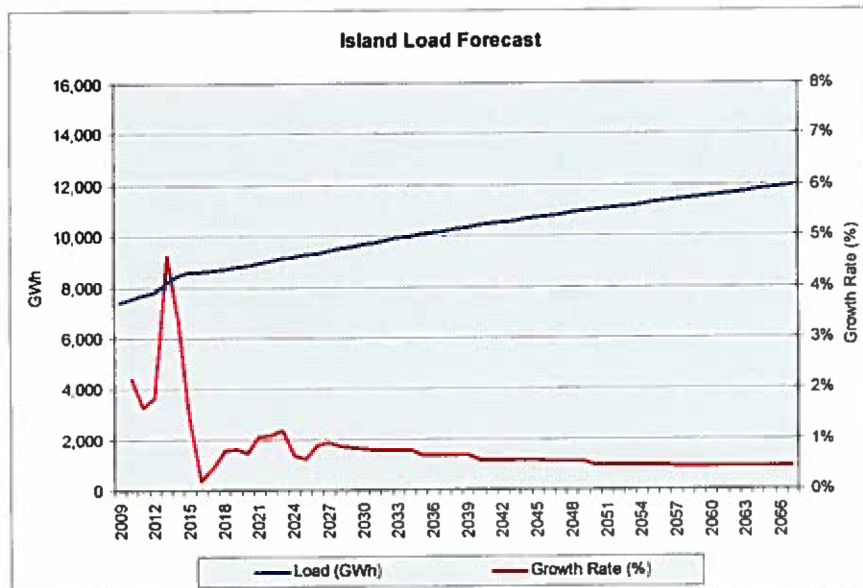
Overview

CONFIDENTIAL
COMMERCIALLY SENSITIVE

- Electricity Forecast
- Island Supply – Options & Considerations
- Economic Assumptions
- Generation Expansion (focus scenarios)
- Island Revenue Requirement (focus scenarios)
- Oil Price Outlook
- Fuel Costs
- Summary Considerations
- Appendix - Generation Expansion Scenarios
- Follow Up:
 - CPW Definition
 - Economic Assumptions/Consideration
 - Island Revenue Requirement (\$/MWh)
 - Oil to Gas Fuel Switching
 - Holyrood (LNG Fuel Option)
 - 2002 Pricing Terms Revisited

Electricity Forecast

CONFIDENTIAL
COMMERCIALLY SENSITIVE



Island electricity forecast:

- 2010 7,585 GWh
- 2020 8,872 GWh
- 2041 10,493 GWh
- 2067 11,979 GWh

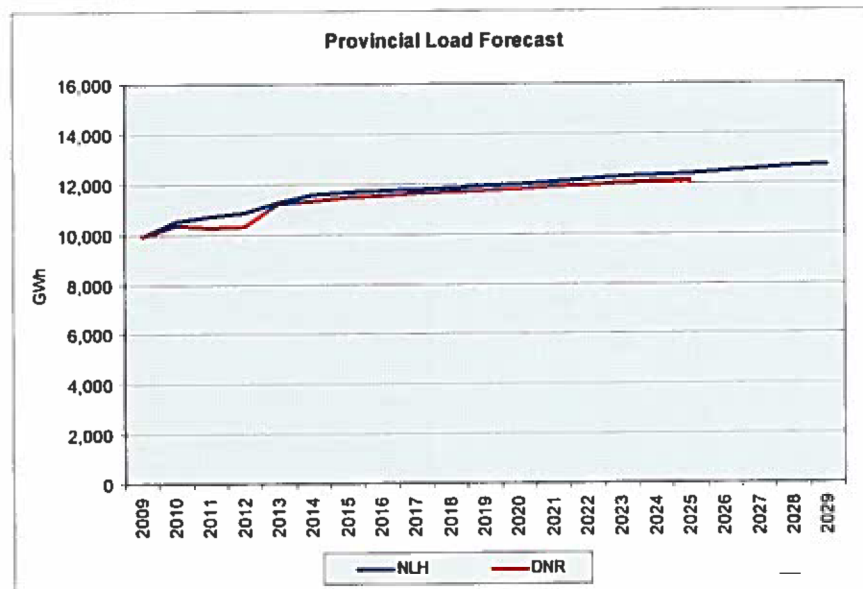
- Growth Rates: 2010-2041 1.1% annual avg.
2010-2067 0.8% annual avg.

Assumptions:

- Single newsprint mill, single refinery, nickel processing facility, Duck Pond Mine to 2013, Hebron developed, Economic forecast (Dept. of Finance)
- Island capacity deficit 2015
(criteria - loss of load no more than 2.8 hrs/year)
- Island energy deficit post 2019

Considerations:

- Efficiency & Conservation not explicitly incorporated in forecast. NLH models technological change variables (trend variables with negative coefficients) in domestic & commercial to capture overall trends.
- Electric space heating is a key driver for domestic/residential & commercial consumption.
- DNR does not have separate forecast for Island Interconnected. DNR & NLH forecasts for total NL are consistent.



Island Supply Options Considered

CONFIDENTIAL
COMMERCIALLY SENSITIVE

Scenario	Island Revenue Requirement (CPW@8% in Million \$)	Comments
Isolated Island	\$12,272	<ul style="list-style-type: none"> ▪Petroleum/thermal based ▪Risks to fuel costs/oil prices & environmental costs ▪No interconnection to North America grid ▪NL ratepayer impact ▪Holyrood replacement post 2030
MF with Lab HVdc	\$10,604	<ul style="list-style-type: none"> ▪Schedule & approval risk ▪Capital cost control risk ▪Additional surplus output ▪Near term NL ratepayer impact ▪Renewable supply ▪Interconnection to North America grid ▪Holyrood shutdown 2021
GI with Lab HVdc	\$10,604	<ul style="list-style-type: none"> ▪Schedule & approval risk ▪Capital cost control risk ▪Additional surplus output ▪Near term NL ratepayer impact ▪Renewable supply ▪Interconnection to North America grid ▪Holyrood shutdown 2021
Imports via HQ (HVdc line from CF; supply from NYISO)	\$12,413	<ul style="list-style-type: none"> ▪Need to secure long term firm supply ▪Power source unknown ▪External market price volatility ▪NL ratepayer impact ▪Interconnection to North America grid ▪Holyrood shutdown 2021
Imports via Maritime Line (supply from NEISO)	\$12,398	<ul style="list-style-type: none"> ▪Project execution for multi-jurisdictional link ▪Need to secure long term firm supply ▪Power source unknown ▪External market price volatility ▪NL ratepayer impact ▪Interconnection to North America grid ▪Holyrood shutdown 2021

Island Supply Considerations

CONFIDENTIAL
COMMERCIALLY SENSITIVE

- Impact of federal/provincial environmental mitigation strategies
 - For Isolated Island, pollution control equipment (scrubbers ESP and related investments) installed at Holyrood to address SO₂ and particulate emissions.
 - For carbon emissions, these uncertain costs (due to ongoing regulatory and pricing uncertainty) have not been included. Such costs could materially increase Isolated Island utility costs.
- Have other future Island Isolated supply scenario options been considered?
 - The Isolated Island scenario includes known and feasible indigenous hydroelectric and wind resources.
 - NL offshore gas has not been considered – viewed as not yet a realistic option for current utility system planning.
 - LNG with a regasification facility at Holyrood is being evaluated – no results available.
- Consideration of a Maritime link for purposes of purchasing power/importing for Island
 - A Maritime link with supply, effectively from NEISO, has been evaluated as an alternative to Labrador supply. Has been found to be higher cost.
 - A maritime link scaled for the purposes of finding a market for surplus Muskrat Falls power supply above Island needs is under active investigation.
- Options/technologies to improve dispatchability of intermittent sources
 - To the extent that future technology enables a higher penetration of wind resources on an isolated grid, such gains would occur where warranted.
 - In general, a real time generation expansion plan would not speculate on a specific future technology change.
 - An additional consideration for a hydro based system is the increase in water spillage risk as wind penetration increases.
- Does Labrador HVdc link to Island eliminate Island thermal?
 - An Island Link scenario eliminates the need for Holyrood (shut down 2021) and any additional future baseload thermal generation. While there are combustion turbines added over the course of the operating life of the Island link in order to preserve standard utility reliability criterion, there is no thermal energy production as such from these facilities. These are there more to maintain an adequate reserve relative to demand in case of emergencies.
- Isolated Island improved technology case
 - Known efficiency gains in new thermal plant relative to existing is incorporated in the expansion plan (ie replacing straight cycle plant with combined cycle plant(s) for base load requirements.)

Economic Assumptions

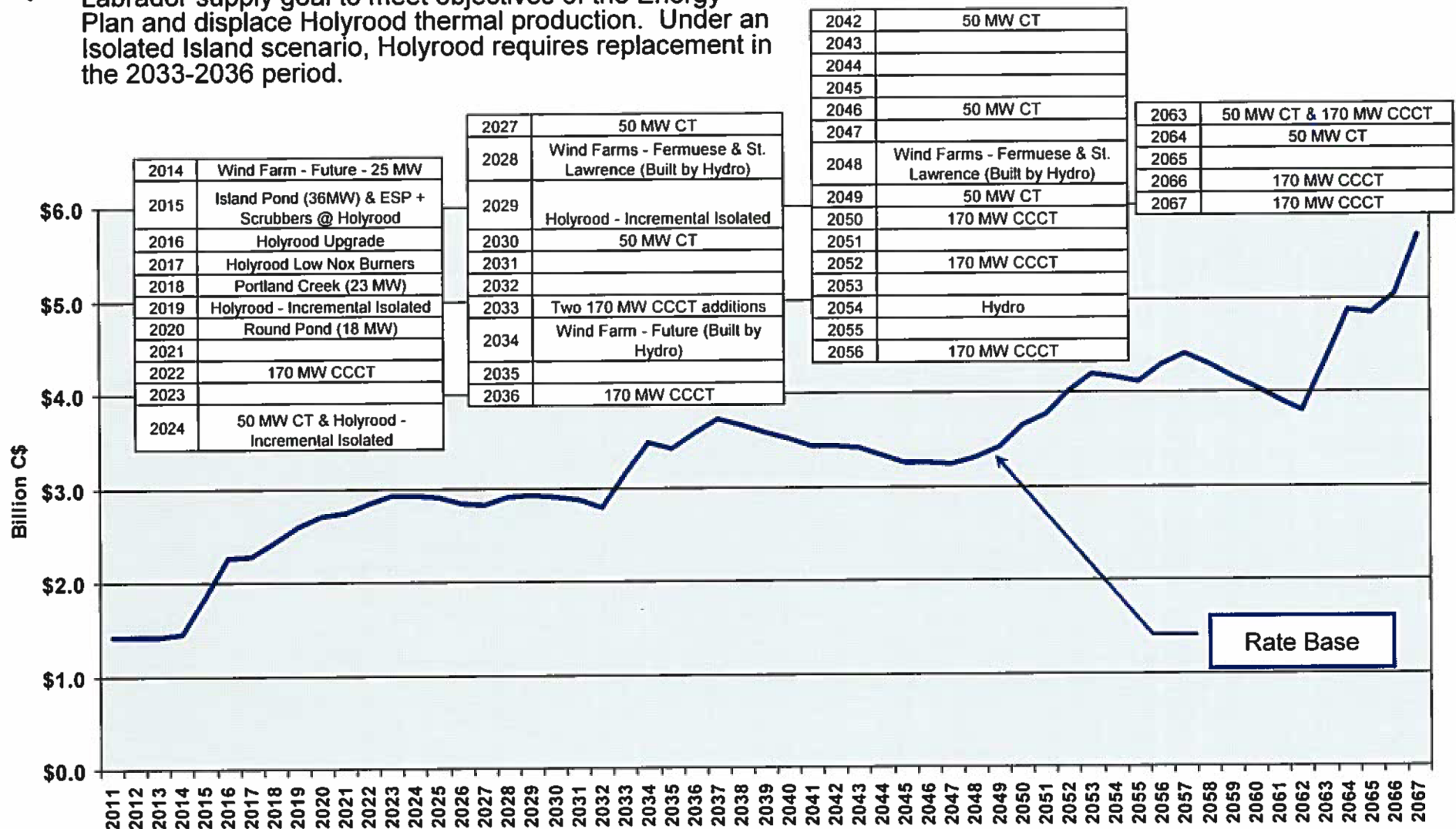
CONFIDENTIAL
COMMERCIALLY SENSITIVE

- Inflation 2% CPI
- Cost escalation:
 - Generation and transmission O&M 2.5%
 - Capital costs 2% - 3%
- Debt to Equity ratio 74:26
(Employee Future Benefits included in Debt portion)
- Debt Cost 7.7%
- Equity Return 10.1%
- Weighted Average Cost of Capital 8.2%
- Exchange rate \$1Cdn = \$0.964U.S.
- Capital cost estimates +/- +/-10% to +/- 25%
(Represents potential variance in capital cost estimates for the Isolated Island and Lab HVdc scenarios. Nalcor indicates that for regulated NLH, this is a general accuracy range with the lower range indicative of near term capital budget proposals submitted to the PUB and the higher range indicative of costs for major utility project estimates maintained for generation expansion and planning.)

Generation Expansion - Isolated Island

CONFIDENTIAL
COMMERCIALLY SENSITIVE

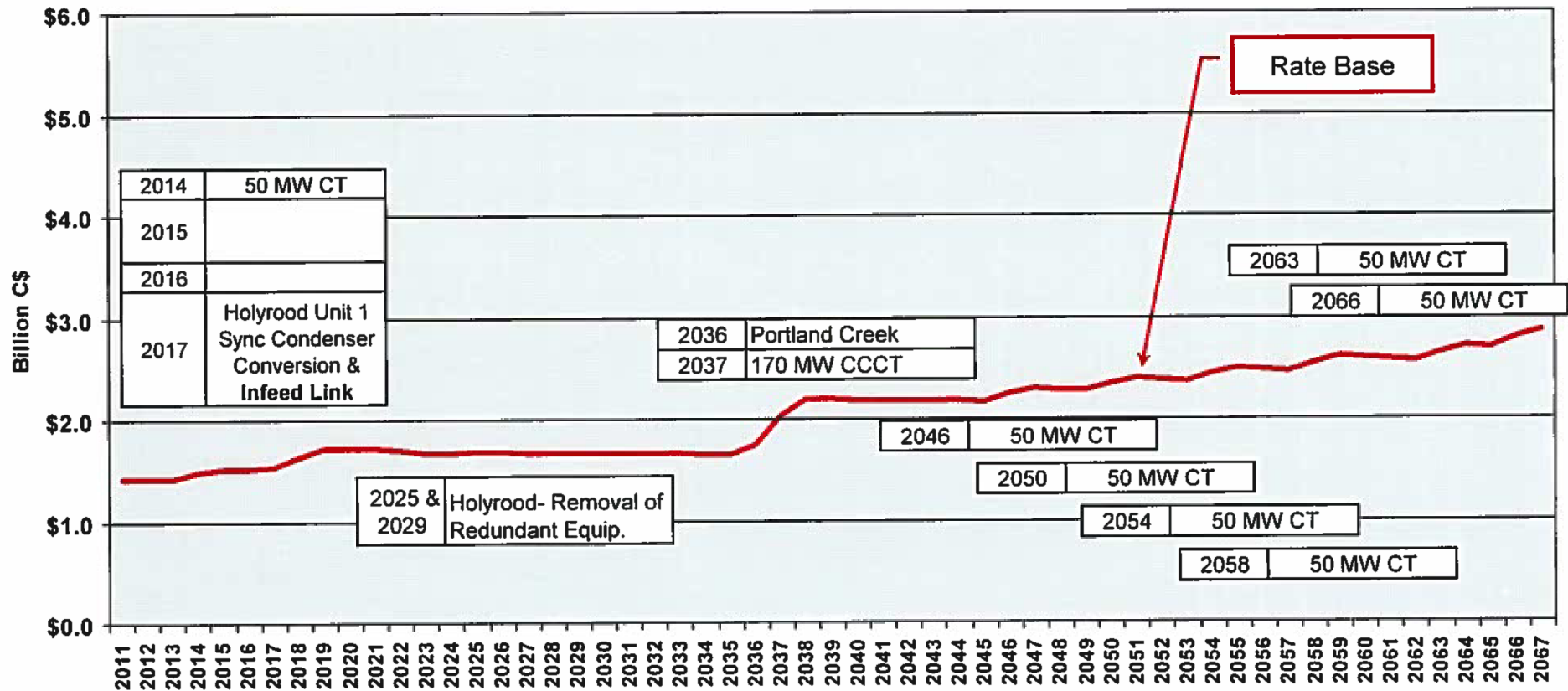
- Isolated Island - thermal generation expansion plan with some small hydro and wind resources.
- Labrador supply goal to meet objectives of the Energy Plan and displace Holyrood thermal production. Under an Isolated Island scenario, Holyrood requires replacement in the 2033-2036 period.



Generation Expansion – Labrador HVdc

CONFIDENTIAL
COMMERCIALLY SENSITIVE

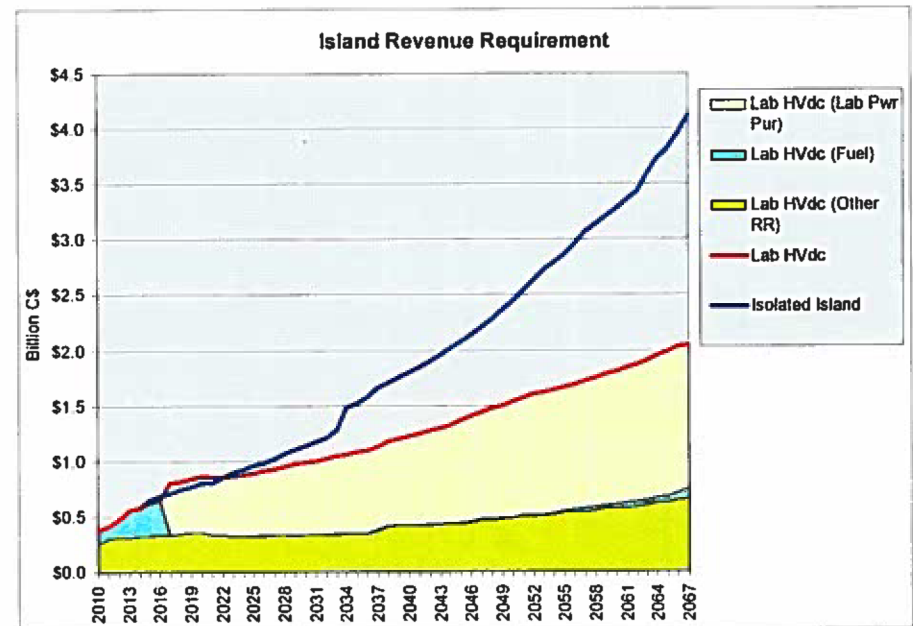
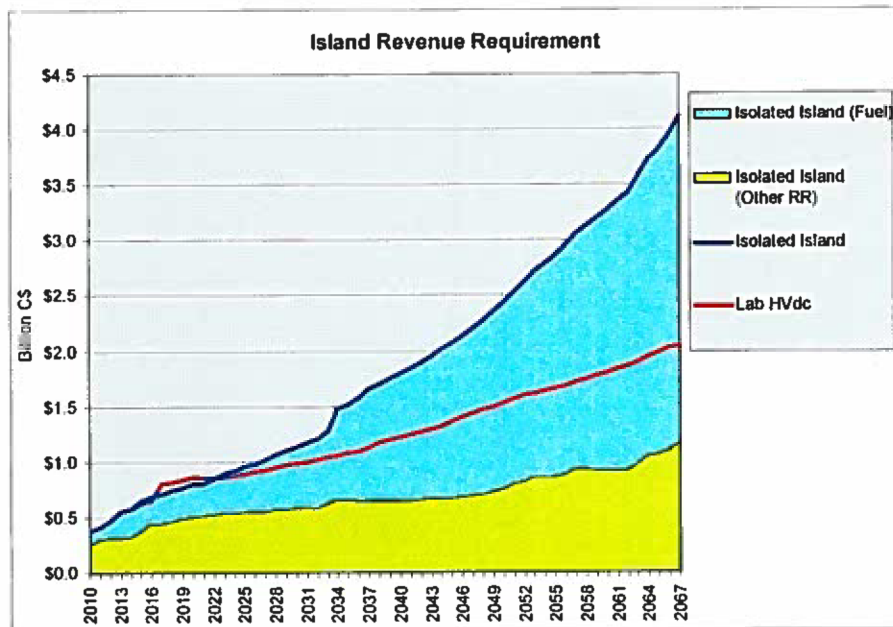
- Labrador HVdc -Muskrat Falls with HVdc Island link. A small hydro near term. Longer term thermal for system reliability. Holyrood retired in 2021.



Island Revenue Requirement

CONFIDENTIAL
COMMERCIALLY SENSITIVE

$$\text{Revenue Requirement} = \text{O\&M} + \text{Fuel} + \text{Power Purchases} + \text{Depreciation} + \text{Return on Rate Base} - \text{Misc Rev}$$



Cumulative Present Worth
(PV @ 8% - Million C\$)

Island Isolated
Lab HVdc

2010-2041*

\$9,761
\$9,081

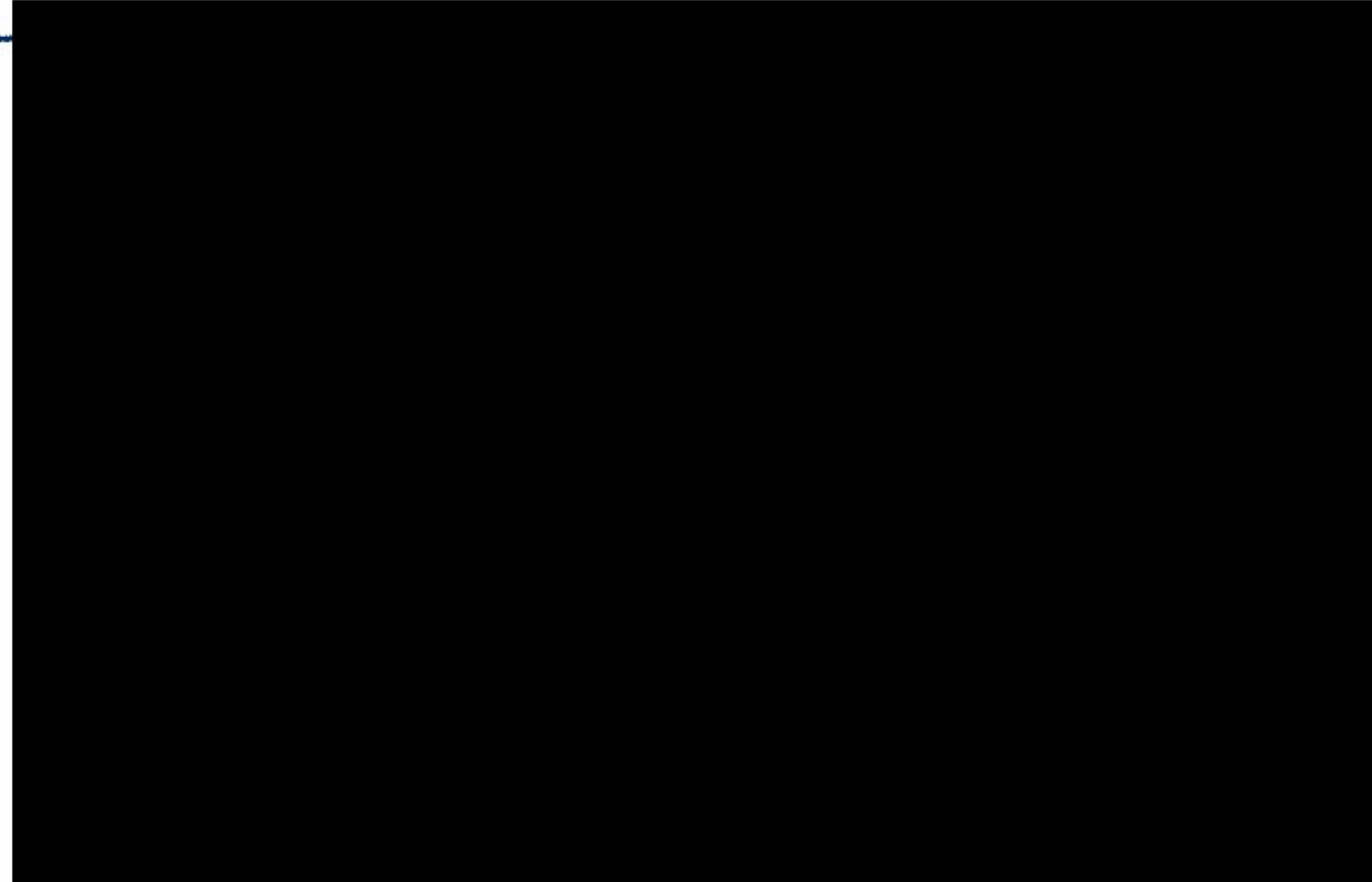
2010-2067

\$12,272
\$10,604

* Calculated by DNR.

Crude Oil Price Outlook

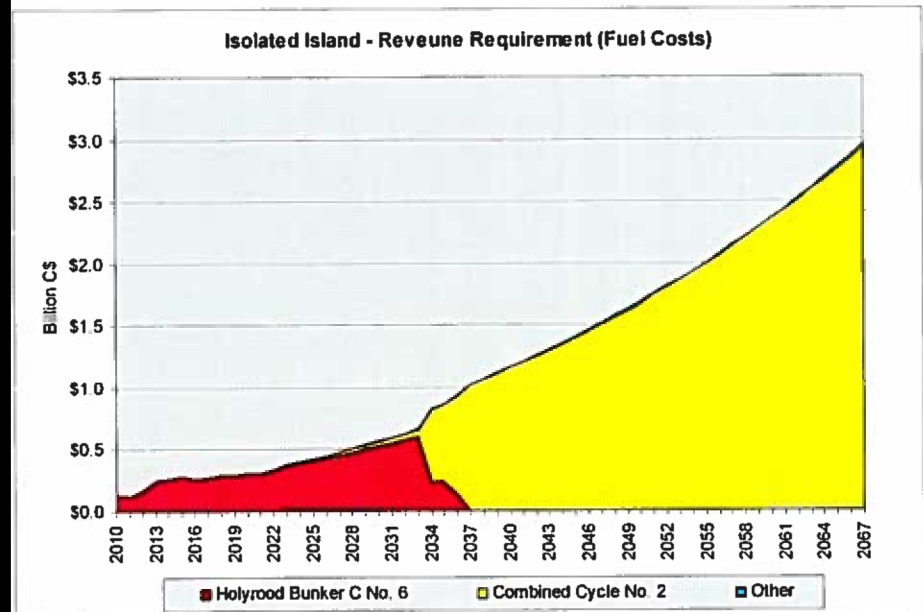
CONFIDENTIAL
COMMERCIALY SENSITIVE



- Oil Price Forecast:
 - PIRA Reference Case outlook to 2025
 - Post 2025 outlook based on assumptions communicated by Nalcor
 - Real \$ oil prices held flat post 2025
 - Nominal \$ oil prices escalated by inflation assumption (2% annually) post 2025

Fuel Costs - Isolated Island

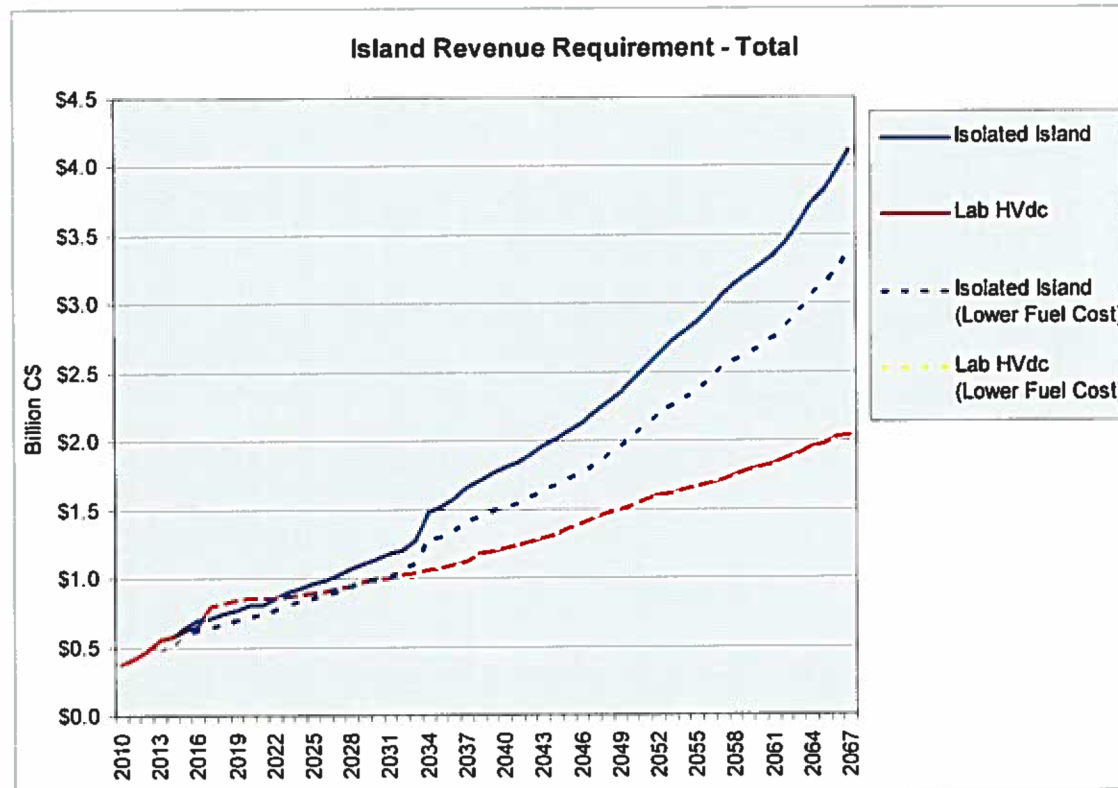
CONFIDENTIAL
COMMERCIAL SENSITIVE



- WTI oil price forecast consists of PIRA outlook to 2025 and escalated at 2% annually post 2025.
- No. 6 fuel oil priced at a discount to crude oil price.
 - Long run fuel costs for Holyrood are derived from PIRA based on Bunker C heavy fuel oil (No. 6 fuel oil) to crude price relationships. Applying a Bunker Pricing Ratio to WTI crude derives heavy fuel oil prices applicable for Holyrood. (e.g., the Bunker Ratio for 0.7% HFO is 90%, for 1% HFO is 87% and for 2.2% HFO is 83%)
- No. 2 fuel oil priced at a premium to crude oil price. (No. 2 fuel oil utilized by CCCTs & CTs)
- In discussion, indicated that a low price oil case has been analyzed for generation expansion although CPW analysis not taken through to a rate impact analysis.

Fuel Costs - Consideration

CONFIDENTIAL
COMMERCIALLY SENSITIVE



Cumulative Present Worth (PV @ 8% - Million C\$)	2010-2041	2010-2067
Island Isolated	\$9,761*	\$12,272
Lab HVdc	\$9,081*	\$10,604
Island Isolated (Lower Fuel Cost)	\$8,673**	\$10,749**
Lab HVdc (Lower Fuel Cost)	\$8,785**	\$10,303**

* Calculated by DNR.

** Calculated by DNR. Based on simple reduction of fuel costs to 75% of costs for the Isolated Island and Lab HVdc scenarios. No other assumed revenue requirement impacts/changes.

Summary Considerations

CONFIDENTIAL
COMMERCIALY SENSITIVE

- Timeline on Lab HVdc consideration linked to timing of decision for environmental upgrades at Holyrood.
- Island electricity forecast appears reasonable – consistent with July 2010 PUB capital plan filing.
- Economic assumptions appear reasonable.
- Capital cost estimate risks.
- Isolated Island scenario presented as an oil-fueled thermal generation expansion scenario.
- Oil prices and hence fuel costs can be volatile variables and difficult to forecast.
- Generally, long term outlook horizon makes forecasting more difficult.

CONFIDENTIAL
COMMERCIALLY SENSITIVE

Appendix

Appendix - Generation Expansion Scenarios

CONFIDENTIAL
COMMERCIAL SENSITIVE

Year	ISOLATED ISLAND (2010-2038)	LABRADOR HVdc (2010-2038)	Year	ISOLATED ISLAND (2039-2067)	LABRADOR HVdc (2039-2067)
2010			2039		
2011			2040		
2012			2041		
2013			2042	50 MW CT	
2014	Wind Farm - Future - 25 MW	50 MW CT	2043		
2015	Island Pond (36MW) & ESP + Scrubbers @ Holyrood		2044		
2016	Holyrood Upgrade		2045		
2017	Holyrood Low Nox Burners	Holyrood Unit 1 Sync Condenser Conversion & Infeed Link	2046	50 MW CT	50 MW CT
2018	Portland Creek (23 MW)		2047		
2019	Holyrood - Incremental Isolated		2048	Wind Farms - Fermuese & St. Lawrence (Built by Hydro)	
2020	Round Pond (18 MW)		2049	50 MW CT	
2021			2050	170 MW CCCT	50 MW CT
2022	170 MW CCCT		2051		
2023			2052	170 MW CCCT	
2024	50 MW CT & Holyrood - Incremental Isolated		2053		
2025		Holyrood- Removal of Redundant Equip.	2054	Wind Farm - Future - Built by Hydro	50 MW CT
2026			2055		
2027	50 MW CT		2056	170 MW CCCT	
2028	Wind Farms - Fermuese & St. Lawrence (Built by Hydro)		2057		
2029	Holyrood - Incremental Isolated	Holyrood- Removal of Redundant Equip.	2058		50 MW CT
2030	50 MW CT		2059		
2031			2060		
2032			2061		
2033	Two 170 MW CCCT additions		2062		
2034	Wind Farm - Future (Built by Hydro)		2063	50 MW CT & 170 MW CCCT	50 MW CT
2035			2064	50 MW CT	
2036	170 MW CCCT	Portland Creek	2065		
2037		170 MW CCCT	2066	170 MW CCCT	50 MW CT
2038			2067	170 MW CCCT	

Note: Holyrood is fully retired in 2036 in the Isolated Island Scenario compared to 2021 in the Labrador HVdc link scenario.

CONFIDENTIAL
COMMERCIALLY SENSITIVE

Follow Up

CPW Definition

CONFIDENTIAL
COMMERCIAL SENSITIVE

- Cumulative Present Worth or CPW is defined as the present value of a financial time series of data discounted at a specified percentage rate to a base year. In this current analysis, the discount rate is 8% with the annual financial flows discounted to 2010.
- For evaluation of system supply options, the CPW calculation can be applied as:
 - the present value of incremental variable and fixed costs (excludes existing costs). These are used by utility system planning to evaluate new supply options/scenarios to reliably meet forecasted demand. It is a benchmark for evaluation of least cost utility planning. The generation expansion future with the lowest CPW would have the lowest overall consumer rates.
 - the present value of revenue requirement to be paid by ratepayers. Regulated revenue requirements for the Island interconnected grid combines the regulated cost-of-service revenue requirements for the existing grid, with the go-forward revenue requirements for incremental capital and operational costs from the generation expansion analysis, into an overall total regulated revenue requirement. These total costs become the obligations for ratepayers. (this is the focus for reviewing overall ratepayer impacts of the various scenarios)

Economic Assumptions/Consideration

CONFIDENTIAL
COMMERCIAL SENSITIVE

- **Inflation** **2% CPI**
Comment: Nalcor indicates forecast from Conference Board of Canada. 2% is a generally accepted assumption level for inflation and within the range of the Bank of Canada target for CPI.
- **Cost escalation (approximate):**

O&M	2.5%	(does not include fuel price/cost escalation)
Capital costs (construction)	2% - 3%	

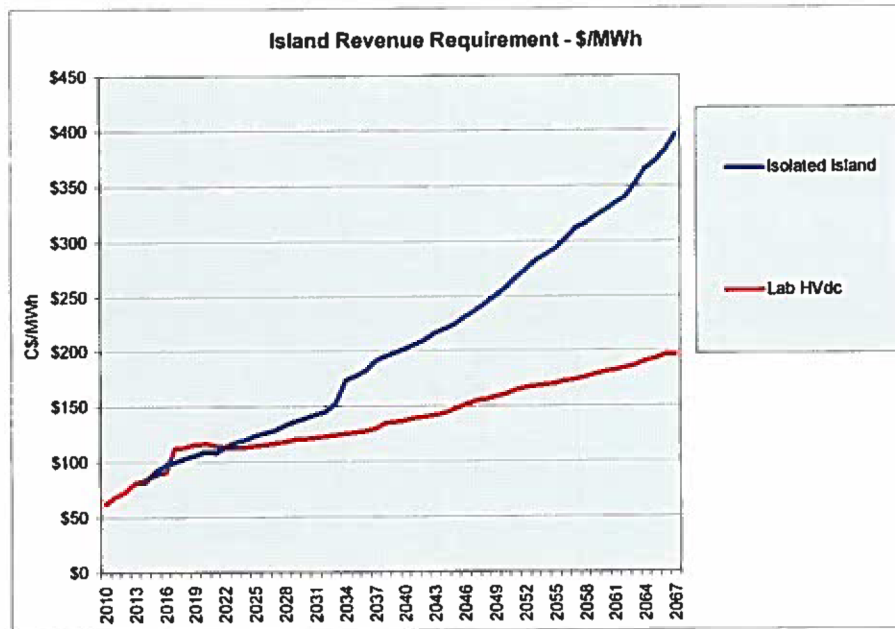
 Comment: Project specific cost indices have been developed for LCP. Generally, average forecast capital cost indices are slightly higher for thermal plant (CT & CCCT) compared to hydraulic plant for 2010-2019. Post 2019, all at 2%/year.
- **Debt to Equity (D/E) ratio** **74:26**
Comment: Newfoundland Power D/E ratio at about 55:45.
- **Debt Cost** **7.7%**
Comment: Newfoundland Power 2009 weighted average long term debt rate at approximately 7.7%.
- **Equity Return** **10.1%**
Comment: Newfoundland Power stated 2009 return on equity at 8.64% making the Nalcor assumption higher in comparison. Equity rate may be lower for a regulated utility in today's financial environment but longer term would be contingent on long term market conditions and regulatory approval (where required). Nalcor's goal of a market representative equity return may be key driver.
- **Weighted Average Cost of Capital** **8.2%** (employed as rate of return on rate base)
Comment: Newfoundland Power 2009 stated rate of return on rate base for rate setting purposes was 8.23% with a range of 8.05% to 8.41% for 2010. This alignment with Nalcor assumption may mitigate any concern for D/E ratio, debt & equity rate differences as this parameter drives rate base return in calculating ratepayer impacts.
- **Exchange rate** **\$1Cdn = \$0.964U.S.**
Comment: In line with the current exchange rate. The 2010 year-to-date average noon rate is \$1Cdn = \$0.967U.S. Consistent with Nalcor oil & gas project assumption.
- **Capital cost estimates +/-** **+/-10% to +/- 25%**
Comment: Represents potential variance in capital cost estimates for the scenarios. Nalcor indicates that for regulated NLH, this is a general accuracy with the lower range indicative of near term capital budget proposals submitted to the PUB and the higher range is indicative of costs for major utility project estimates maintained for generation expansion and planning.
- **For this analysis, the information provided to DNR indicates assumptions that are effectively the same for the scenarios. An important consideration moving forward with a preferred Island supply option will be to ensure that economic/financial parameters are reasonable (for both Nalcor and NLH) and do not unnecessarily inflate costs, do not allocate costs improperly to parties utilizing infrastructure and the overall approach meets least cost power principles for ratepayers.**

Island Revenue Requirement (\$/MWh)

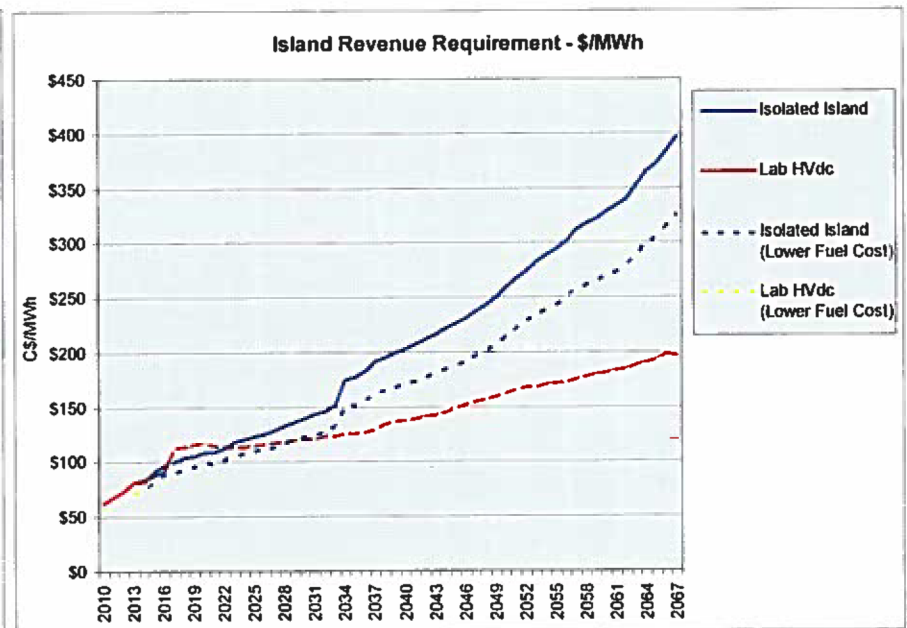
CONFIDENTIAL
COMMERCIALLY SENSITIVE

- As requested, these charts display the Island revenue requirement results under the two scenarios on a \$/MWh basis.

Isolated Island & Labrador HVdc

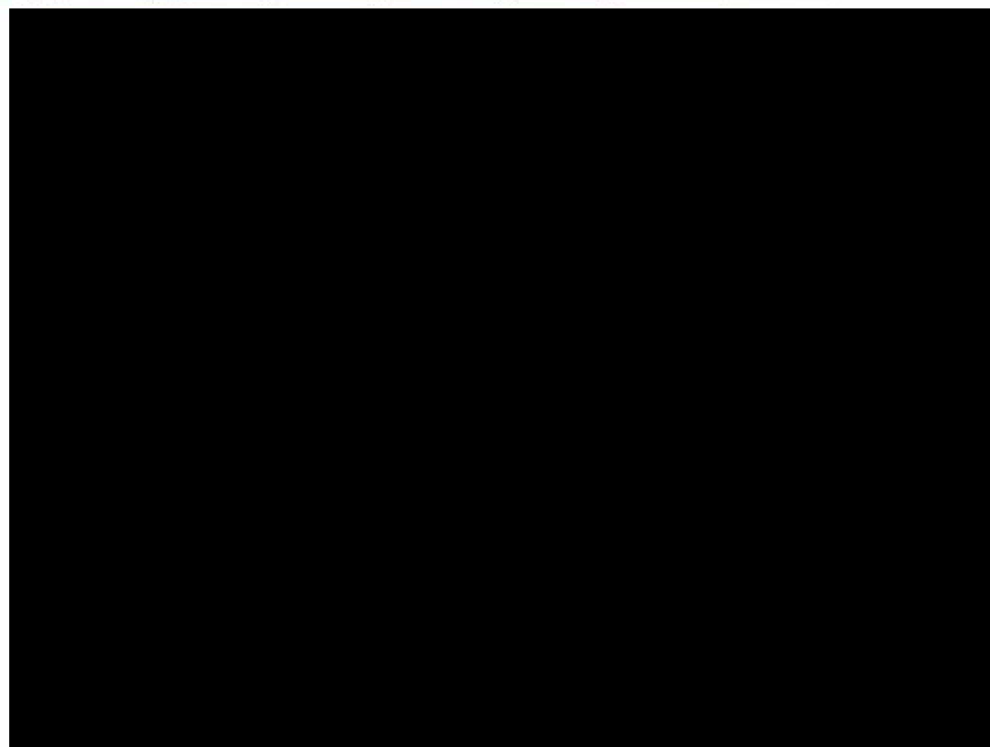


**Isolated Island & Labrador HVdc
with comparison to Lower Fuel Cost Scenarios**



Oil to Gas Fuel Switching

CONFIDENTIAL
COMMERCIALLY SENSITIVE



- Historically, crude oil and natural gas prices (particularly in North America) were linked and moved in convergence.
 - From 2000 to 2005, the Henry Hub gas price ranged between 75% & 102% of WTI oil price on an oil equivalent basis. (see table below)
 - Historical price difference between oil & gas did not encourage fuel switch to gas.
 - Following 2005, oil and gas prices began to diverge.
 - From 2006 to 2009, the Henry Hub gas price ranged between 59% & 37% of WTI oil price on an oil equivalent basis. (see table below)
 - PIRA indicates that it expects this oil/gas price gap to continue throughout its long term outlook with oil price at more than double gas price.
 - PIRA also expects both Asian and European spot gas prices to converge toward Henry Hub gas prices.
- This long term price difference could encourage investments in fuel switching if gas is available (with appropriate infrastructure) and the required investments to fuel switch do not exceed the price gap benefits.
 - For markets with a lack of gas access, the liquefied natural gas (LNG) import supply option may be a more viable than it once was. PIRA indicates that the LNG supply option is expanding globally due to a combination of widely available gas, more flexible commercial arrangements and the loss of the U.S. as a significant LNG consumer.

(on an oil equivalent basis)

Source: Calculated based on price data from PIRA.

Holyrood (LNG Fuel Option)

CONFIDENTIAL
COMMERCIAL SENSITIVE

- PIRA indicates that LNG pricing in regional market have lacked consistency in contract prices or pricing formulas.
 - In North America, LNG prices normally tied to Henry Hub gas prices plus a locational differential.
 - In Europe, LNG prices tend to be set based on a formula tied to oil products.
 - In Asia, LNG prices tied to imported crude oil prices.
 - There is a growing tendency of spot sales to be tied to Henry Hub or UK Spot natural gas prices.
- Historically, LNG primarily sold under long term contracts allowing regional pricing differences to be maintained with little arbitrage opportunities for suppliers. [REDACTED]
- The incentive to convert Holyrood to natural gas from No. 6 heavy fuel oil (which is normally priced at a discount to crude oil price) based on imported LNG would primarily depend on the combined cost competitiveness of:
 - the LNG pricing terms delivered to NL
 - the necessary investments for on-site LNG storage/regasification and gas fired generation equipment.These costs are unknown by DNR as well as the extent to which Holyrood expenditures on emission mitigation equipment (part of current Isolated Island scenario) could be avoided if a switch to gas was made.
- If the LNG delivered price is tied to Henry Hub gas price (with a locational/delivery differential), there may be a price incentive to fuel switch although a full cost and rate impact analysis would be required to sufficiently determine whether such a fuel switch opportunity could exist and, if so, under what circumstances.
- Another consideration is Holyrood would not purchase LNG volumes year-round and cargoes may be smaller (relative to other markets) so may be more suited as a spot market customer verses a long term contract customer although this aspect would require more investigation.

Holyrood (LNG Fuel Option)

CONFIDENTIAL
COMMERCIAL SENSITIVE

This example is for illustrative purposes to demonstrate, under these assumptions, the potential gap between fuel price costs.

In this example, gas fuel cost option represents between 53%-60% of heavy fuel oil cost option up to 2020 and 60%-70% post 2020.

This is a smaller gap compared to the crude oil to natural gas gap illustrated in previous slide as heavy fuel oil price is discounted from crude price and gas price incurs a locational differential/delivery cost.

Under these assumptions, the gap would represent a potential cost range available for gas conversion capital and operating expenditures.

Notes to Chart:

- Holyrood No. 6 heavy fuel costs as provided by Nalcor.
- Natural gas cost estimated by DNR based on:
 - PIRA Henry Hub natural gas price forecast
 - Gas price adjusted by C\$2/MMBtu as an estimate for the NL locational differential/delivery cost. This is a simple assumption and further detailed research/analysis would be required to determine future delivered LNG gas prices to NL.
 - Exchange rate of \$1 Cdn = \$0.964 U.S.
 - Plant heat rate of 10,800 BTU per kWh
 - Gas energy content of 1,024 BTU per cubic foot

- Combined Cycle plants fueled on No. 2 fuel oil (priced at a premium to crude oil price) may show a stronger incentive for LNG import option. These plants would be new builds with capital investments to be incurred regardless of fuel option.

2002 Pricing Terms Revisited

CONFIDENTIAL
COMMERCIAL SENSITIVE

	2005	2006	2007	2008	2009	2010	2011
Total Revenue from Electricity Sales (\$Millions)	\$10,585	\$10,551	\$11,985	\$12,364	\$12,055	\$12,082	\$12,448
Electricity Sales (Million kWh)	184,519	181,795	192,779	191,696	188,673	n/a	n/a
Average Revenue (\$/MWh)	\$57.37	\$58.04	\$62.17	\$64.50	\$63.89	n/a	n/a
Annual Price Index	1.034	1.012	1.071	1.037	0.991	n/a	n/a
Sales Price - January thru March (\$/MWh)			\$36.7	\$36.5	\$42.5	\$42.9	\$39.4
Sales Price - April thru December (\$/MWh)			\$35.9	\$40.7	\$40.9	\$38.7	n/a
Average Sales Price (\$/MWh)			\$36.1	\$39.7	\$41.3	\$39.8	n/a
Final Sales Price (\$/MWh)		\$35.50	\$38.0	\$39.5	\$39.1	n/a	n/a

Source: Hydro Quebec Annual Reports and Strategic Plan

Approach:

- 2006: \$35.50/MWh
- 2007-2009: Final Sales Price as per 2002 terms
- 2010: Average Sales Price as per 2002 terms
- 2011: January thru March Sales Price as per 2002 terms
- 2012-2025: HQ average sales revenue growth rate from 1993-2009 at 2.07%.

Results:

- 2009: \$39.1/MWh
- 2010: \$39.8/MWh (interim price based on 2008 & 2009 indices)
- 2011: \$39.4/MWh (interim price based on 2009 index)
- 2025: \$52.5/MWh
- If escalated at 2.07% from 2010 (instead of 2012), results are price about the same for 2010 and about \$1.50/MWh, on average, higher over the 2011 to 2025 period (red dotted line in chart).

