

*Sept meeting*

# Lower Churchill Phase 1

## August 2015 Project Update

Boundless Energy



*Briefing with Premier's Office*



*Project name: ...*

# PROJECT BACKGROUND AND RATIONAL

# Project Background and Rational

- NL needs more power overall
- MF/LIL determined to be lowest cost option following extensive alternatives review
- Replaces Holyrood Thermal Generating Station > 45 years old
- Investment in an asset we own, returning value and cash flow in excess of \$30 billion to the people of the province
- Paying ourselves, as opposed to paying for oil to outside companies – we are “buying”, not “renting”
- Clean power; power generation in our Province will be 98% GHG free, and avoid emerging future risk of costs of carbon (Obama)
- Significant construction benefits; jobs for NL’s, and economic benefits for NL businesses

# Project Background and Rational

- Interest rates locked in at historic lows
- Federal Loan Guarantee acquired in recognition of regional GHG reduction benefits from the project and national significance
  - will save > \$6 Billion over life of project financing, 35 years for MF and 40 years for LIL
- This project is a key investment in a long term revenue generating asset for current and future generations of Newfoundlanders and Labradorians, paid off in total within 35-40 years utilizing mortgage style debt retirement.
- Strategic investment opening up Energy Warehouse and establishing critical transmission access for the Province
- 65-70% of Newfoundlander and Labradorians have consistently supported the Project

# PROJECT PROGRESS

# Overall Progress

- Construction underway on all components: generation, transmission and associated infrastructure
- 100 work fronts across province and around globe
- Majority of work fronts progressing as planned
- Work being performed safely, in an environmentally-responsible manner to a high quality
- Tremendous benefits to the province:
  - >3,750 NL residents working on the project, 84% of workforce
  - Approx. \$590 million in estimated wages to NL workers
  - \$870 million to NL businesses

# Muskrat Falls: Our Project, Our Benefits



**> 13M hours**  
worked since start  
of construction



Approximately  
**4,400 people**  
working on the  
project at peak

**> 502 women**  
from NL



**3,752**  
**NL residents**  
working on  
the project

**84%**  
of project workforce

**477 Aboriginal**  
NL residents

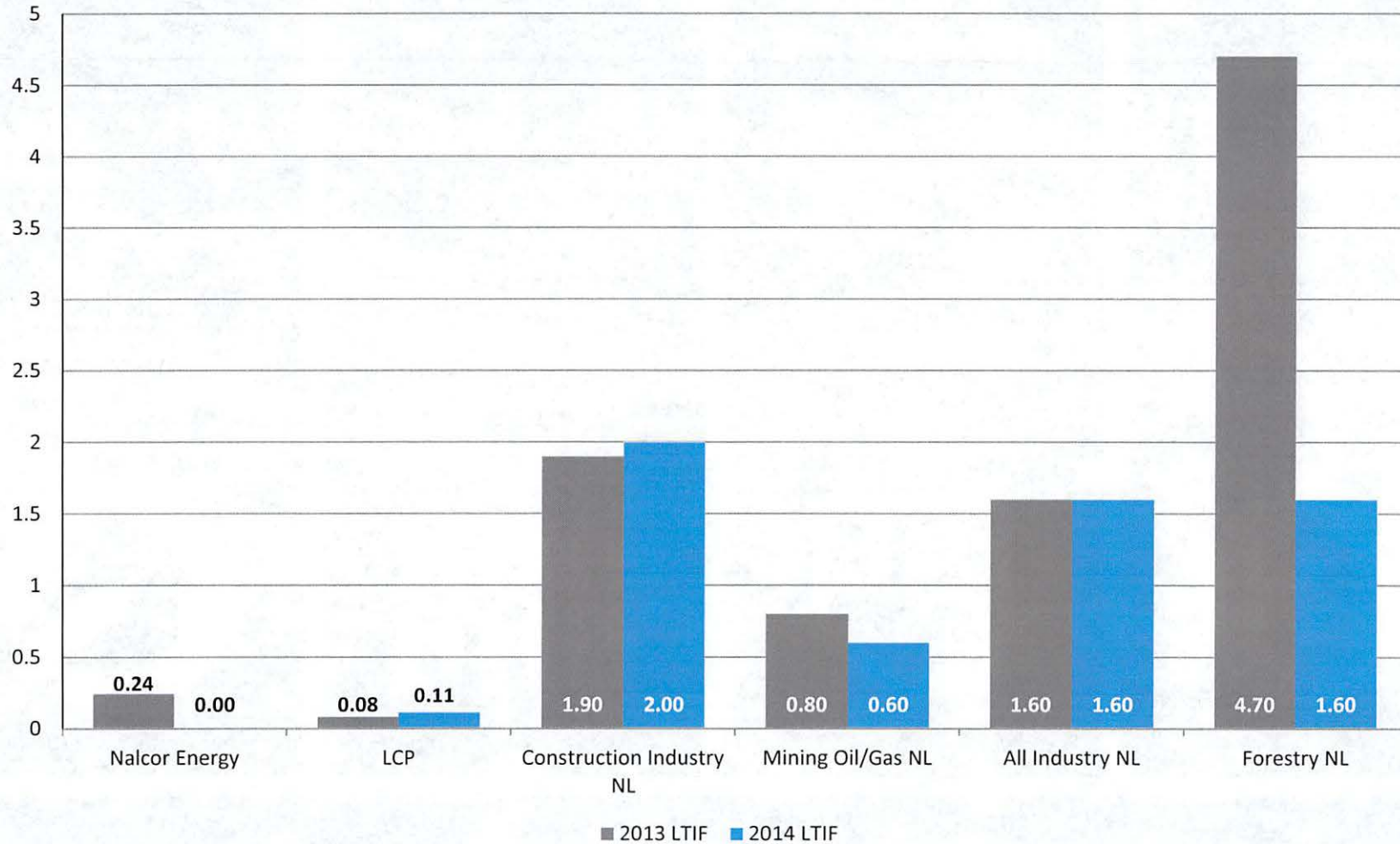


**\$870M invested**  
in NL business since  
start of project  
construction

**\$590M in**  
**estimated wages**  
to NL residents

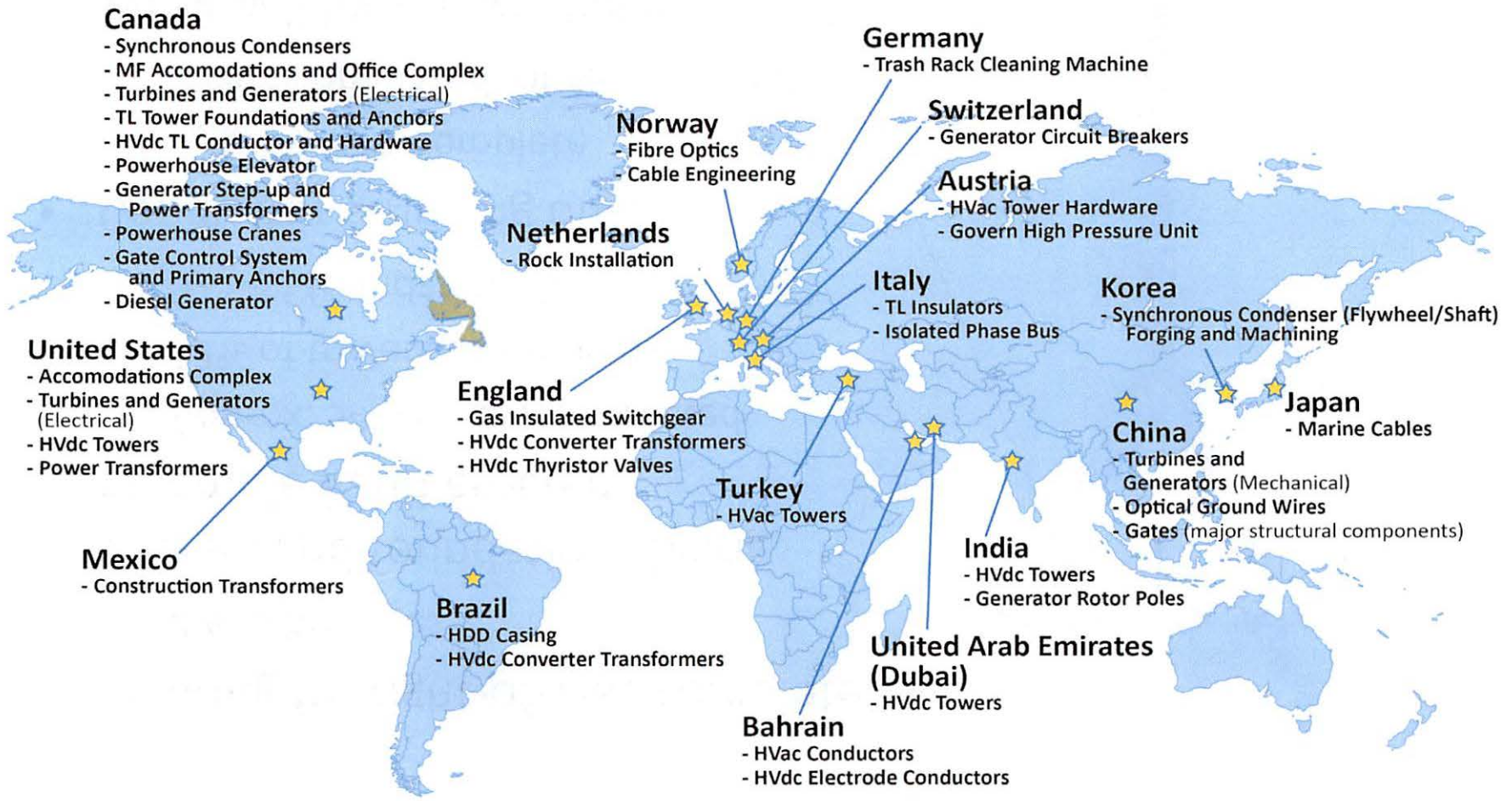
*\* Figures above for June 2015 and project to date*

# LTIF Comparison – Lower Churchill





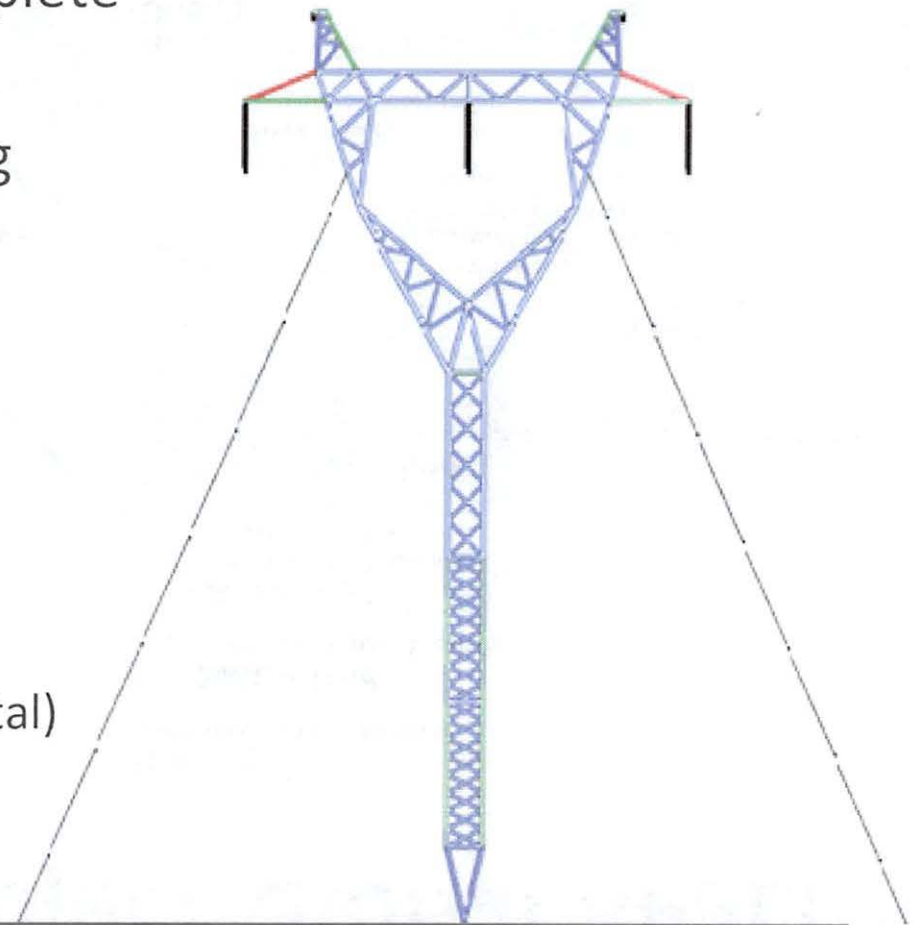
# Lower Churchill Project Global Reach



January 2015

# AC Transmission: Muskrat to Churchill Falls

- Clearing for right-of-way complete
  - 2,450 hectares
- Towers and foundations being assembled and erected
  - Approx. 54% of towers erected
  - 72% of towers assembled
  - 92% of foundations installed
- Conductor stringing ongoing
  - Approx. 32% complete
  - 78 km completed (of 490 km total)
- Work will be substantially complete in 2015

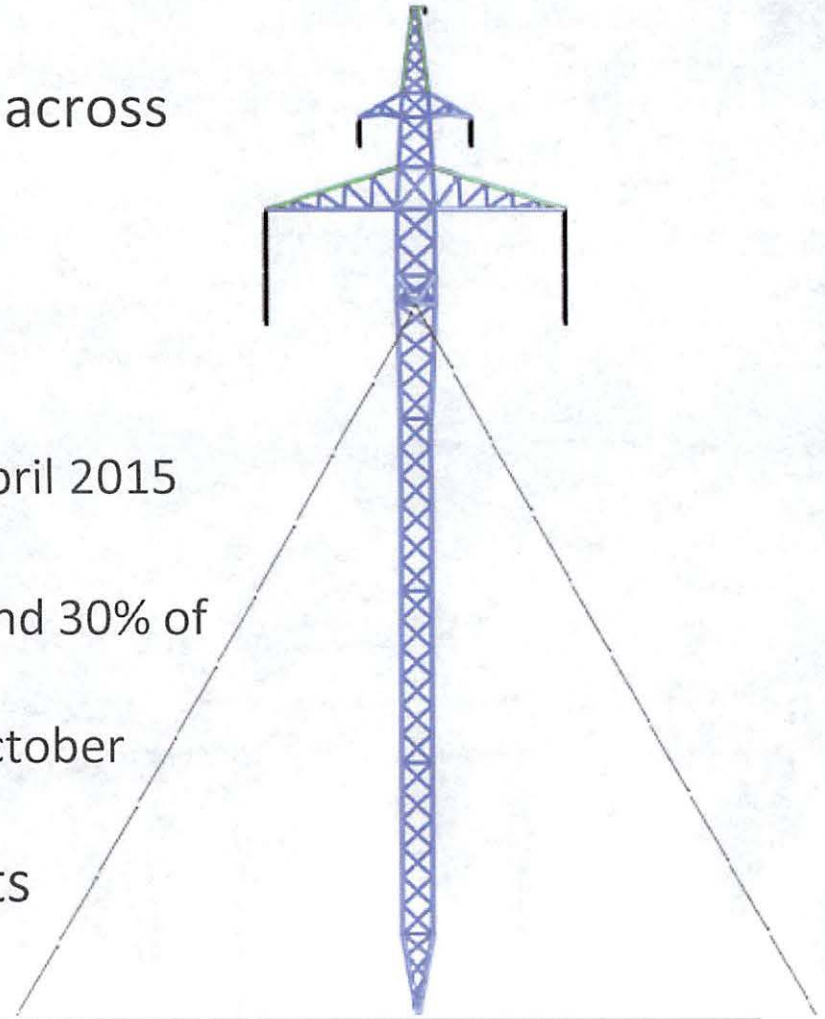






# DC Transmission: Labrador-Island Link

- Clearing for right-of-way ongoing across province
  - Approx. 67% cleared in Labrador
  - 32% cleared on the island
- Towers and foundations
  - First tower erected in Labrador in April 2015
  - 79 towers erected in Labrador
  - Approx. 35% of towers assembled and 30% of foundations installed in Labrador
  - Start tower assembly on island in October 2015
- Remaining ROW clearing contracts under evaluation











# HVdc Specialties

- Civil construction works underway for Synchronous Condenser facility at Soldiers Pond, HVdc Converter Stations at Soldiers Pond and Muskrat Falls, and ac Substations at Soldiers Pond, Muskrat Falls and Churchill Falls
- Construction of grounding sites at Dowden's Point and L'Anse au Diable well advanced with breakwater construction scheduled for completion in 2015
- Manufacturing of all power transformers (7 units for Churchill Falls, 4 units for Soldiers Pond, and 2 units for Muskrat Falls) complete. All units scheduled for delivery in September/October 2015



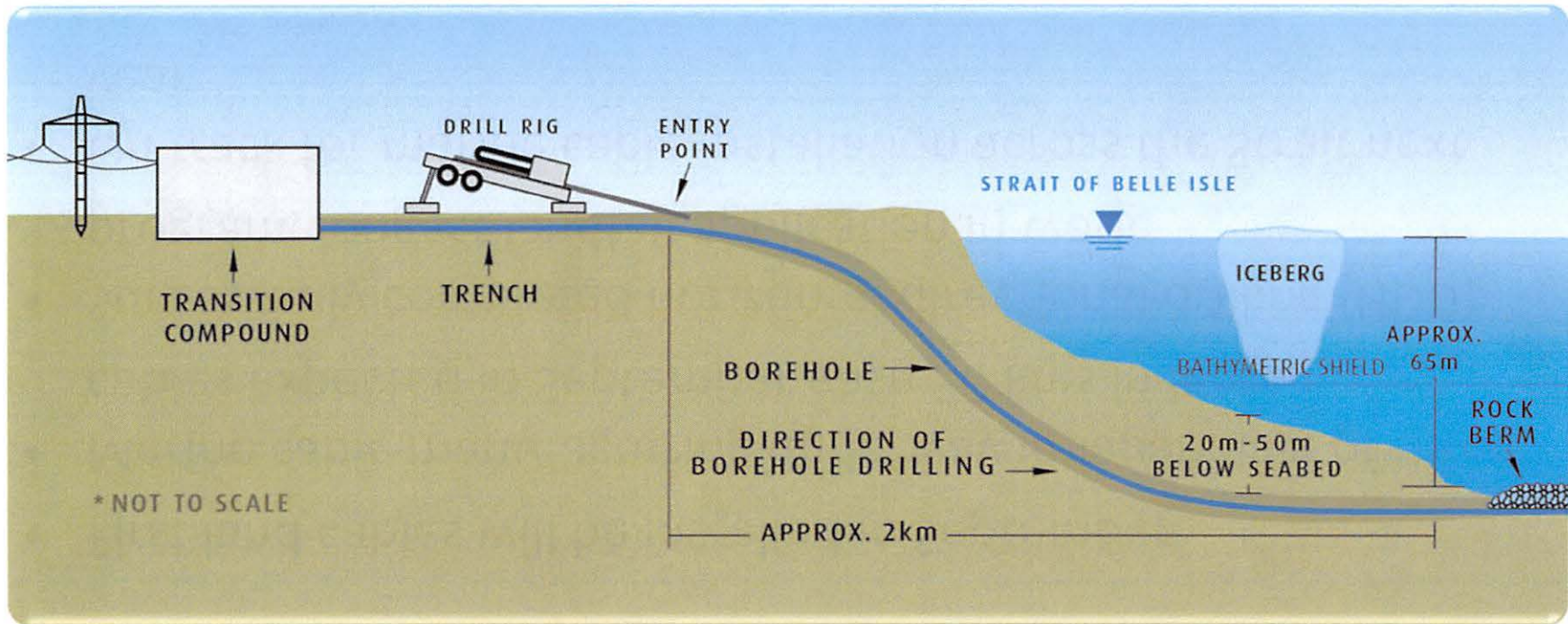




# Strait of Belle Isle Marine Cable Crossing

- First land cables will be installed in September
- Marine cable manufacturing underway in Japan; last of three cables expected in September each 30 kms in length
- Successfully completed horizontal directional drilling (HDD) program; longest landfall application in world
- On track for marine cable installation across the Strait next year

# Horizontal Directional Drilling





# Muskrat Falls Generating Facility

- Stabilization work progressing well at North Spur; geotechnical conditions as expected
  - Concrete for spillway piers and slabs nearing completion, moving toward starting installation of gate guides & gates this fall
  - River diversion thru spillway on track for 2016
  - Concrete placement in powerhouse tripled since May 2015
  - Turbines and generators as well as gates being manufactured in China, equipment being delivered to Muskrat Falls
  - Reservoir clearing advanced ahead of schedule with opportunity for contractor and workers to be utilized on transmission right-of-way
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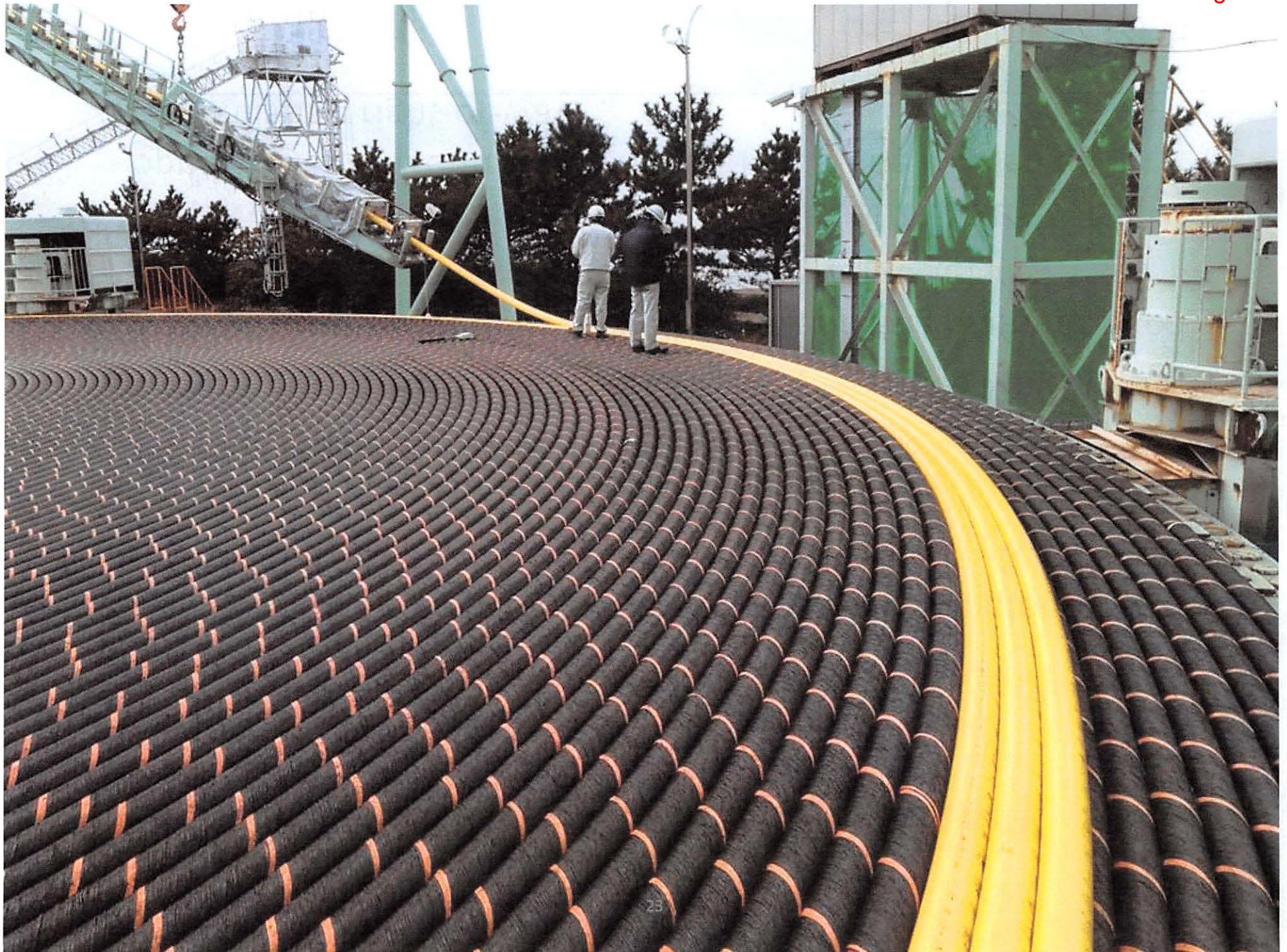
































# Project Now Progressing On All Fronts

- With recent Astaldi performance improvement, all aspects of the Project are now progressing effectively – LIL, LTA, SOBI, North Spur, North/South Dams, the Powerhouse, Maritime Link, and associated equipment and materials.
- Nalcor leadership has been critical in successfully addressing Astaldi performance issues, and Astaldi now delivering strong performance
- Safety, environmental, and quality performance remain on track, and performance is strong.

# Nalcor Actions to Address Astaldi Issues

- Engagement at highest levels of Astaldi and Nalcor continuously over last 12-18 months
- Nalcor support and leadership in implementing performance improving initiatives and organizational improvements
- Nalcor provided key Construction Management personnel to Astaldi
- Nalcor Site Team augmented with senior Project Management personnel to provide on site decision making and support to Astaldi
- Current Status
  - Astaldi concrete production rate vastly improved and Construction management team fully functional.
  - Nalcor continues to provide support, guidance and leadership



# COST UPDATE

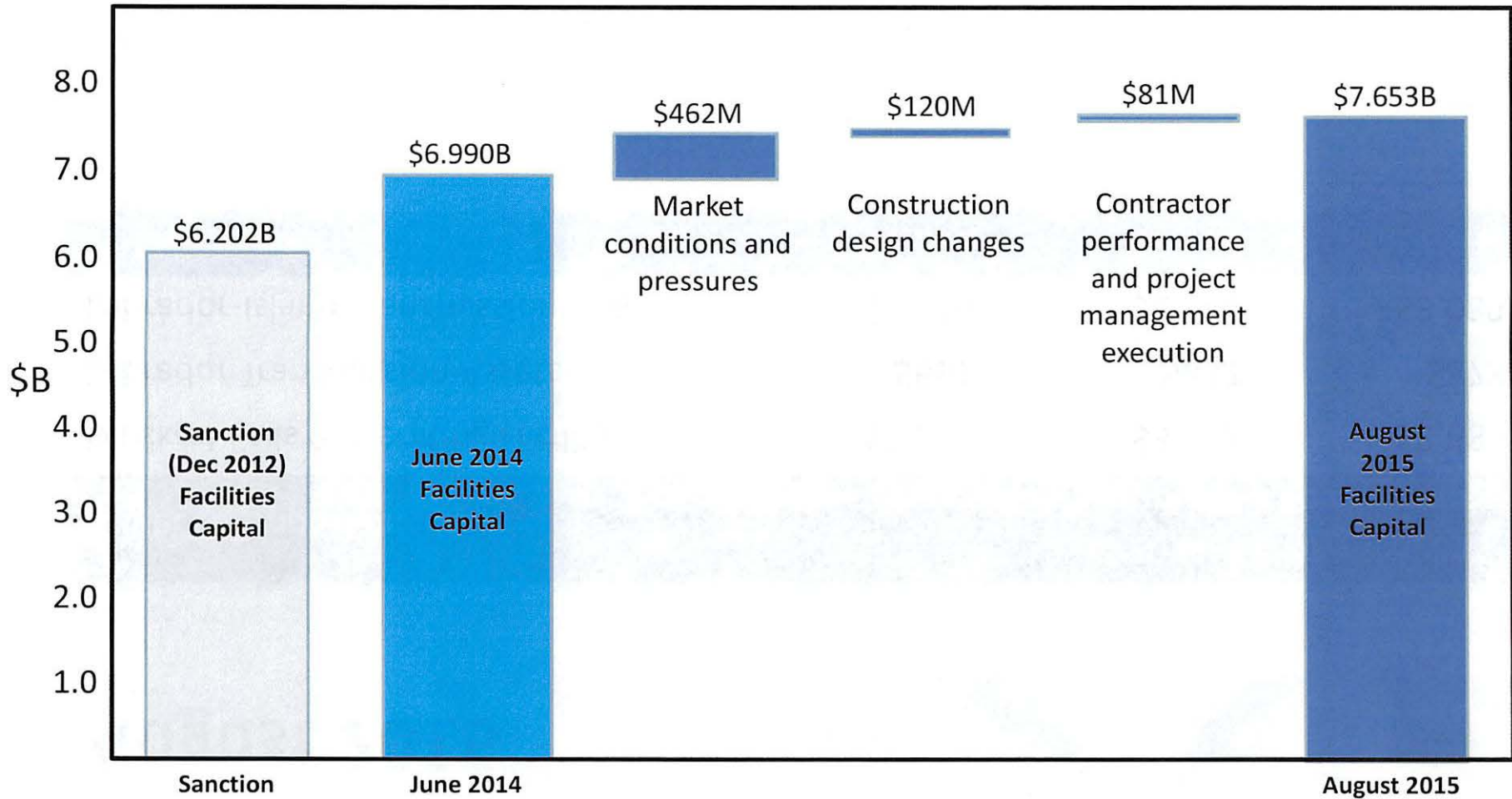
## Key Messages (cont'd)

- Facilities capital costs are currently projected to grow by an additional 10.6%, (total since sanction including this 10.6% is 23%)
  - the 10.6% includes a contingency allowance representing 4% of remaining expenditures.
  - $\$6,990\text{M} + \$473\text{M} + \$187\text{M Contingency} = \$7,650\text{M}$
- Although the following amounts are not a part of “facilities capital”, they are partial offsets to overall value of the project which have occurred since sanction, equating to 13% (nominal) of facilities capital;
  - 8% (nominal) - \$500M nominal lower than budgeted financing costs, and
  - 5% (nominal) - \$300M nominal higher than budgeted revenue from excess electricity sales

## Key Messages (cont'd)

- Procurement of material and supplies, and selected NL execution work (such as SOBI drilling) comprising >50% (\$3.2B) of total facilities capital are overall within 2.5% of budgeted amounts
- Increase of 23% in facilities capital since sanction (excluding offsets) are primarily related to execution of work in Newfoundland and Labrador, comprised of 3 main categories;
  - Market conditions and pressures
  - Construction design changes
  - Contractor performance and project management execution

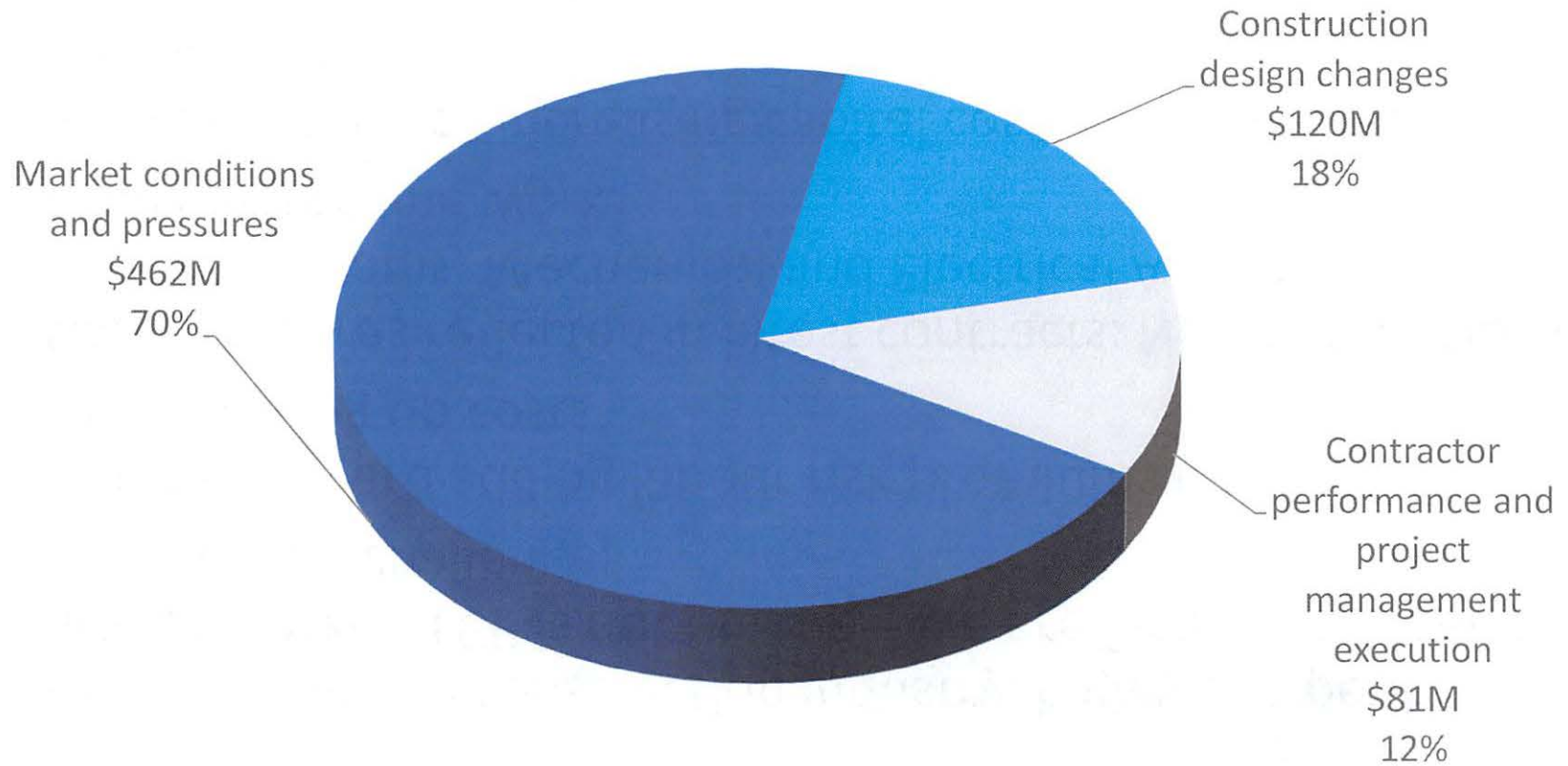
# Cost growth contributors since sanction



# Changes from DG3, June 2014 and August 2015

Project Component	DG3 Cost Estimate	June 2014 Cost Estimate	August 2015 Cost Estimate
Muskrat Falls Generating Facility	\$2,901	\$3,372	\$3,686
Labrador Transmission Assets	\$691	\$832	\$878
Labrador-Island Transmission Link	\$2,610	\$2,786	\$3,089
<b>TOTAL</b>	<b>\$6,202</b>	<b>\$6,990</b>	<b>\$7,653</b>

# Facilities Capital Changes (since June 2014)



# Marketplace Conditions

- Extremely active construction industry, highly competitive labour market. LCP is not unique – we are facing labour and productivity challenges
- Contractors are adding labour risk premiums into their bids – this is driving up costs
- Cost pressures reflected in latest contracts: North Spur, North and South Dams, Mechanical and Electrical Auxiliaries, some transmission line work
- Market pressures increasing capital costs, pricing, contracts for the project
- Decreasing value of Canadian dollar, foreign exchange rates
  - We have avoided the majority of this but still have an impact

# Other Project Experience

In-Province Hebron Topsides (Gross \$MCAD)	Project Sanction Base Estimates (including allowances)	Original AFE Contingency %	Total Sanction Estimate (including contingency and allowances)	Hebron (Exxon) Forecast inc. Contingency Apr-15	Hebron (Exxon) % Over AFE with Contingency Inc.	Nalcor Forecast w/Contingency Jun-15	Nalcor Estimate % Over AFE inc. contingency
DSM	214	15%	245	438	79%	439	79%
Ancillaries	34	25%	43	45	5%	45	5%
LQ EPC / Site Infrastructure	287	10%	316	409	29%	415	31%

Hebron GBS (Gross \$MCAD)	Project Sanction Base Estimate (including allowances)	Original AFE Contingency %	Total Sanction Estimate (including contingency and allowances)	Hebron (Exxon) Forecast inc. Contingency Apr-15	Hebron (Exxon) % Over AFE with Contingency Inc.	Nalcor Forecast w/Contingency Jun-15	Nalcor Estimate % Over AFE inc. contingency
GBS Base Costs	3,195	12.7%	3,603	4,326	20%	4,422	23%

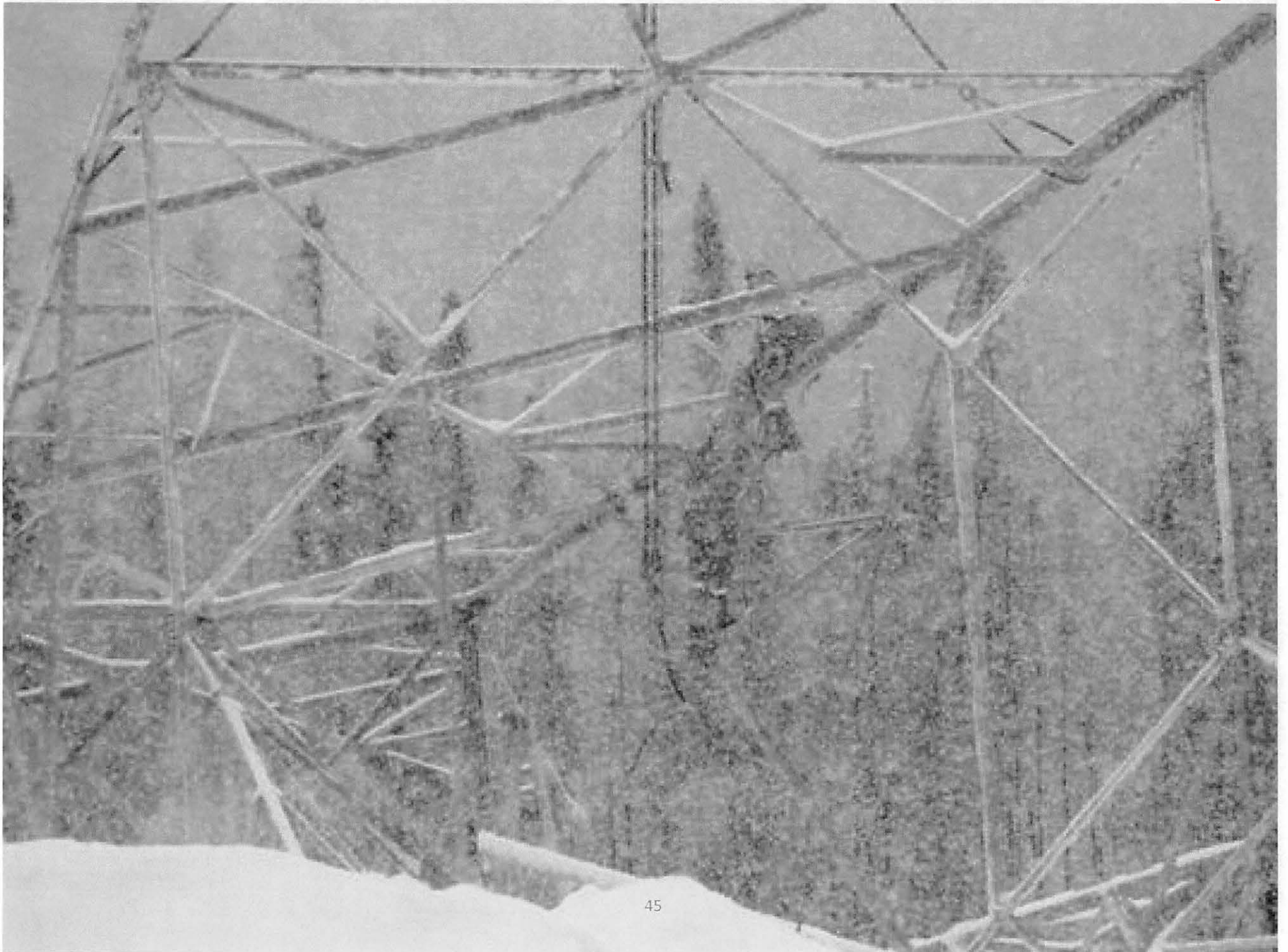
White Rose Wellhead Platform Argentia (Gross \$MCAD)	Project AFE Base Estimate (including allowances)	Original AFE Contingency %	Total Sanction Estimate (including contingency and allowances)	Husky Forecast inc. Contingency May-15	Husky % Over AFE with Contingency Inc.	Nalcor Forecast w/Contingency Jul-15	Nalcor Estimate % Over AFE inc. contingency
Graving Dock Construction	66	7.4%	71	101	42%	101	42%

Korean Topsides (Gross \$MCAD)	Project Sanction Base Estimates (including allowances)	Original AFE Contingency %	Total Sanction Estimate (including contingency and allowances)	Hebron (Exxon) Forecast inc. Contingency Apr-15	Hebron (Exxon) % Over AFE with Contingency Inc.	Nalcor Forecast w/Contingency Jun-15	Nalcor Estimate % Over AFE inc. contingency
UPM (incl bulks)	495	15%	569	683	20%	695	22%
DES	36	15%	41	68	66%	70	71%



# Construction Design Changes

- Design enhanced for some tower anchors, weight and type of foundations required for geotechnical conditions
  - Geotechnical constraints identified during construction more than planned in some areas, particularly in the interior of Labrador
- Winter roads added in addition to all season roads to more effectively advance clearing work fronts and installing bridges
  - Very severe weather conditions last winter impacting worker productivity, driving need for more workers/hours
  - Constructing permanent transmission infrastructure in challenging terrain and remote areas – bridges, roads
- Additional costs upfront, but long-term value and reliability such as long term access for maintenance, and more robust towers adding to long term reliability





# Construction Productivity & Performance Enhancement Measures

- 200+ contracts managed by the LCP project team
- Majority of contracts tracking on schedule, cost
- More project management required by LCP on some contracts - additional costs but positive outcomes:
  - Concrete placement tripled from 8,000 m<sup>3</sup>/mo. to 24,000 m<sup>3</sup>/mo. since May 2015
  - Additional oversight for transmission construction
- LCP hands-on with contractors for productivity, safety, environment, general project management – ultimately benefits outcome

# SCHEDULE UPDATE

# Key Messages

- The ability to transfer electricity to the island remains on track for 2017, and Churchill Falls recall power and market purchase of power are available to displace Holyrood in 2017 and beyond.
- LIL, LTA, SOBI, North and South dams, North Spur, transition dams, Spillway and river diversion, and material and equipment deliveries remain on schedule.
- The Powerhouse is behind due to Astaldi slow start, and first power from Muskrat Falls will be delayed from 2017, with the revised timeframe under review.
- Additional costs and potential cost offsets and reductions associated with the powerhouse delay are also under review.

# Looking Ahead

- SOBI marine cables installed in 2016
- On track for power from Churchill Falls to the island on new transmission lines in 2017
- First time island connected to North American grid in 2017
- Begin commissioning and startup facilities in 2017
- Conduct start up and performance testing of integrated systems; teams now in place planning to bring units online
- Gradually bring power from Labrador to island customers in 2017 with Muskrat Falls units in 2018
- Maritime Link planned to be ready, working with Emera to integrate into our system

# HOW WE MANAGE RATES IS A CRITICAL SUCCESS FACTOR



# Rate Mitigation

- *“With much of the country’s electricity infrastructure nearing the end of its life expectancy, investing in grid renewal and modernization today will be essential to ensuring a reliable, cost-effective and sustainable power supply tomorrow. The costs of doing so will be high—at least \$350 billion in capital investments over the next 20 years—but will be necessary to address the deteriorating condition of utility assets.”*
- *“Fortunately, the investments being made by utilities across Canada are providing a much needed short-term boost to the economy through economic stimulus and job creation.”*

*Canadian Electricity Association, 2015 Report*

*ELECTRIC UTILITY INNOVATION - TOWARD VISION 2050*

# Rate Smoothing in Other Jurisdictions

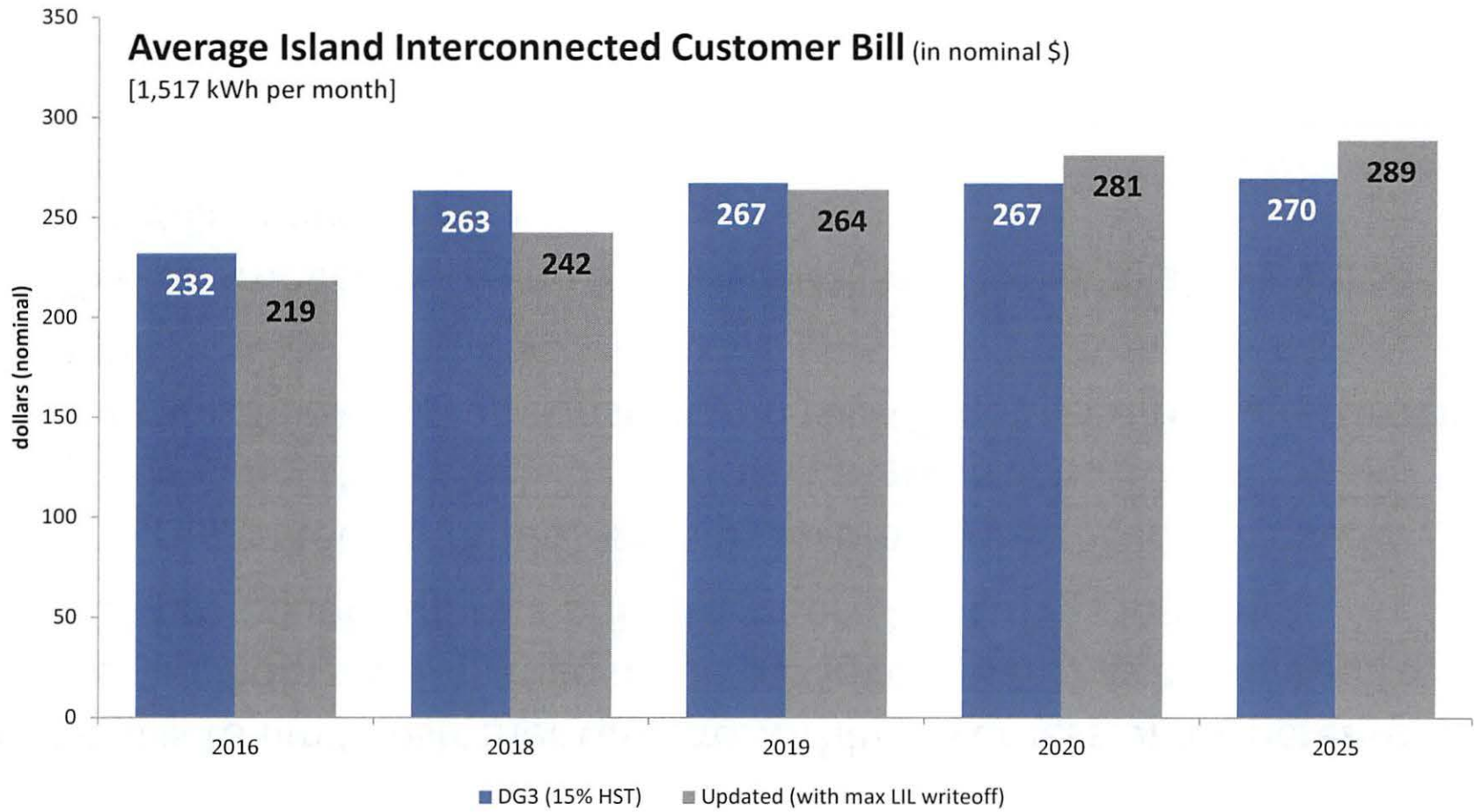
- It is common in some other Canadian and US jurisdictions that specific actions are taken by regulators to smooth the rate impacts from large capital investments
- Manitoba and Ontario are two Canadian jurisdictions where such provisions have been addressed
- Several examples in the United States where relevant legislation was passed in the 2006-8 time frame

# Rate Mitigation

- Impact on NL Customer rates can be mitigated by utilizing available funds from
    - \$3B excess electricity value, an amount that was never included in the economics
    - return on MF/LIL/LTA equity cash flow, and
    - other Nalcor cash flow, based on principle of investing an appropriate portion of current non-renewable revenue into renewable infrastructure for future generations
  - Approximate total available funds from Nalcor from now until 2042 estimated at \$15 billion, of which assuming \$3-4 Billion equity injection into Nalcor, yields a remaining \$11-\$12 Billion during this time frame
  - These amounts do not consider the significant additional, growing revenue post 2042 from MF ROE, Upper Churchill or Oil and Gas
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# Suggested Rate Mitigation Program

- Goal is to limit customer rates to within 5% or less of an increase (not including HST change made by Government) as compared to DG3 projections up to a point to where the curves intersect.
- One suggested methodology is to assume \$655 million of equity already injected into LIL by the Province is structured as a Contribution In Aid of Construction (CIAC), not requiring a return on equity.
- The net impact would be a small fraction of the available total of \$15 Billion over time.



# RISK ASSESSMENT GOING FORWARD

# Many Milestones Completed

- Environmental Approvals
- Innu “New Dawn” and the IBA arrangements
- Federal Loan Guarantee in place
- Debt Financing locked in at low rates with \$5B borrowed cash on deposit
- Emera and Nova Scotia arrangements
- Engineering
- Camp and catering in place and operating
- MF site roads, site power and laydown areas
- Bulk excavation of the Powerhouse and Spillway

# Many Milestones Completed

- Completion of Spillway civil works this fall, on track for river diversion next year
- Turbines and Generators Unit 1 and 2 on track to ship this fall
- Subsea drilling SOBI complete
- SOBI subsea cables - 2 manufactured, 1 in final stages
- SOBI land cables manufactured and en route to NL
- Tower steel, conductor and hardware
- Significant reservoir and transmission line clearing
- LTA Transmission from MF to CF significant progress, expected completion this year



# Many Milestones Completed

- LIL Transmission commenced, expected to be out of Labrador by year end
- Significant progress on North Spur
- Significant site work preparation for transition infrastructure (switchyards, converters, electrodes)
- All major contracts now awarded or bids received

# Key Remaining Risks

- With all PO and Contract costs contracted there will be limited further Market Risk
- Risk exposure will be narrower and will shift to execution:
  - Labour Productivity of Time and Material type contracts
  - Key Contractor performance
  - Potential Claims
  - Potential union unrest
  - Aboriginal unrest
  - Geotechnical risk of N Spur and North Dam construction
  - Commissioning and Startup
- There are risk mitigation plans in place and being actioned

# Current Project Summary

Transmission ~ 30% \$2.2 B	DC ~ 15% \$1.2 B	Other ~ 15% \$1.2 B	Muskrat Falls ~ 40% \$3.0 B
AC Line ~ \$.4 B (MF-CF) <ul style="list-style-type: none"> <li>• Clearing</li> <li>• Tower steel</li> <li>• Hardware</li> <li>• Construction</li> </ul>	Converter ~ \$.5 B <ul style="list-style-type: none"> <li>• Muskrat</li> <li>• Soldiers</li> </ul>	<ul style="list-style-type: none"> <li>• EA</li> <li>• IBA</li> <li>• Engineer</li> <li>• Legal</li> <li>• Owners</li> <li>• Community</li> <li>• Etc.</li> </ul>	Civil ~ \$.8 B (10%) <ul style="list-style-type: none"> <li>• Reservoir</li> <li>• North Spur</li> <li>• Bulk Excavation</li> <li>• Dams</li> </ul>
DC Line ~ \$1.4 B (MF-SP) <ul style="list-style-type: none"> <li>• Clearing</li> <li>• Tower steel</li> <li>• Hardware</li> <li>• Construction</li> </ul>	Switch yards ~ \$.4 B <ul style="list-style-type: none"> <li>• Muskrat</li> <li>• Soldiers</li> <li>• Churchill</li> </ul>		Electro Mechanical ~ \$.6B (8%) <ul style="list-style-type: none"> <li>• Turbines &amp; Generators</li> <li>• Gates</li> <li>• BOP</li> </ul>
SOBI – Subsea ~ \$.3B <ul style="list-style-type: none"> <li>• Subsea cable</li> <li>• Land drilling</li> <li>• Cable protection</li> </ul>	Synchronous condenser ~ \$.2 B <ul style="list-style-type: none"> <li>• Sync @ Soldiers</li> <li>• Electrodes</li> <li>• Telecoms</li> </ul>		Site Infrastructure & Services ~ \$.5 B (7%) <ul style="list-style-type: none"> <li>• Camp and catering</li> <li>• Roads</li> </ul>

# LOOKING AHEAD

# Our Project, Our Benefits

- Muskrat Falls remains the best option to meet NL electricity needs
- Hydro developments are long-term investments, risk/capital intensive up front
- 100+ year asset will generate clean, renewable energy – ahead of future carbon capture requirements
- Enhanced reliability and stable rates for electricity customers
- Provide significant value and cash flows to NL – >\$30B in nominal value over life of project
- GHG cost impacts and potential sales value not included in project economics
- Manage our own energy and economic future
- We have the right team to make it happen