From:
 briancrawley@nalcorenergy.com

 To:
 pharrington@nalcorenergy.com

 Subject:
 for NR

 Date:
 Tuesday, August 7, 2012 11:46:49 AM

 Attachments:
 \_\_Dng DG3 Estimate Update to MHI 17-June-2012.pptx

Paul... are you ok with this going to Charles? It is what we provided to MHI. We should also bring Gilbert into the loop. Brian

**Brian Crawley** Nalcor Energy - Lower Churchill Project t. 709 737 - 1499 c. 709 725 - 9145 1.888.576.5454

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----- Forwarded by Brian Crawley/NLHydro on 08/07/2012 11:43 AM -----

From: Jason Kean/NLHydro

To: Brian Crawley/NLHydro@NLHYDRO

Date: 06/19/2012 12:19 PM

Subject:

DG3 Estimate Update to MHI 17-June-2012.pptx



Jason R. Kean, P. Eng., MBA, PMP Deputy Project Manager, Muskrat Falls & Labrador -Island Transmission Link (Consultant to Nalcor Energy) Nalcor Energy - Lower Churchill Project t. 709 737-1321 c. 709 727-9129 f. 709 737-1985 e. JasonKean@nalcorenergy.com

1.888.576.5454

You owe it to yourself, and your family, to make it home safely every day. What have you done today so that nobody gets hurt?

# CIMFP Exhibit P-00817 Page 3 DG3 Estimate Overview Presentation to MHI 17-Jun-2012

**Boundless Energy** 





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### **Cost Estimate is comprised of 3 Primary Components** Definitions as per AACE Recommended Practice No. 10S-90





# **DG2 Estimate Summary**

#### LCP Phase 1 (Excluding Maritime Link) DG2 Estimate Summary (millions Jan 2010 CDN \$)

	MF	LTA	LITL	Totals
Base Estimate	\$1,947.46	\$290.95	\$1,615.93	\$3,854.34
Contingency	\$284.33	\$43.64	\$236.12	\$564.09
Escalation Allowance	\$273.49	\$61.35	\$208.00	\$542.84
Totals	\$2,505.27	\$395.94	\$2,060.05	\$4,961.27

	% of Total	50.5%	8.0%	41.5%	100.0%
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### Base Estimate developed using 4 Main Inputs

Nalcor's follows principles of AACE Recommend Practice No. 36R-08



# **DG3 Estimate Attributes**

Attribute	Key Characteristic
Intended Purpose	<ul> <li>(i) Verify the Decision Gate 2 estimate</li> <li>(ii) Provides increased level of confidence in outcome.</li> <li>(iii) Seek Effective Project Approval or Sanction</li> <li>(iv) Establishes the Project Budget</li> </ul>
Project Definition (i.e. level of engineering	<ul> <li>(i) Completed design documents including drawings and outline specifications at the end of Gateway Phase 3.</li> </ul>
design complete)	<ul> <li>(ii) All project execution strategies in-place for execution.</li> <li>(iii) Complete working drawings for early construction packages being issued for tender.</li> <li>(iv) Expended engineering effort from 30% to 40% of total.</li> </ul>
Preparation Methodology	<ul> <li>(i) Deterministic based for both direct and indirect cost</li> <li>(ii) Majority of estimate prepared from measured and priced quantities obtained from the completed design drawings and outline specifications.</li> <li>(iii) Price and performance factors developed specifically for the Project (i.e. project labor agreement, commodity prices, productivity rates) and benchmarked against historical projects.</li> <li>(iv) Production rates and timeline durations aligned with detailed construction schedule.</li> <li>(v) A very minor proportion of the estimate may be in the form of allowances.</li> </ul>
Level of Precision	Medium to High
Cost Flow	<ul> <li>(i) Aligned with Project Control Schedule</li> <li>(ii) Monthly cost flow available for each major commodity and for each currency and for each WBS Physical Component.</li> </ul>



# **DG3 Estimate Summary**

#### LCP Phase 1 (Excluding Maritime Link) DG3 Estimate Summary (millions Jan 2012 CDN \$)

	MF	LTA	LITL	Totals
Base Estimate	\$2,511.92	\$601.31	\$2,359.61	\$5,472.84
Contingency	\$226.69	\$54.83	\$86.48	\$368.00
Escalation Allowance	\$162.54	\$35.44	\$163.66	\$361.64
Totals	\$2,901.15	\$691.58	\$2,609.75	\$6,202.48

% 01 10tal 40.8% 11.2% 42.1% 100.0%	% of Total	46.8%	11.2%	42.1%	100.0%
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### **Comparative Summary**

	Component	DG2 Estimate	DG3 Estimate	Delta
on iion	Muskrat Falls Powerhouse, Dams and Reservoir Works	\$ 1,346,131,998	\$ 1,645,182,446	\$ 299,050,448
enerati	Muskrat Falls Site Infrastructure	\$ 140,834,519	\$ 183,906,888	\$ 43,072,369
Falls Ge dor Tra	MF Site Support Services	\$ 121,265,328	\$ 248,312,374	\$ 127,047,046
uskrat   d Labra	MF and CF Switchyards and MF to CF Hvac Transmission Lines	\$ 261,446,000	\$ 498,769,539	\$ 237,323,539
an	Sub-Total	\$ 1,869,677,845	\$ 2,576,171,247	\$ 706,493,402
ssion	Converter Stations, Cable Transition Compounds, and Electrodes	\$ 451,780,065	\$ 560,105,163	\$ 108,325,098
ransmi	SOBI Crossing	\$ 288,396,480	\$ 337,440,262	\$ 49,043,782
sland T Link	HVdc Overland Transmission	\$ 435,630,000	\$ 957,203,750	\$ 521,573,750
ador - I	Island System Upgrades	\$ 193,733,200	\$ 157,313,680	\$ (36,419,520)
Labra	Sub-Total	\$ 1,369,539,745	\$ 2,012,062,855	\$ 642,523,110
	Owner + EPCM + Incurred To-Date	\$ 624,358,482	\$ 884,612,150	\$ 260,253,668
	Total	\$ 3,863,576,072	\$ 5,472,846,252	\$ 1,609,270,180



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# **Cost Growth Since DG2**





# Estimate Contingency Setting

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Nalcor's follows principles of AACE Recommend Practice No. 42R-08





# **Contingency Recommendations**

- Westney engaged to conduct risk assessment in late May / early June with Project Team. Key Findings:
  - 1. The scope for the project is well defined and represents design development consistent with project sanction. Considerations, such as likely geotechnical conditions and quantity variations due to further design development, were quantified based on the experience of the project team and used as a basis for assessing the possible outcomes.
  - 2. The estimate and quantification are consistent with the requirements of project sanction. In many cases, pricing was based on actual bids and budgetary quotes. "Check" estimates were developed by industry experts for key areas, including the Muskrat Falls powerhouse and dam works. Other pricing was benchmarked against representative projects. The effects of weather, labour /skills availability, and supervision were also considered and/or benchmarked. Overall, this project's degree of design development, definition, and methodology is consistent with an AACEI Class 2 estimate.
  - 3. The estimate, plus an amount to reach the P50 on the results curve, should represent the cost at which the project can be executed according to the plan exclusive of external uncertainties.
  - 4. A P50 contingency is \$368 million which equates to 7% of the estimate.



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# Tactical Risk Analysis Results (Westney)

Risk Analysis for the overall Lower Churchill Project suggests, at a P50 value, the project contingency would be \$368 million (\$5,833 million minus \$5,465 million), which equates to 7% of the estimate.





# External / Strategic Risks Beyond Estimate Contingency

#### Performance Risk Exposure

#### Competition for Resources

#### Schedule Risk Exposure

The performance rates /norms and indirect estimates used in the estimate, including the estimate contingency, are based upon historical performance for similar hydro-projects and are predicated upon achieving the envisioned labor strategy and rare much better than what is being experience in Long Harbour (restrictive work practices). Contractor mark-ups for unit price agreements could be excessive if there is a perception risk that the labor strategy will not materialize.

Experience front-line supervision, a key to performance, is now a world market and will likely experience high demand during this project.

The estimate for MF is based upon the labor rates in the Hebron Agreement. Given that the total project has approx. 18 million person-hours of labor requirements (including Owner + PMT + Services), it is likely to compete with Western Canada for labor. The wages used for estimating are slightly lower than Western Canada, but NL have larger union premiums resulting in lower take-home compensation. In addition completion bonus are planned for Western Canada.

Escalation allowance assumes between 3 and 3.5% annual increase in labor cost.

There is a potential time or schedule risk exposure for beyond the plan due to the weather and volume of work in the powerhouse. The current schedule for MF assumes achievable performance in the powerhouse concrete, however the sustainability of the required production rates for placement of the ~460,000 m3 of concrete through-out several winters will be challenging.

Maintaining a October 2012 start of Bulk Excavation is considered critical to maintain the overall program.



# **ESCALATION ESTIMATING PROCESS**

Nalcor's follows principles of AACE Recommend Practice No. 58R-10

#### **Inputs**





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# **Escalation Allowance**





- \$360 million in total escalation
- Custom project-specific model developed
- Used a combination of Global Insight, Power Advocate and LCP market intelligence
- Costs broken down into 30 bins
- Contract pricing provides greater certainty for some project components



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# **Back-up Material**



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# Questions

