

# Muskrat Falls Project Oversight Committee

Committee Report – August 2015







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# Introduction

The Muskrat Falls Oversight Committee was established by the Government of Newfoundland and Labrador in March 2014 to strengthen the existing oversight of the Muskrat Falls Project (the Project). The Committee's mandate focuses on cost, schedule and risk management for the construction phase of the Project. Reports of the Committee can be located at [www.gov.nl.ca/mfoversight](http://www.gov.nl.ca/mfoversight).

The Committee's last report for the quarter ended March 2015 highlighted several risks to the Project budget and schedule including that two major contracts had not yet been awarded and schedule and cost pressures were being experienced, particularly with respect to the Powerhouse & Intake contract for the Muskrat Falls Generating Facility. During the ensuing period, the Committee has been closely monitoring these risks and receiving regular updates on the Project from Nalcor. Over this period, Nalcor has finalized costing of the two outstanding contracts referenced above and identified additional cost pressures, including labour and materials for access clearing based on experience gained in the field to date. As a result, in September 2015, Nalcor revised the Project Budget from \$6.99 billion to \$7.65 billion<sup>1</sup>.

The Committee was scheduled to provide the update for the quarter ending June 2015. However, as Nalcor was in the process of finalizing the revised budget, the Committee felt it would be more relevant to incorporate the most current Project cost and schedule information. As a result, this report includes, to the extent possible, information from April 2015 through August 2015.

<sup>1</sup> Total Project costs include construction costs of \$7.65 billion plus interest and other financing costs of \$1.4 billion that will be incurred during construction, for an estimated total of \$9.05 billion.



Muskrat Falls Site – Progress on Spillway and Powerhouse – August 2015

# Project Costs

## Committee Observations

- Project capital budget has increased from \$6.99 billion to \$7.65 billion.
- Incurred costs at August 2015: \$3.26 billion.
- Committed costs at August 2015: \$5.97 billion.
- Project Forecast Contingency budget at September 2015 has been revised to \$186.8 million.
- Contract execution risk at the Muskrat Falls Generating Facility remains high.

Table 1 provides information on the allocation of the adjustment in the Project budget from \$6.99 billion to \$7.65 billion among the three sub-projects. This table also includes incurred costs up to the end of August 2015, totaling \$3.3 billion<sup>2</sup>. At the end of August 2015 the committed costs<sup>3</sup> totaled \$5.97 billion.

Table 1  
**Project Cost Change as of September 2015 and Incurred cost as of August 2015** (in \$ thousands)

Muskrat Falls Project	Project Budget		Change		Incurred Costs August 2015
	June 2014	September 2015	(\$)	(%)	
Muskrat Falls Generation Facility	\$3,371,988	\$3,685,966	\$313,978	9.3%	\$1,726,356
Labrador-Island Transmission Link	\$2,786,481	\$3,089,378	\$302,897	10.9%	\$1,046,647
Labrador Transmission Assets	\$831,945	\$877,557	\$45,612	5.5%	\$488,277
<b>Total Project</b>	<b>\$6,990,414</b>	<b>\$7,652,901</b>	<b>\$662,487</b>	<b>9.5%</b>	<b>\$3,261,280</b>

Table 2 provides additional information on the revised Project Budget by expenditure category for each of the sub-projects.

2 Incurred Costs represents the total estimated cumulative value of all goods and services provided to the Project up to the point in time regardless of whether it was paid during the current period or will be paid at some future point in time.

3 Committed Costs: The estimated value of an obligation made by the Project for the provision of goods or services; represented by a Financial Commitment. Committed costs are captured when a Financial Commitment is made and its value is based upon the original estimate for that Financial Commitment. A Financial Commitment is a legal agreement between Nalcor Energy – Lower Churchill Project (NE-LCP) and a third party which authorizes NE-LCP to proceed with the award/instruction to the third party to provide goods and/or services for an agreed price or in accordance with an agreed pricing structure. The value of the Financial Commitment is represented by the cumulative value of the original amount and any approved variation orders to the contracts or change orders to the purchase order (which may or may not be a Project scope change).

Table 2

**Project Cost Change by Sub-Project as of September 2015** (in \$ thousands)

Muskrat Falls Generation Facility	Project Budget		Change	
	June 2014	September 2015	(\$)	(%)
NE-LCP Owners Team, Admin and EPCM Services	\$382,811	\$408,723	\$25,912	6.8%
Feasibility Engineering	\$17,949	\$17,949	(\$0)	0.0%
Environment & Regulatory Compliance	\$24,312	\$25,825	\$1,513	6.2%
Aboriginal Affairs	\$13,314	\$13,314	\$0	0.0%
Procurement and Construction	\$2,786,766	\$3,121,813	\$335,047	12.0%
Commercial & Legal	\$25,989	\$25,239	(\$750)	-2.9%
Contingency	\$120,847	\$73,102	(\$47,745)	-39.5%
<b>Total MFGen</b>	<b>\$3,371,988</b>	<b>\$3,685,966</b>	<b>\$313,978</b>	<b>9.3%</b>
Labrador-Island Transmission Link	Project Budget		Change	
	June 2014	September 2015	(\$)	(%)
NE-LCP Owners Team, Admin and EPCM Services	\$225,814	\$221,293	(\$4,521)	-2.0%
Feasibility Engineering	\$21,252	\$21,252	\$0	0.0%
Environment & Regulatory Compliance	\$22,306	\$14,446	(\$7,860)	-35.2%
Aboriginal Affairs	\$2,244	\$2,684	\$440	19.6%
Procurement and Construction	\$2,426,095	\$2,717,326	\$291,231	12.0%
Commercial & Legal	\$16,490	\$16,490	\$0	0.0%
Contingency	\$72,280	\$95,887	\$23,607	32.7%
<b>Total LIL</b>	<b>\$2,786,481</b>	<b>\$3,089,378</b>	<b>\$302,897</b>	<b>10.9%</b>
Labrador Transmission Assets	Project Budget		Change	
	June 2014	September 2015	(\$)	(%)
NE-LCP Owners Team, Admin and EPCM Services	\$99,973	\$144,958	\$44,985	45.0%
Feasibility Engineering	\$220	\$220	\$0	0.0%
Environment & Regulatory Compliance	\$710	\$811	\$101	14.3%
Aboriginal Affairs	\$188	\$188	\$0	0.2%
Procurement and Construction	\$696,322	\$709,643	\$13,321	1.9%
Commercial & Legal	\$3,141	\$3,891	\$750	23.9%
Contingency	\$31,391	\$17,846	(\$13,545)	-43.2%
<b>Total LTA</b>	<b>\$831,945</b>	<b>\$877,557</b>	<b>\$45,612</b>	<b>5.5%</b>
<b>Total Project</b>	<b>\$6,990,414</b>	<b>\$7,652,901</b>	<b>\$662,487</b>	<b>9.5%</b>

Additional details of the cost increase for the revised budget by Sub-Project are provided below:

## I. Muskrat Falls Generation Facility

Total budgeted costs for the Muskrat Falls Generation Facility have increased from \$3.37 billion to \$3.69 billion, a difference of \$314 million or 9.3 per cent from the June 2014 budget. This cost increase is primarily attributable to the finalization of major outstanding contracts and contractor performance.

Table 3


### Muskrat Fall Generation Facility – Revised Project as of September 2015 (in \$ thousands)

Muskrat Falls Generation Facility	Project Budget		Change	
	June 2014	September 2015	(\$)	(%)
NE-LCP Owners Team, Admin and EPCM Services	\$382,811	\$408,723	\$25,912	6.8%
Feasibility Engineering	\$17,949	\$17,949	(\$0)	0.0%
Environment & Regulatory Compliance	\$24,312	\$25,825	\$1,513	6.2%
Aboriginal Affairs	\$13,314	\$13,314	\$0	0.0%
Procurement and Construction	\$2,786,766	\$3,121,813	\$335,047	12.0%
Commercial & Legal	\$25,989	\$25,239	(\$750)	-2.9%
Contingency	\$120,847	\$73,102	(\$47,745)	-39.5%
<b>Total MFGen</b>	<b>\$3,371,988</b>	<b>\$3,685,966</b>	<b>\$313,978</b>	<b>9.3%</b>

### 1. Finalization of Major Outstanding Contracts

In earlier reports, the Committee noted it was monitoring the progress of three major contracts to be awarded for the Muskrat Falls Generating Facility as this was identified as a risk to the contingency budget. These three contracts were valued at approximately five per cent of the total June 2014 Project Budget. In its December Report, the Committee noted that the contract for the North Spur Stabilization Works was awarded at a higher value than originally budgeted. Since March 2015, one of the two remaining contracts - the construction of the North and South Dams was finalized and similarly resulted in those contract costs being significantly higher than original budget. Nalcor indicates that this cost escalation is reflective of increased market pressures and may also apply to the remaining contract, the supply and installation of the Mechanical and Electrical





auxiliaries, which is still under review. The cost increases associated with these two major contracts and the third remaining contract is reflected in the increase in the budget for Procurement and Construction category in Table 3.

## **2. Contractor Performance on the Muskrat Falls Generation Facility**

In its March 2015 Report, the Committee noted continued slippage in schedule progress at the Muskrat Falls Generating Facility, specifically the Powerhouse & Intake. The Committee observed an increase in risk levels associated with contractor performance; powerhouse concrete placement rates; and readiness for river diversion in 2016. Nalcor continues to work with the contractor to implement the mitigation plan which involves ramping up labor and production in an effort to get back on schedule. The additional efforts at the Muskrat Falls Generation Facility are inducing additional cost pressures on the project. However, Nalcor does have a provision in the contract with the main civil contractor to mitigate exposure to labour cost increases.

In addition, to ensure continued production improvements and minimize risk of further schedule slippage, Nalcor has increased the budget for additional project management resources and centralized camp services for both contractor and project management personnel. This is expected to increase project management costs under the category NE-LCP Owners Team, Admin and EPCM Services in Table 3.

## II. Labrador Island Transmission Link

Total budgeted costs for the Labrador Island Transmission Link have increased from \$2.79 billion to \$3.09 billion, a difference of \$302.9 million or 10.9 per cent.

Table 4

### Labrador Island Transmission Link – Revised Project as of September 2015 (in \$ thousands)

Labrador-Island Transmission Link	Project Budget		Change	
	June 2014	September 2015	(\$)	(%)
NE-LCP Owners Team, Admin and EPCM Services	\$225,814	\$221,293	(\$4,521)	-2.0%
Feasibility Engineering	\$21,252	\$21,252	\$0	0.0%
Environment & Regulatory Compliance	\$22,306	\$14,446	(\$7,860)	-35.2%
Aboriginal Affairs	\$2,244	\$2,684	\$440	19.6%
Procurement and Construction	\$2,426,095	\$2,717,326	\$291,231	12.0%
Commercial & Legal	\$16,490	\$16,490	\$0	0.0%
Contingency	\$72,280	\$95,887	\$23,607	32.7%
Total LIL	\$2,786,481	\$3,089,378	\$302,897	10.9%

In previous reports, the Committee noted that there had been drawdowns on contingency for changes relating to steel towers, foundation types, and additional materials required for the Labrador-Island Transmission Link. Nalcor reports that as work progressed for clearing right-of-way access roads, the geotechnical conditions encountered, particularly in Central Labrador, were significantly more challenging than originally anticipated. Based on experience to date and recent in-depth field experience of the ground conditions, Nalcor has confirmed that additional labour and materials will be required to complete this work. Harsher than normal winter conditions have also impacted labour productivity, resulting in projected additional labour hours to complete the work.

In addition, given the geotechnical conditions encountered, Nalcor has enhanced the tower and foundation design in certain areas to ensure reliability of this infrastructure. This change in design, combined with investments towards road infrastructure (including bridges and culverts) to provide long-term operational year-round access reliability in remote areas, will also increase anticipated costs. A change in foreign exchange rates has also resulted in an increase in contract costs for the contract for the Switchyard, transmission towers and conductor, Converter and Synchronous condensers. Nalcor advises that the impact of the reduction in the value of the Canadian dollar has been otherwise largely avoided. Although significant purchases

are being made outside Canada, many of these contracts were either priced in Canadian dollars at the date of execution, or the goods were delivered and payments made prior to the devaluation of the Canadian dollar.

The anticipated cost escalation as outlined above is reflected in the increase in the budget for Procurement and Construction and Contingency categories in Table 4.

The activities for the line installation for both the LITL and the LTA are very similar in nature with many of the same sub-contractors. As a result, the Project Management associated with these activities for these two sub-projects are shared. During the period, there was a reallocation of Project management budget from the Labrador Island Transmission Link to the Labrador Transmission Assets to more appropriately reflect the actual Project management costs being experienced. However, at this same time, Nalcor has also increased Project Management resources as a result of the increased efforts required due to the geotechnical conditions experienced. This resulted in a net decrease to the Project Management budget, reflected under the category NE-LCP Owners Team, Admin and EPCM Services.

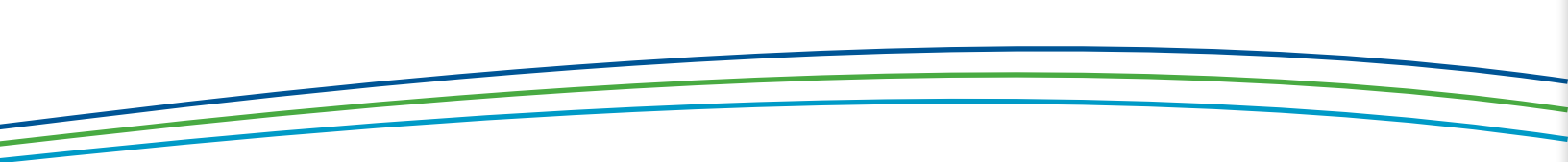
### III. Labrador Transmission Assets

Total budgeted costs for the Labrador Transmission Assets have increased from \$831.95 million to \$877.56 million, a difference of \$45.6 million or 5.5 per cent.

Table 5

**Labrador Transmission Assets – Revised Project as of September 2015** (in \$ thousands)

Labrador Transmission Assets	Project Budget		Change	
	June 2014	September 2015	(\$)	(%)
NE-LCP Owners Team, Admin and EPCM Services	\$99,973	\$144,958	\$44,985	45.0%
Feasibility Engineering	\$220	\$220	\$0	0.0%
Environment & Regulatory Compliance	\$710	\$811	\$101	14.3%
Aboriginal Affairs	\$188	\$188	\$0	0.2%
Procurement and Construction	\$696,322	\$709,643	\$13,321	1.9%
Commercial & Legal	\$3,141	\$3,891	\$750	23.9%
Contingency	\$31,391	\$17,846	(\$13,545)	-43.2%
Total LTA	\$831,945	\$877,557	\$45,612	5.5%



In previous reports, the Committee noted that there had been drawdowns on contingency for changes relating to additional foundations and mechanical rock anchors for the transmission line and backfill required for the foundations of some transmission towers for the Labrador Transmission Assets. Nalcor advises that some design changes to the AC Line and switchyard layout at Muskrat Falls and Churchill Falls are required to respond to geotechnical conditions which will result in increased costs. Furthermore, Harsher than normal winter conditions have also impacted labour productivity resulting in projected additional labour hours to complete the work. The anticipated cost pressures as outlined above are reflected in the increase in the budget for Procurement and Construction category in Table 5.

In addition, as reflected in Table 5, Nalcor has increased Project management resources for the Labrador Transmission Assets. As referenced previously, the activities for the line installation for both the Labrador-Island Transmission Links and the Labrador Transmission Assets are very similar in nature with many of the same sub-contractors. As a result, the Project Management associated with the line installation activities for these two sub-projects are shared. During the period, there was a reallocation of Project management budget from the Labrador-Island Transmission Link to the Labrador Transmission Assets to more appropriately reflect the actual Project management costs being experienced. This increase is reported under the category NE-LCP Owners Team, Admin and EPCM Services.

Additional information on the revised Project Budget can be found on Nalcor's website at [http://muskratfalls.nalcorenergy.com/wp-content/uploads/2015/09/NR\\_Muskrat-Falls-Project-Update\\_29Sept2015\\_final.pdf](http://muskratfalls.nalcorenergy.com/wp-content/uploads/2015/09/NR_Muskrat-Falls-Project-Update_29Sept2015_final.pdf).

# Project Schedule Performance

## Committee Observations

- Schedule pressures continue to be experienced at the Muskrat Falls Generating Facility's Powerhouse & Intake.
  - Critical Path for River Diversion in 2016 remains on track.
  - Risk of schedule delays remains high due to powerhouse concrete placement.
  - Critical Path to first power for December 2017 is under review.
  - Project Milestone Dates for Muskrat Falls Generating Facility are currently under review.

### At August 2015

- Actual Construction Progress 33.5 per cent. Planned Progress 43.3 per cent. Variance of 9.8 per cent behind schedule.
  - Progress on the Muskrat Falls Generating Facility continues to track slower than planned.
    - Schedule has been corrected on the Spillway and Gates and is currently 3.4 per cent ahead of plan.
    - Schedule progress is 23.4 per cent behind plan for the Powerhouse & Intake.
    - Mitigation actions continue to be implemented and production improvements must be maintained to avoid further schedule slippage.
  - Progress on the Labrador-Island Transmission Link is tracking 6.3 per cent behind plan.
    - Schedule variance relates primarily to progress on the transmission line installation.
  - Progress on the Labrador Transmission Assets is tracking 5.3 per cent behind plan.
    - Schedule variance relates primarily to work at switchyards.

In this section, the Committee provides information on actual schedule progress compared to planned schedule progress for the period ended August 2015. Readers are cautioned that Nalcor is currently establishing new baselines for the Project schedule as the Project budget has been adjusted and Milestone Dates are under review. As a result, the planned progress reference measures will change when the new baseline is complete. The progress measures provided here are in reference to the original planned schedule to August 2015.

# Muskrat Falls Project

This section provides an overview of the planned schedule to August 2015, first on an overall Project basis, and then by each of the sub-projects.

## Schedule

Nalcor monitors and reports schedule progress on all activities, both construction and manufacturing. Construction activities include all those activities occurring at site locations in the province. Manufacturing activities include those supply/install contracts that take place outside the province (e.g. the generators are being manufactured in China).

### 1. Construction Activities

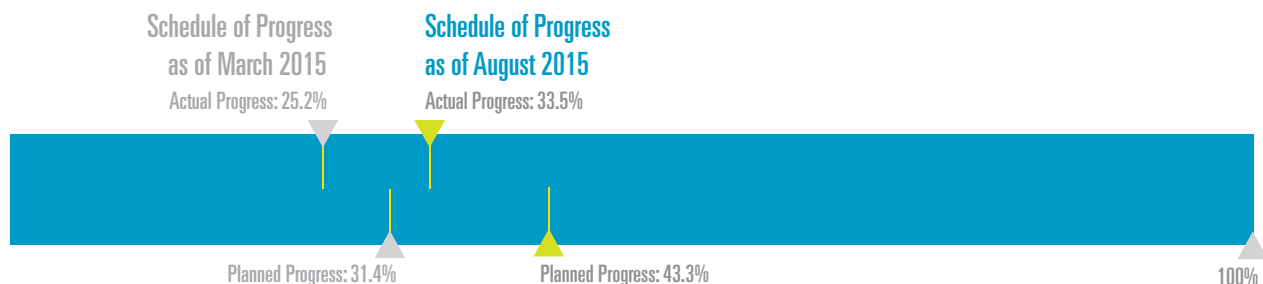
Construction activities are mainly monitored and reported on an ongoing installation/construction progress basis, while manufacturing activities are generally monitored and reported based on a Milestone and/or delivery date basis.

Construction has continued to advance on the Muskrat Falls Project since March 2015. As outlined in Figure 1 and detailed in Table 6, overall Project schedule progress at the end of August 2015 is 33.5 per cent as compared to a planned schedule progress of 43.3 per cent, a variance of 9.8 per cent lower than planned [March 2015 Report variance was 6.2 per cent lower than planned].

Figure 1

### Muskrat Falls Project – Schedule of Progress at August 2015

(including March 2015 comparison)



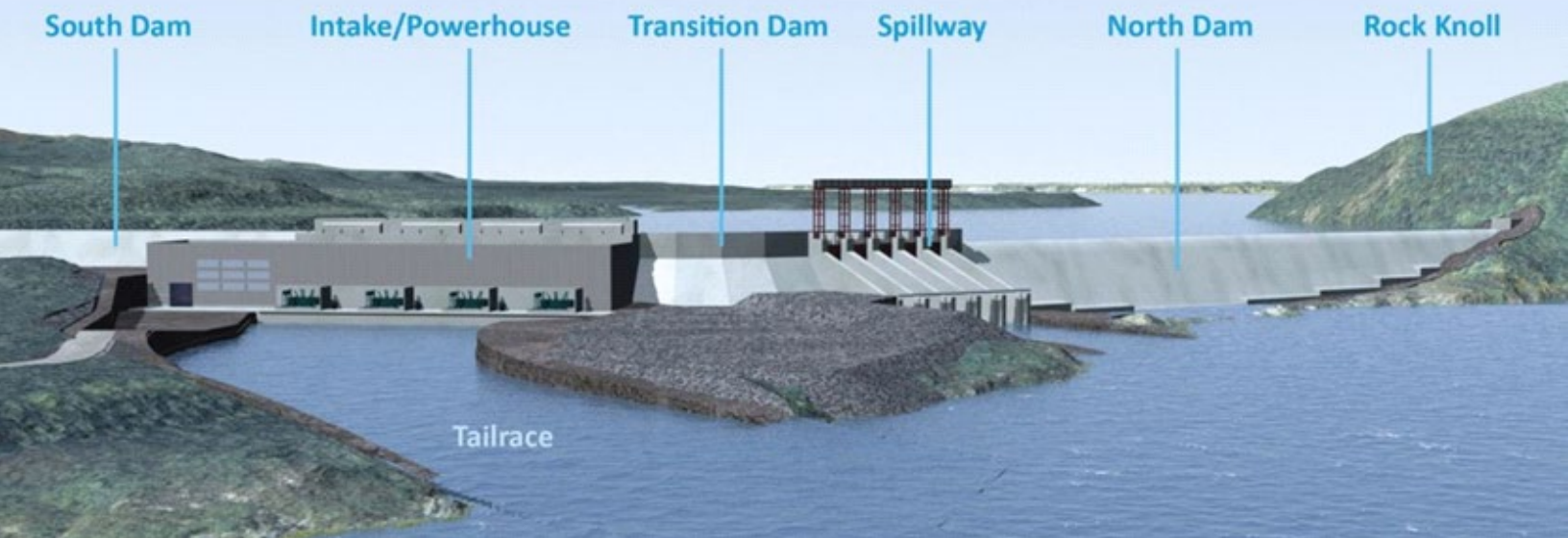
Schedule progress is distributed among the three sub-projects as outlined in Table 6. Progress variance relates primarily to the Muskrat Falls Generating Facility which continues to track behind schedule. Since March 2015, there has been slippage on both the Labrador-Island Transmission Link and the Labrador Transmission Assets sub-projects. Further information regarding the progress schedule is provided in the section below by sub-project.

Table 6

**Planned Construction Schedule Progress vs. Actual Schedule Progress – August 2015**

Muskrat Falls Project: Sub-Project	August 2015			Variance June 2015	Variance March 2015
	Planned Schedule Progress	Actual Schedule Progress	Variance		
Muskrat Falls Generating Facility	48.8%	34.8%	-14.0%	-14.3%	-11.7%
Labrador-Island Transmission Link	33.4%	27.1%	-6.3%	-5.5%	-1.4%
Labrador Transmission Assets	57.1%	51.8%	-5.3%	-2.1%	1.0%
Total	43.3%	33.5%	-9.8%	-9.3%	-6.2%

# Sub-Project: Muskrat Falls Generating Facility



Muskrat Falls Generating Facility

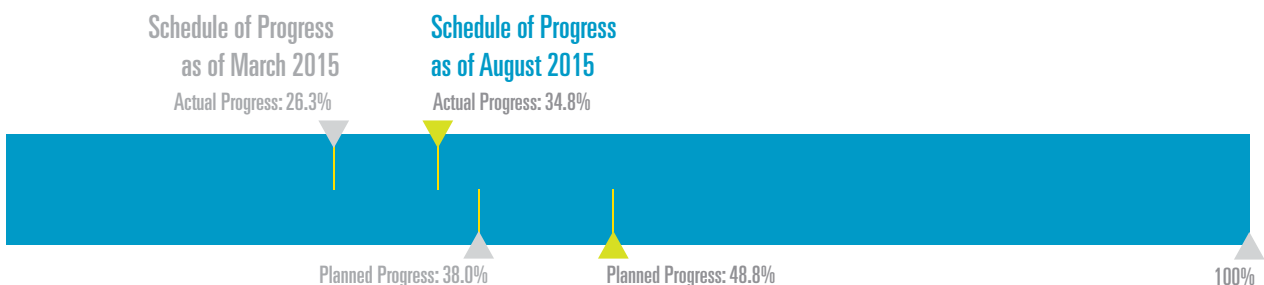
## Schedule

As of the end of August 2015, the actual construction progress for the generating facility was 34.8 per cent complete compared to a planned progress of 48.8 per cent complete, a variance of 14.0 per cent behind the planned schedule [March 2015 Report variance was 11.7 per cent behind the planned schedule].

Figure 2

### Muskrat Falls Generating Facility – Schedule of Progress at August 2015

(including March 2015 comparison)





This schedule variance is mainly attributable to three activities within the generating facility sub-project:

- North Spur Stabilization
- Powerhouse & Intake
- Reservoir Preparation

The progress status of each of these activities is summarized in Table 7:

Table 7

**August 2015 - Construction Activity for the Muskrat Falls Generating Facility**

Planned Progress vs. Actual Progress

Construction Activity	August 2015 Cumulative %			June 2015	March 2015
	Planned	Actual	Variance	Variance	Variance
Activity	A	B	B – A	C	
North Spur Stabilization	41.6%	16.6%	-25.0%	-25.8%	-21.2%
Powerhouse & Intake	41.9%	18.5%	-23.4%	-22.9%	-18.3%
Reservoir Preparation	71.5%	60.8%	-10.7%	-6.2%	0.6%

**North Spur Stabilization**

As outlined in the Committee’s September 2014 report, the planned date for the North Spur Works Ready for Diversion Milestone was revised from November 2015 to September 2016. Nalcor advises that the slippage recorded in the current schedule with respect to the North Spur



Muskrat Falls Site – Progress on North Spur – August 2015

Stabilization Works, is not reflective of the revised plan date for this work activity. As a result, as noted in previous reports, Nalcor advises that the progress will continue to track behind current plan for this scope of work until a new baseline of the work schedule is set based on this revised execution strategy. This re-baselining of the schedule for the North Spur Stabilization Works is expected to be completed in November 2015. Nalcor advises that stabilization work is progressing well at the North Spur and the geotechnical conditions encountered to-date, are as expected.


### **Powerhouse & Intake**

The progress on the Powerhouse & Intake continues to fall behind the original contractor's schedule. As of the end of August 2015, the actual construction progress for the Powerhouse & Intake was 18.5 per cent complete compared to a planned progress of 41.9 per cent complete, a variance of 23.4 per cent behind the planned schedule [the March 2015 variance was 18.3 per cent behind planned schedule].

Nalcor advises they are working diligently with the civil contractor to improve concrete placement rates and achieve increased and sustained production rates. The Project's critical path required priority on the Spillway & Gates in order to achieve river diversion in 2016. The spillway and transition dams concrete placement is on target to achieve this milestone, with the mechanical outfitting of the gates on stop logs next on the critical path. There are ongoing discussions with the civil contractor to determine timelines for the completion of the remaining work in the Powerhouse & Intakes.



Progress on the Powerhouse at the Muskrat Falls Site – August 2015



The Committee notes that the Integrated Project Schedule indicates that the tracking milestone on the critical path to first power for December 2017 is currently under review by Nalcor, along with other Project Milestone Dates for the Muskrat Falls Generating Facility.

The Independent Engineer states in the recent site visit report that “... *fully meeting the current overall schedule for the powerhouse and intakes will be a significant challenge, not impossible, but likely not probable.*”

### **Reservoir Preparation**

The Committee has observed a notable change in the progress on the Reservoir Preparation since the March 2015 report. As of the end of August 2015, the actual construction progress for the Reservoir Preparation was 60.8 per cent complete compared to a planned progress of 71.5 per cent complete, a variance of 10.7 per cent behind the planned schedule [the March 2015 variance was 0.6 per cent ahead of the planned schedule]. Nalcor indicates that there is considerable float in the reservoir preparation work, it is not on the critical path and will not impact river diversion. As a result, the contractor resources have been reassigned to the clearing work on the Labrador Island Transmission Link which is closer to a critical path milestone. The current forecast date for the reservoir clearing is under review.

### **Spillway & Gates**

The Committee notes that for the period April to August 2015, considerable progress has been reported for the Spillway & Gates sub-project. As of the end of August 2015, the actual construction progress for the Spillway & Gates was 58.0 per cent complete compared to a planned progress of 54.6 per cent complete, a variance of 3.4 per cent ahead of the planned schedule [March 2015 Report variance was 9.0 per cent behind the planned schedule]. Nalcor has advised that Spillway concrete work will be significantly complete in 2015 and is on target to achieve River Diversion in 2016.

# Sub-Project: Labrador-Island Transmission Link



The route for the Labrador-Island Transmission Link by Segment

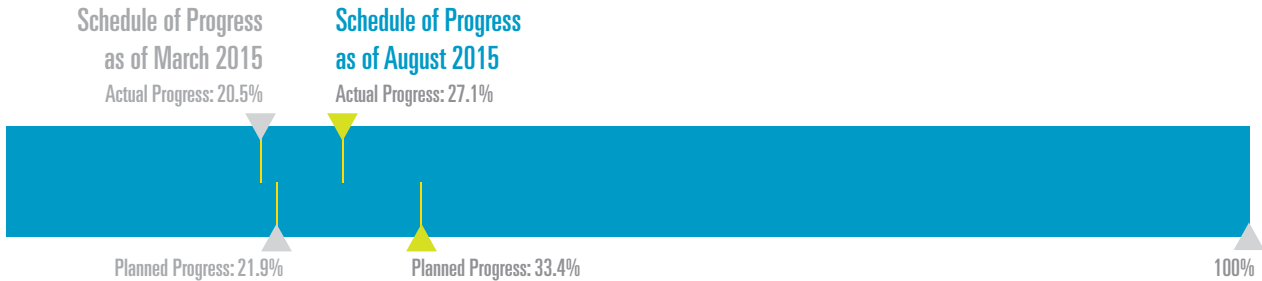
## Schedule

As of August 2015, the actual construction progress for the Labrador-Island Transmission Link was 27.1 per cent complete compared to a planned progress of 33.4 per cent complete, a variance of 6.3 per cent behind planned schedule [March 2015 Report variance was 1.4 per cent behind planned schedule].

Figure 3

### Labrador-Island Transmission Link – Schedule of Progress at August 2015

(including March 2015 comparison)



Nalcor advised that the increased slippage in schedule performance is mainly due to challenging geotechnical conditions being experienced, particularly in Central Labrador affecting clearing, access, and tower foundations works. The spring thaw also caused severe conditions at the work sites, resulting in the temporary lay-off of employees while awaiting improvement.



Progress on the HVdc Transmission Line (Labrador-Island Transmission Link) – August 2015

# Sub-Project: Labrador Transmission Assets



Figure showing the route for the transmission line for the Labrador Transmission Assets

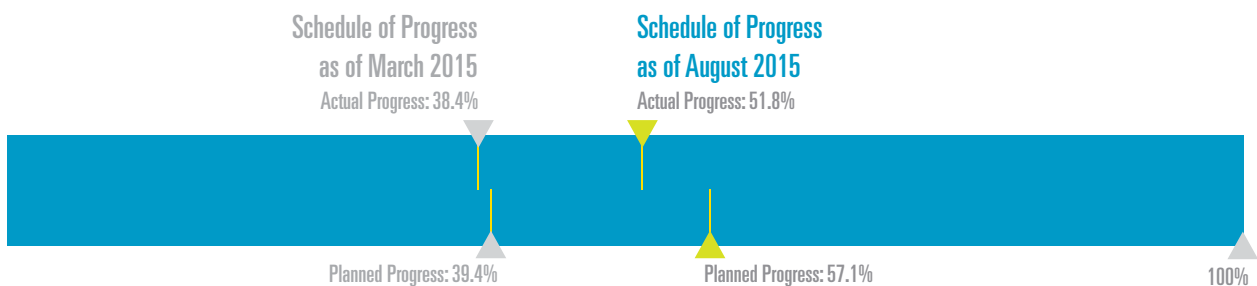
## Schedule

As of the end of August 2015, the actual construction progress for the Labrador Transmission Assets was 51.8 per cent complete as compared to a planned progress of 57.1 per cent complete, a variance of 5.3 per cent behind planned schedule [March 2015 Report variance was 1.0 per cent behind planned schedule].

Figure 4

### Labrador Transmission Assets – Schedule of Progress at August 2015

(including March 2015 comparison)



Nalcor advised that there was some slippage in schedule performance, due to the geotechnical conditions encountered at the switchyards at both Churchill Falls and at Muskrat Falls which required design modifications and delayed start of civil work. The temporary layoff during the spring thaw also affected progress on the Labrador Transmission Assets. However, performance is expected to allow catch up to forecast.



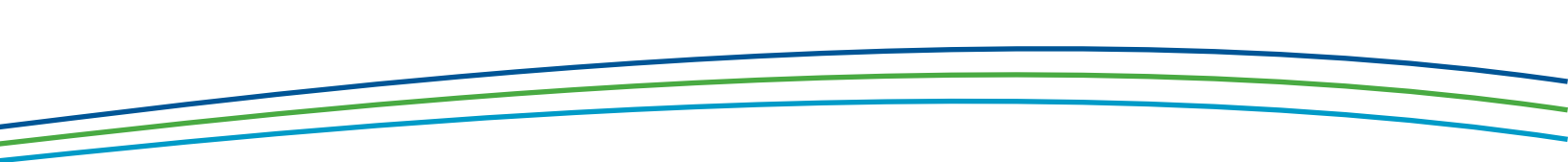
Progress on the HVac Transmission Line (Labrador Transmission Assets) – August 2015

## 2. Manufacturing Activities

The six material manufacturing supply and install contracts awarded to date are as follows:

- Turbines and Generators;
- Powerhouse Hydro-Mechanical Equipment;
- HVdc Converters and Transition Compounds;
- Submarine Cable for the Strait of Belle Isle crossing;
- AC Substations; and
- Synchronous Condensers for the Soldiers Pond Switchyard.

A summary of progress on these manufacturing activities as of the most recent Manufacturing report available is outlined as follows:



The **Turbine and Generators** contract continues to track behind the original contract schedule based on July 2015 contractor report – 35.39 per cent complete as compared to a planned progress of 48.59 per cent, representing a variance of 13.2 per cent (10.01 per cent in March 2015). Nalcor advises that this is within the contract schedule variance tolerances and the equipment remains on track to meet the planned delivery dates. In its Draw Certificate dated August 27, 2015, the Independent Engineer continues to note that there is considerable float between the site need date in the Integrated Project Schedule and the contract schedule, and that there is currently no cause for concern.

The contractor's report for the **Powerhouse Hydro-Mechanical Equipment** for the month of June 2015 indicates the project progress is at 24.67 per cent complete as compared to a planned progress of 39.12 per cent. Nalcor advises that this is within the contract schedule variance tolerances and the equipment remains on track to meet the planned delivery.

The contractor's report for the **HVdc Converters and Transition Compounds** for the month of May 2015 indicates that actual project progress is 12.1 per cent against a baseline planned progress of 18.9 per cent. The report indicates that part of this slippage is due to the re-aligning of the engineering phase, with the priority given to the Civil Works deliverables and procurement. Nalcor advises that this is within the contract schedule variance tolerances and the equipment remains on track to meet the planned delivery.

For the period ended August 2015, the **Submarine Cable for the Strait of Belle Isle** crossing is tracking slightly behind schedule with cumulative progress of 53.74 per cent complete as compared to a planned progress of 57.66 per cent.

The contractor's report for the **AC Substations** for May 2015 indicates that overall progress is ahead of the base line schedule by 0.3 percent with actual progress of 12.1 per cent complete compared to a planned progress of 11.8 per cent. The report notes that despite delays in engineering progress, the overall progress of the project exceeds the planned progress due to the progress made in procurement.

The contractor's report for the **Synchronous Condensers** for the month of June 2015 indicates the project progress is at 15.8 per cent complete as compared to a planned progress of 27.2 per cent. Nalcor advises that this is within the contract schedule variance tolerances and the equipment remains on track to meet the planned delivery. Notwithstanding, the contractor is studying the issues that have potentially caused the delay and is organizing a workshop with their subcontractors and Nalcor to troubleshoot and devise work plans to correct any schedule variances.



## Long-term Schedule

Nalcor is currently establishing new baselines for the Project schedule; therefore, as outlined in Table 8, the majority of the Milestone Dates have either been revised or are currently under review.

Table 8

### Milestone Schedule

Muskrat Falls Generating Facility	Planned Date March 2015	Actual/Forecast August 2015	Status
Project Sanction	December 2012	December 2012	Complete
North Spur Works Ready for Diversion	September 2016	September 2016	Under review
River Diversion Complete	November 2016	November 2016	Under review
Reservoir Impoundment Complete	November 2017	November 2017	Under review
Powerhouse Unit 1 Commissioned - Ready for Operation	December 2017	December 2017	Under review
First Power from Muskrat Falls	December 2017	December 2017	Under review
Powerhouse Unit 2 Commissioned - Ready for Operation	February 2018	February 2018	Under review
Powerhouse Unit 3 Commissioned - Ready for Operation	April 2018	April 2018	Under review
Powerhouse Unit 4 Commissioned - Ready for Operation	May 2018	May 2018	Under review
Full Power from Muskrat Falls	May 2018	May 2018	Under review
Commissioning Complete - Commissioning Certificate Issued	June 2018	June 2018	Under review
Labrador-Island Transmission Link	Planned Date March 2015	Actual/Forecast August 2015	Status
Project Sanction	December 2012	December 2012	Complete
SOBI Cable Systems Ready	October 2016	October 2016	No change
MF Switchyard and Converter Station Ready for Operation	February 2017	July 2017	Revised
HVdc Transmission Line Construction Complete and Connected	June 2017	July 2017	Revised
Soldier's Pond Switchyard & Converter Stn. Ready for Operation	October 2017	July 2017	Revised
Ready for Power Transmission	October 2017	September 2017	Revised
Soldier's Pond Synchronous Condenser Ready for Operation	November 2017	June 2017	Revised
Commissioning Complete - Commissioning Certificate Issued	June 2018	June 2018	Under review
Labrador Transmission Assets	Planned Date March 2015	Actual/Forecast August 2015	Status
Project Sanction	December 2012	December 2012	Complete
Hvac Transmission Line Construction Complete	June 2016	September 2016	Revised
Churchill Falls Switchyard Ready to Energize	May 2017	May 2017	No change
Muskrat Falls Switchyard Ready to Energize	May 2017	May 2017	No change
Ready for Power Transmission	May 2017	May 2017	No change
Commissioning Complete - Commissioning Certificate Issued	June 2018	June 2018	Under review

# Project Risks

Given the size and complexity of the Project, it is important that any risks continue to be proactively identified and monitored and that mitigation measures are implemented as appropriate. The Committee continues to review Nalcor's monthly risk report and meets regularly with Nalcor officials to discuss major project risks and mitigation strategies. Based on the Committee's review of the risk report for the period ending June 2015, the Committee focused on providing updates with respect to the following risks:

- 1 Risk of Project Schedule Delays
- 2 Risk of Cost Escalation for Muskrat Falls Generation Facility

## 1 Risk for Project schedule delays

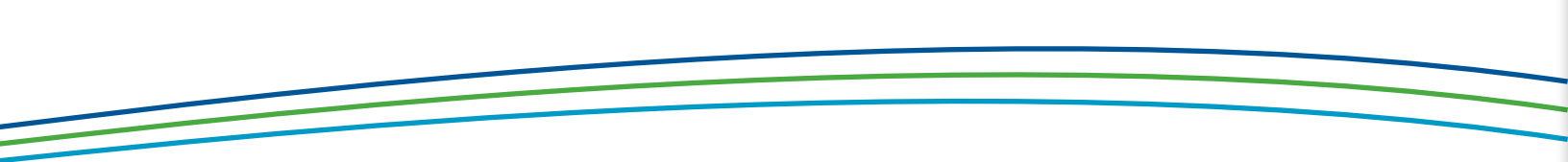
While there has been significant improvement in concrete placement rates over the summer period and risk levels for certain areas – including the North Spur and River Diversion in 2016 – have decreased in the risk report since March 2015, the risk for schedule delays due to powerhouse concrete placement remains high. Contractor performance in the Powerhouse & Intake remains a key area of focus for the contractor and Nalcor.

River diversion in 2016 is a critical milestone and is directly related to the civil construction associated with the Muskrat Falls Generating Facility, more specifically with the work on the Spillway and Gates. The Committee notes that to avoid Project schedule delays significant production improvements in concrete placement and schedule performance at the powerhouse will continue to be required in the short term, with those projected improvements consistently aligned with the established targets in the future. As previously referenced, the Milestone Dates relating to the Muskrat Falls Generating Facility remain under review at this time.

The Committee questioned Nalcor as to its assessment of risk for not achieving River Diversion in 2016. Nalcor advised that while there are always risks associated with a project of this magnitude, the Nalcor Project Team is working diligently to manage these risks that it can directly control. As discussed in the previous section on the status of the Spillway and Gates, the River Diversion in 2016 is the next major activity on the Project Critical path. In order to achieve this event, work on the North Spur work must be complete, the Spillway concrete works and mechanical outfitting have to be advanced enough to control the gates and the river closure work must be progressed to cut off the natural flow path of the river. Nalcor indicates that all of these activities are currently on target.

## 2 Risk of Cost Escalation for Muskrat Falls Generation Facility

Nalcor advises that the remaining cost risks for the Project are much reduced. As the Project has advanced and construction is well underway on all components, potential high risk activities which impacted project costs have been achieved and the Capital budget has been adjusted where required. All major contracts have been awarded or are through advanced evaluation which includes the majority of contract costs. The majority of materials have been ordered and costs are committed.



There is some remaining potential risk associated with the awarded contracts which have a reimbursable or time and material content and as well as risk for potential claims. The remaining project cost risks are associated with contractor performance, which can be impacted by many factors and is a major part of the Nalcor project management team's attention. Other remaining risks include weather; geotechnical conditions; and commissioning, startup and integration.

Nalcor noted that the Contingency of \$186.8 million is designed to cover these potential risks and has been estimated in accordance with the low range advised by the Association for the Advancement of Cost Engineering International (AACEI) standard.

Nalcor further advises that the AACEI standard for the hydropower industry states that the accuracy of the capital cost at this stage of a project is between -3 to +3 per cent. Nalcor has used 4 per cent on the remaining scope of the project. Nalcor advises that it sets aggressive contingency amounts in order to drive costs as low as possible.

The Committee notes that significant schedule pressures with respect to the Muskrat Falls Generating Facility remain. The performance of the civil contractor for the Muskrat Falls Generating Facility, while recently improved remains an ongoing area of focus given the schedule slippage already incurred. It will be critical for the civil contractor to sustain the production improvements to avoid further schedule slippage and may require additional efforts from certain Project contractors. This could impact costs beyond the Project execution risk contingency that has been established.

# Other Oversight Activities

The Committee provides the following update with respect to additional oversight activities.

## Independent Engineer

From March 13 to 16, 2015 the Independent Engineer accompanied Nalcor representatives on a factory visit to the Andritz facility in Chengdu, China where the turbines and generators are being manufactured. Based on the site visit the Independent Engineer concluded that the workmanship of the manufacturing work was very good and the most up-to-date technologies and tools were being used during the manufacturing process. The Independent Engineer also noted that in general good safety procedures were being observed during manufacturing.

Subsequently, on March 19, 2015 the Independent Engineer also accompanied Nalcor representatives on a site visit to the Nexans facility in Futtsu, Japan. The purpose of this visit was to verify the status of work and review the quality of processes for the manufacturing of the submarine cables for the Strait of Belle Isle cable crossing as well as the High-Voltage underground cables. The Independent Engineer found the manufacturing workmanship to be very good and observed that the manufacturing process thus far has been carried out in compliance with very high standards of safety, quality and environmental criteria. The Engineer also reported that the work under this contract appears to be on schedule.

The official reports on both site visits were released in August 2015 and can be found on the Committee's website at: [www.gov.nl.ca/mfoversight/engineer/](http://www.gov.nl.ca/mfoversight/engineer/) or, on Nalcor's website at: <https://muskratfalls.nalcorenergy.com/newsroom/reports/>

The Independent Engineer also made a site visit to the Muskrat Falls site during July 6 to 9, 2015. Committee representatives accompanied the Independent Engineer on this site visit. The Independent Engineer's report on the site visit was issued to Nalcor on September 11, 2015. The report concludes:

*"Overall, the project is managed and progressing well. However, fully meeting the current overall schedule for the powerhouse and intakes will be a significant challenge, not impossible, but likely not probable. The IE also notes that such scheduling challenges are typical for most large hydroelectric projects."*

# Nalcor's External Auditor

On August 13, 2015 Nalcor released its 2015 Q2 Financial Report which included unaudited consolidated interim financial statements for the three and six months ended June 30, 2015 along with the associated Management Discussion and Analysis. Nalcor's Internal Audit Committee has reviewed this report. The document can be found on Nalcor's website at:

<http://www.nalcorenergy.com/uploads/file/Nalcor%20Energy%202015%20Q2%20Financial%20Report.pdf>

The Report indicates that capital expenditures for the project for Q2 2015 were \$509.7 million and \$830.1 million year-to-date. This represents an increase of \$231.6 million for the quarter and \$364.2 million year-to-date compared to the same period in 2014. The Q2 capital expenditures included \$199.7 million for Muskrat Falls Generating Facility, \$93.7 million for Labrador Transmission Assets and \$178.1 million for the Labrador-Island Transmission Link.

The unaudited financial statements also reported on capital costs incurred on the Maritime Link, which is owned and financed by a subsidiary of Emera Inc. Capital expenditures for the Maritime Link for Q2 2015 were \$94 million, bringing the total expenditure for that project to date to \$526 million.

## Other Assurance Reviews

In fulfilling its mandate, throughout the construction period the Committee will examine issues such as whether management processes and controls are well designed and followed. The Committee provides the following update:

### **1. Project Controls for Cost and Schedule**

As noted in previous Committee Reports, Ernst & Young, LLP (EY), in its role as consultant to the Committee, has been engaged to undertake a review of the Project Controls for Cost and Schedule. EY has completed execution of this work and has provided a draft report to the Committee. A copy of the report has been shared with Nalcor for final validation. The Committee will post the EY report to the Committee website once finalized.

# Next Report

The Committee will continue its oversight of the construction of the Project in accordance with its mandate and the Oversight Framework.

# Appendix A

## Project Budget Summary Expenditure Categories

The summary expenditure categories are described as follows:

**NE-LCP Owners Team, Admin and EPCM Services:** includes the labor, facilities and overhead costs of the LCP Project team as well as costs of SNC Lavalin.

**Feasibility Engineering:** includes the cost of early stage engineering activities which are now complete.

**Environmental & Regulatory Compliance:** includes costs associated with environmental assessment, permits, licenses and similar such costs.

**Aboriginal Affairs:** includes costs associated with activities in the aboriginal communities along with obligations under the Impact and Benefits Agreement.

**Procurement & Construction:** includes costs associated with the major construction activities and the award of contracts.

**Commercial & Legal:** includes costs associated with insurance, legal and other commercial activities.

**Contingency:** provision for additional expenditure, if required.



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