

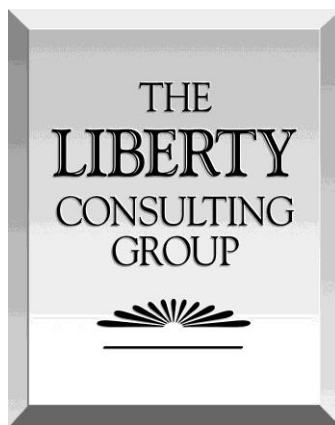
**Second Quarterly Monitoring Report on the  
Integration of Power Supply Facilities to the  
Island Interconnected System**

**Presented to:**

**The Board of Commissioners of Public Utilities  
Newfoundland and Labrador**

**Presented by:**

**The Liberty Consulting Group**



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## 1. Introduction

### a. Interim and Longer-Term Transmission System Readiness

Our report from the preceding quarter described the focus of our monitoring of schedule progress in readying Labrador-Island Link (LIL) assets for turnover to operations. It does not address construction of the Muskrat Falls phase of the Lower Churchill Project (LCP). We have been addressing only those efforts planned and executed to become fully prepared to operate the facilities that connect the LCP to the Island grid, after supply resources become available.

We have also examined readiness to operate the network facilities that will, in the interim before Muskrat Falls completion, permit the import of power from the LIL and the Maritime Link (ML). A long-standing concern with and focus on the sufficiency of supply resources to serve the Island Interconnected System (IIS) led to a decision to place a special focus on readiness of those links to provide import sources of supply prior to the availability of electricity production from Muskrat Falls. The LIL will make recall power available from the LIL connection to Labrador and the ML will make available supply sources originating in or passing through Nova Scotia.

We therefore address readiness in both the interim (pre-Muskrat Falls) and longer-term (post Muskrat Falls) periods. Hydro has in the past addressed the need for and support provided from LIL connections to an operating IIS and an operating ML. The focus placed on completing and getting the LIL into operation led to the establishment of a 1<sup>st</sup> power<sup>1</sup> date for the link of June 30, 2018. An end of second quarter 1<sup>st</sup> power date would make the LIL available to support supply needs on the IIS this coming winter. Supply adequacy has proved very troublesome in past winter seasons, and remains a matter of significant attention now.

### b. Continuation of “TTO” Activities

The ML is now in service and management reports that it has been regularly transferring electricity to and from the IIS. Its availability for the coming winter provides a substantial source of support to the supply portfolio available to meet needs served off the IIS. Management advised at our May 1, 2018, review session that it expects to provide this month a report on generation adequacy for the coming winter season. That report will address the expected contributions from and short-term needs for the LIL and the ML. Hydro’s views on those needs, however, remain to be seen formally. Therefore, we continued to review progress on single-pole LIL operation against the scheduled June 30, 2018, date for 1<sup>st</sup> power.

As our preceding quarterly report observed, management has created a structured program, Transition to Operations (TTO), supported by a large team of internal and external personnel possessing a wide range of experiences and backgrounds, for ensuring technical and operations readiness.

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<sup>1</sup> 1<sup>st</sup> power is the beginning of a list of tests and activities whose performance is necessary prior to commercial operation.

The TTO program continues to plan and measure progress using the same four work streams we described in our last quarterly report. While Muskrat Falls construction continued to proceed under its own plans and schedules, progress against those construction milestones have continued to bear on and have material linkages to the TTO work streams and their schedules. For example, in many cases, TTO activity commencement depends on construction (and other) work being performed by General Electric. Our interest in construction milestones in this report focuses solely on addressing how they may influence TTO activities.

The four workstreams of the TTO, each of which operate under dedicated teams, consist of:

- BTPO (Building the Production Organization), which focuses on operations and maintenance strategy, organization design and staffing, training, securing needed outside resources, and the development of operations and maintenance plans, systems, strategies, and procedures for the integration of the IIS and the LCP
- RFI (Ready for Integration), which focuses on system planning inputs for design and operational requirements, development of reliability standards, support for operational readiness, and participation in testing
- RCFI (Ready for Commercial Integration), which focuses on commercial, legislative, and regulatory matters
- RFO (Ready for Operations), which has functional oversight of a variety of requirements (*e.g.*, safety and environmental) required reports, contractor deliverables, and turnovers to operations.

### **c. The Purpose of this Report**

As our last quarterly report described, the Board of Commissioners of Public Utilities (the Board) asked The Liberty Consulting Group (Liberty) to examine and assess progress in accomplishing a smooth and successful transition to operations. Such a transition is central to IIS adequacy and reliability, both before and after generation begins at Muskrat Falls. We have continued to examine plans, schedules, and status of activities in the first three of the four TTO work streams. We have not examined LCP construction status or progress. Nalcor has embedded the team responsible for the RFO work stream into the LCP organization responsible for construction. We therefore have excluded its work as well from our review.

This report sets forth the results of our second quarterly review of the efforts through the BTPO, RFI, and RCFI work streams. We address how well TTO work has proceeded in support of the integration of and reliable operation of the assets at the planned in-service dates.

Our work in reviewing progress over the past quarter sought answers to a series of basic questions:

- Do the BTPO, RFI, and RCFI work stream plans and schedules present a sufficiently comprehensive, well-defined, logically sequenced and tied set of activities to support the TTO?
- What progress was made in the last quarter relative to the schedules for these three work streams?
- Can management provide meaningful answers to questions about the status of scheduled activities?

- Has management identified actions that, if executed, can succeed in meeting the schedule established last fall for these three work streams?
- What specific measures, actions, and results should form the focus of our next quarter's monitoring efforts?
- What lessons learned from our past quarter's monitoring efforts will enhance future ones?

## 2. Overall Perspectives from Management

As it did in the context of our last quarterly report, management prepared a detailed presentation describing its views of TTO progress. This presentation also addressed specifically an extensive list of topic areas and issues we provided following our review of a report on TTO schedule activities. We found the report very informative and directly responsive to our topics and issues. Within the limits of what one can glean from a review of the TTO work stream scheduling and reporting (we discuss those limits below), we found the presentation and management's responses to our detailed questions very useful in our assessment of schedule status and potential jeopardy to key milestone dates. We continue to acknowledge management's support for our efforts.

We learned that management considers work fully supportive of meeting the June 30, 2018 milestone for 1<sup>st</sup> power, expressing the following views:

- All construction activities remain on track to meet the milestone of single-pole LIL operation ("1<sup>st</sup> power milestone")
  - Significant components have been energized, turned over, or scheduled for turnover in April
- Three of four TTO completion gaps related to 1<sup>st</sup> power milestone that our last quarterly report noted (witness/verification – monopole controls, ECC points, reliability standards) have been closed
- TTO "outcomes" exceeded the most recent quarter's baseline expectations
- The remaining TTO deliverables to enable 1<sup>st</sup> power are on track
- Past personnel issues are being addressed through in-place arrangements with HVdc specialists to support start-up oversight
- Getting "focus" by General Electric on its work to enable commencement of and provide support to readiness activities has been an issue, but
  - Confidence now exists that concerted attention from Nalcor has succeeded in getting adequate focus
  - Management will continue to place a high priority on interaction with General Electric to sustain progress.

Management also reported successful completion of ML high power heat runs and that the ML has been operating and executing commercial transactions.

We address in the following sections our views on these and related issues.

### 3. Summary of Liberty's Conclusions

Some time ago, Nalcor changed its plans for completing work on the LIL to enable first operation of a single pole. A key milestone in support of this initiative is achieving LIL "1<sup>st</sup> power." The goal of this change was to permit use this coming winter season of what will eventually become a bipole power transmission path. Successful completion of this plan will provide access to recall power from Labrador, through initial, single-pole operation. Management reported that all commercial and operational requirements to gain access to recall power have been completed.

Substantial work on construction and on TTO activities, however, remains necessary to support the currently scheduled June 30, 2018 milestone for 1<sup>st</sup> power. The focus of our monitoring of schedule progress and exposure to delay focuses on the latter (TTO) streams of work. Readiness for 1<sup>st</sup> power has for us, as for Nalcor, remained a primary element of that focus. However, we have also examined TTO work extending to the ultimate completion of the LIL, which ends with full bipole operation.

The ML is now in service, having completed key testing and turnover milestones, and it has reportedly regularly transferred power from and to Nova Scotia. Later this month, Hydro will file its next bi-annual report addressing the adequacy of supply to serve needs on the IIS. This coming report will address the role and importance of the LIL in single pole operation and of the ML over the coming winter season. We have not anticipated the results of that report, but have continued this quarter to analyze schedule performance using the June 30, 2018 1<sup>st</sup> power date.

We observed substantial progress against schedule in the last quarter. However, even as measured by management, progress has not recaptured all time lost in the previous quarter. Management nevertheless has full confidence in its ability to meet the current schedule for 1<sup>st</sup> power and for eventual turnover to operations of a fully completed LIL pole capable of up to 150MW. As before, we do not share that confidence. The schedule continues to use approaches and techniques that significantly encumber a straight-forward analysis of the activity linkages one would typically expect to find on a project such as this one. Management has done the best it can to provide information responsive to our questions, but we nevertheless have had to turn to other, less clear methods for analyzing status.

Relying on the numbers of activities scheduled versus those completed still, as it did in the past quarter, shows management falling well short of completing the numbers of activities its schedule says it should have finished. The gap in planned versus actual activity completions shows in both activities considered critical to reaching key milestones on time and in other activities. The closer a project of this magnitude gets to a key milestone (like 1<sup>st</sup> power) the less time remains for closing gaps in critical activity completion, for preventing non-critical activities from becoming critical, and for preventing the sheer volume of remaining tasks from stressing project resources beyond their capability to perform on a timely basis.

Two factors continue to stand out as the principal barriers to timely TTO work completion as LIL single-pole operation approaches:

- Completion of tasks dependent upon General Electric

- A continuing lag in filling internal positions

These sources of delay have continued from the inception of our monitoring and through the first quarter of 2018. Their persistence demonstrates that they should be considered critical. To its credit, management recognizes the importance of dealing with them, and has continued to act in response to them. However, for so long as first power remains a near-term priority, management needs to place greater immediate emphasis on them. Management therefore needs to take action to get its staff adequately trained to operate, maintain and troubleshoot the LIL. The staff needs to get involved in commissioning activities - - the best way to gain a thorough understanding of the HVDC scheme at a level of detail that will fully support operations.

Securing greater focus and more timely performance from General Electric and accelerating efforts to fill internal positions are by far the two most significant challenges facing management. Our work addressing the January – March quarter of this year, however, also identified a number of other issues.

***Spares and Parts Warehousing*** - - Management plans to use a St. John’s location temporarily for warehousing critical LIL spares and parts, for cost-saving reasons. The remoteness of this location, particularly but not solely with respect to Muskrat Falls, calls for the immediate development and aggressive implementation of a plan for identifying essential items that should be stored at the expected locations of their use, and for a longer-term plan that will eliminate that distant, temporary facility. This plan detail should be in place by the end of the second quarter of this year, should detail efforts to address efforts to minimize reported delays in addressing BTPO inventory, and should undergo close progress monitoring by management.

***Recall Power and Other Commercial Arrangements*** - - The filing with the Board of the Power Supply Power Purchase and Optimization Agreement (PSPPOA) has been delayed to the third quarter of 2018. That delay does not appear critical to 1<sup>st</sup> power, but nevertheless holds much significance. It will govern sharing of economic benefits from combined operation of regulated and non-regulated assets to enable sales and purchases to and from market participants outside of Newfoundland and Labrador. Delay in presenting the PSPPOA for Board review must be minimized. Hydro should undertake all feasible efforts to expedite agreement execution and its filing with the Board.

In addition, the delivery point under the Multi-Party Pooling Agreement (MPAA) for off-Island power needs to be established. Management reports that this establishment, a technical matter, will shortly follow resolution of the question of CF(L)Co participation in MPAA. This delivery point needs to be established to deliver market off-Island power purchases in October 2018 for Holyrood displacement. Nalcor should report on where delivery point designation stands at the next quarterly meeting, given the issue’s connection to displacing supply from Holyrood.

***BTPO Support Contracts and Training Services*** - - Necessary support contracts with Hydro and with General Electric remain “under review.” Matters not yet agreed to with General Electric include key commercial terms, as the 1<sup>st</sup> power milestone looms. General Electric activity completion has for some time formed a primary source of TTO activity delay. Management decided fairly late into the TTO process to bring in contracted personnel to use in lieu of planned

internal resources it has been unable to secure in sufficient numbers as scheduled. Completion of these agreements with dispatch and ensuring rapid contractor mobilization of the required resources has thus become a major need. Management needs to expedite execution of support agreements.

Recognizing that current circumstances will leave material amounts of O&M operator training unperformed prior to 1<sup>st</sup> power, management has also turned to outside resources for support there as well. Execution of plans to secure and to employ those resources prior to 1<sup>st</sup> power remains a work in progress. Management also needs to prepare a plan for activities needed to ensure sufficient training resources, identify and develop critical training programs and modules, and schedule their delivery to personnel who need them.

***Emergency Response Preparedness (ERP)*** - - Plans call for completion of operational readiness and mock trial runs by this coming October. With the winter season fast approaching, management should prepare a summary report detailing progress in planning, scheduling, and executing all remaining activities to support the October ERP milestones.

***Technical Studies and Analyses*** - - We questioned management about 11 areas of technical studies and analyses that the Board has raised as issues. Management provided substantial and satisfactory responses to each, identifying them as complete, or as ongoing as part of Stage IV of the Operational Studies. We will continue to monitor progress made on continuing work in the coming quarter.

#### **4. Program Schedule Structure and First Quarter Performance**

##### *Summary*

Shortcomings in TTO activity schedules and in the ability to use them to monitor performance and status effectively led us to adopt a “work around” approach to support our monitoring work back in September 2017. It involved the use of an “official” baseline schedule established at that time. Our work has included reports from management on progress against that schedule, continuing through the present. Management then considered that schedule comprehensive in laying out the detailed work activities going forward. Management made a surprisingly large number of changes to this schedule in the last quarter of 2017. Those changes included activity additions that we viewed as sound enhancements in schedule detail. However, so many changes at such a late stage raised questions about management’s grasp on the full scope of TTO work remaining.

The schedule has now stabilized somewhat, but issues we observed earlier remain:

- Limited linking among schedule activities
- Continuing use of long duration activities
- Reliance on subjective, percent complete information to assess progress.

The significant number of fourth quarter 2017 schedule changes led Nalcor to propose a total re-baseline of the schedule. We advised that, for our purposes, keeping the September 2017 baseline would better identify where progress was strong, and where it lacked sufficient pace. We did agree



to some small adjustments in early 2018, to facilitate improved performance tracking and monitoring. These changes did not produce schedule extensions for any activities.

*January – March 2018 Milestone Changes*

We reported last quarter that nominally reported milestone performance against the September 2017 baseline fell short in numbers of activities actually completed versus those planned for completion. Some completions lagged by as much as six months. We observed at that time a two-month slippage in activities related to 1<sup>st</sup> power on the LIL. Management cited delays in General Electric’s construction activities, not delays in transition/readiness activities, as the primary cause. As important milestones like 1<sup>st</sup> power approach, less time remains to overcome past delays, making continuing delays concerning, even if delay length has shortened somewhat.

This past quarter continued to show slippage in some key, near-term milestones. The Soldiers Pond and Muskrat Falls converter stations provide key examples. This past quarter showed significant progress and a recapture of some earlier delay, but not enough to eliminate delays already existing. Management reports that it is “less behind” now, but that lags, even though smaller, remain a source of material concern as the scheduled date for 1<sup>st</sup> power comes closer.

The foundation for the baseline integration schedule used by TTO comes from several key milestones extracted from the LCP construction schedule. These milestones provide a framework for the planning, scheduling, and tracking of TTO activities designed to prepare fully for operations. TTO schedule milestones identify linkages between construction and integration activities. Milestone dates tracked in the transition schedule represent the earliest date that the transition team can be ready. The TTO schedule milestones may differ with milestone dates released to the public or those contained in the construction schedule. Nalcor categorizes the TTO schedule milestone dates as “stretch targets.” That term generally connotes targets at the low end of probability range for meeting them (often in the 10-20 percent range). In other contexts, the term reflects dates desirable, but not necessary to meet in reaching critical overall milestones.

The chart below shows that nominally reported milestone progress since the September 2017 baseline has fallen short of planned levels, as measured by numbers of activities completed. It continued to do so in the quarter ended March 31, 2018. This last quarter did, however, witness achievement of a key milestone - - February’s energization of the Churchill Falls Switchyard. The more notable slippages included milestones supporting an LIL 1<sup>st</sup> power date of this coming June 30.

The slips in activities supporting 1<sup>st</sup> power include activities for readying the Muskrat Falls and Soldiers Pond converter stations for operation. Management has listed General Electric’s completion of construction activities and provision of critical documentation as impediments to the inception of transition activities.

Before this quarter, it did not appear that such delays on the construction side posed major threats to completion of readiness activities. However, we now consider the potential impacts material to meeting key milestones - - particularly 1<sup>st</sup> power by the end of this coming June. We base that observation on the compression of timeframes available to complete scheduled activities. Nalcor

continues to express confidence in existing milestones, including 1<sup>st</sup> power by June-end. Management has developed activity work arounds, and brought in greater than planned levels of contracted personnel.

The increased use of outside resources will support-near term schedule milestones and fill operating positions for an extended period after commencement of operations. Increases in contracted resources already made and further ones contemplated recognize:

- Transition and operation obstacles created by the number and nature of open internal positions
- Continuing difficulties in attracting sufficient numbers of qualified personnel for positions slated permanent staffing internally.

Nalcor has turned increasingly to firms such as ATCO and Growler to provide support for meeting near-term milestones. These additions come at the same time as negotiations with General Electric (whose work remains a continuing source of delay) to reduce its transition and readiness work scope. Management reports comfort with the status of those negotiations, but acknowledges that important commercial terms (including a reduction in work levels and compensation due as a result) remain open items.

It bears note that General Electric corporate-wide has experienced significant legal problems and financial turmoil, with concern particularly focused on its power business. GE's power unit plans to cut over 15 percent of its work force this year. Nalcor has cited a significant increase in its efforts to get GE "focused" on its work here, qualitatively noting that it believes that its contractor's focus has increased. Clearly, a company in conditions that force it to work with a diminished and presumably re-staged and distributed professional work force presents major challenges for a project whose performance has lagged and continues to do so.

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	Baseline	2017	2018	2019	2020
<b>Maritime Link</b>					
Granite Canal Switchyard - Substantial Completion	09/07/2017		08/04/2017 Actual		
Bottom Brook Switchyard-Substantial Completion	09/18/2017		07/13/2017 Actual		
Maritime Link 1 <sup>st</sup> Power	10/30/2017			12/17/17 Actual	
<b>Labrador Transmission Assets</b>					
Churchill Falls Switchyard (New) - Ready to Energize	10/31/2017			02/14/18 Actual	
Muskrat Falls Switchyard – Ready to Energize	11/28/2017			04/02/18	
LTA Ready for Power Transmission	01/01/2018			04/02/18	
<b>Labrador Island Link Assets</b>					
HVdc Transmission Line Construction Complete	10/27/2017		10/30/17 Actual		
SP Switchyard & Converter Station – Ready for Operation	01/16/2018			05/11/18	
Muskrat Falls Converter Station – Ready for Energization	01/16/2018			04/30/18	
SP Synchronous Condensers- Ready for Operations	03/06/2018			10/22/18	
LITL 1 <sup>st</sup> Power Transfer Labrador to Newfoundland (Pole 1)	05/01/2018			06/29/18	
LITL 1 <sup>st</sup> Power Transfer Labrador to Newfoundland (Pole 2)	10/30/2018			02/18/19	
<b>Muskrat Falls</b>					
Power House Unit 1- Ready for Operation	04/17/2019			07/18/19	
Power House Unit 2 ready for Operation	07/09/2019			07/09/19	
MFG First Power	07/30/2019			06/24/19	
Power House Unit 3- Ready for Operation	10/16/2019			10/16/19	
Power House Unit 4- Ready for Operation	01/22/2020				01/22/20
MFG Full Power	01/22/2020				01/22/20

*January – March Activity Slippage*

The baseline schedule called for the completion of 104 activities in the September-December quarter, with only 23 actually completed. Another 35, scheduled for completion in the preceding or in following quarters were completed as well. Moreover, only 13 of 63 critical activities targeted for completion in that quarter were actually completed.

Completion of planned activities over the first three months of 2018 continued to lag. The table below shows 85 activities scheduled for completion in the first quarter of calendar 2018, with less than half (31) actually completed. Management also completed an additional 47 activities either scheduled for completion prior to or after the first quarter.

**January – March 2018 Performance Summary**

<i>Baseline Activities Scheduled</i>		<i>Completed</i>	<i>Unscheduled Activities Completed</i>	<i>Total Activities Completed</i>
85	31		47	78

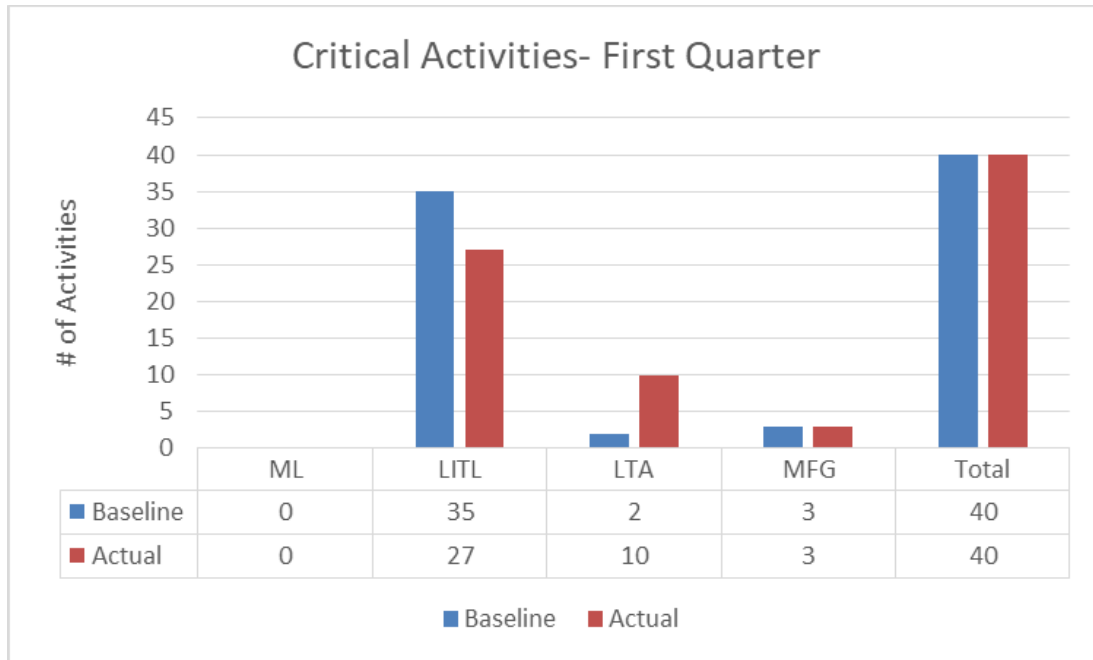
The preceding table’s activities slated for completion in the first quarter fall into two categories:

- Critical activities - - those having an impact on critical path milestones

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- Bulk activities - - those just requiring completion by the end of the project.

Differentiating between the two better serves an assessment of assessing quarterly schedule performance. At this phase of the project, a focus on critical activities best illuminates schedule status. The chart below summarizes first-quarter progress on activities shown as critical to completion per schedules.



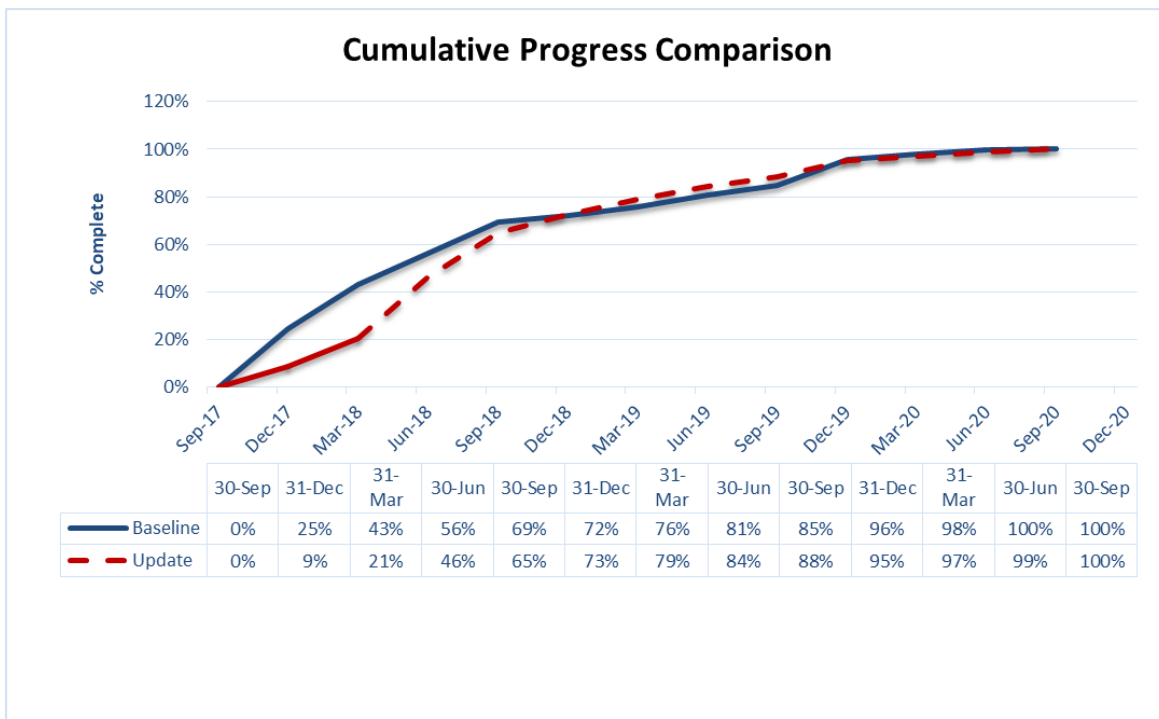
The baseline schedule called for the completion of 40 critical activities in the first quarter of 2018. Nalcor did complete a total of 40 critical activities in the quarter. However, 28 of them had been scheduled for completion by the end of the preceding quarter (December 31, 2017). Thus, management secured the completion of less than 1/3 (12 of 40) of the critical activities targeted for completion in the first quarter of 2018. Continuation of this trend, and in fact, a failure to accelerate activity completion substantially, appears destined to produce material delays in achieving key milestone, particularly 1<sup>st</sup> power.

*The Completion “S-Curve”*

We reported last quarter on progress against a cumulative percent-complete “S-curve” as a metric for assessing delay - - made necessary by the gaps in schedule construction and reporting described earlier. Percent complete as we measured it equals cumulative number of activities scheduled for completion divided by total outstanding activities. Our curve for the last quarter of calendar 2017, incorporating all planned activities confirmed a lack of progress at rates commensurate with the activities called for by the September 2017 baseline. The curve showed completion of only 9 percent of total outstanding activities versus targeted completion of 25 percent. We observed in our report for the last quarter that the pace of progress would have to pick up substantially in 2018 for a return to conformity with the expectations of the baseline.

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The next chart shows that progress continues to lag by the S-Curve measure through the first three months of 2018. Progress improved to 21 percent, but still fell significantly short of the baseline target of 43 percent. The primary reported drivers of the low completion rates were setbacks in completing baseline activities resulting from late staffing additions and delays in completing General Electric work activities. The addition of several new activities also contributed to the gap. The chart also suggests management’s current recovery plan will not bring it back in line with the baseline target until about the fourth quarter of 2018, assuming continuation of current rates of activity completion. Clearly, the pace of progress did not accelerate sufficiently this past quarter to provide confidence in meeting key schedule milestones.



Summary of Progress by Team

The three teams whose work streams we examined made the following overall progress in the quarter just ended,

- The RFI team has made significant progress in a number of areas where we identified significant gaps in the fourth quarter. Examples include completion of system testing/witnessing activities associated with monopole controls, delivery of final points lists related to ECC control and monitoring for the monopole, and completion of NERC Phase 1 reliability standards. However, slower than planned progress on developing grid energization procedures, delays in witness and verification activities resulting from construction delays, and a reforecast of NERC Phase 2 activities to the second half of 2018 contributed to slippage during the first quarter.
- The BTPO team has made additional progress in hiring staff in the first quarter. The current plan calls for 90 positions to be filled in 2018. As of the end of March, 13 of the 90 were on-board, with 70 in various stages of acquisition, leaving 7 not materially advanced.

- The BTPO team’s development of asset management plans, delivery of employee training, development of emergency response and restoration activities continued to lag in the first quarter of 2018. Management responded to our questions about improvement in General Electric performance (an observed issue in our last quarterly report) by expressing a wish that the firm’s work was proceeding more quickly. Management, however, expressed confidence that GE was “getting there.” With the corporate level problems General Electric has faced for some time, with its plans for large 2018 reductions in its power sector’s resources, with the pendency of negotiations for a new commercial agreement, and (particularly) with the continuation of lagging performance (even if improved), strong attention from the highest levels of Nalcor and the securing of firm, quantifiable commitments to resources and performance should be in place at the absolutely earliest available time.
- The RFCI team has made good progress in the first quarter. However, the team has suffered considerable slippage in finalizing the PSPPOA, which has now fallen back into the third quarter of 2018.

A very substantial analytical and development workload remains in the RFI and BTPO work streams. However, the ability to phase that work to focus first on 1<sup>st</sup> power operation offers work-around opportunities that permit deferral of activities that can be performed after this milestone. Nevertheless, it remains important to examine carefully and respond to the impacts that those work-arounds will have on milestones after 1<sup>st</sup> power. The next quarterly meeting will give emphasis to what will have happened with respect to 1<sup>st</sup> power. We will also expect management to be prepared to show how it has handled work-arounds in addressing its post-1<sup>st</sup> power work activities.

## 5. Management’s Ability to Answer Questions

The schedule and the supplemental information continued to support a high-level evaluation of overall performance during the past quarter. With the approach of 1<sup>st</sup> power, management has, however, developed, as one would expect, a clearer sense of where it needs to focus to prevent schedule slippage. Management continued to provide significant information in its presentation to us, and offered clear responses to our questions. Team leads and support personnel for each of the TTO work streams pertinent to our review continued to show knowledge and confidence about their areas of responsibility. Management continues to dedicate a very high level of priority to its preparation for operations, both transitional and long term.

## 6. Other Issues

### a. Spares and Parts Warehousing

Management has arranged for interim warehousing for the inventory of critical spares and parts in St. John’s, with plans to identify and secure permanent locations following 1<sup>st</sup> power on the LIL. Citing a similar approach by NS Power, management moved warehousing out of the base construction effort, in order to enable construction by lower cost contractors for what is expected to be simpler, largely civil work.

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The St. John's location is remote from the sites where such spares and parts would be required. An extended delay beyond first power would be troublesome if it exposes delivery to winters beyond the current one. Management should in the immediate term ensure that it has and is assiduously executing a firm and immediate plan for identifying what essential items can and must be stored now at the locations of their expected use. This need is even greater for the more distant Muskrat Falls location. By the time of the next quarterly review:

- A plan clearly identifying and addressing necessary spares and parts for the coming winter should be in existence, detailed, reflective of the logistics of reaching both Island and Labrador locations, and should remain subject to close monitoring and attention by management
- A similar plan should be in place and happening to address long-term warehousing that solves the distant location issue before the onset of winter seasons following the coming one.

Nalcor has also reported delays in addressing BTPO Inventory, but expects completion by 1<sup>st</sup> power, and considers moderate slippage not critical. The reporting we recommend should include details on efforts to keep slippage within "moderate" limits and actions and schedules for any gaps considered critical should 1<sup>st</sup> power have occurred or remain imminent at the end of June 2018.

**b. Recall Power and Other Commercial Arrangements**

Significant progress continues on completing commercial arrangements. Two merit specific attention:

- Establishing the delivery point under the MPAA for delivery of off-Island power to displace Holyrood in October
- Delay to the third quarter of 2018 in presenting the PSPPOA.

Management has reported that neither agreement threatens the ability to flow recall power to the IIS on an interim basis. Moreover, management reports that *all* arrangements and agreements associated with the temporary availability of recall power are now in existence. Moreover, the nature of those temporary agreements permits them, according to management, to support continued availability, during the period required to complete permanent arrangements.

Management reports the issue of establishing a Labrador delivery point as a technical matter whose resolution will shortly follow resolution of the question of CF(L)Co participation in MPAA, and whatever that resolution brings on that question. A delivery point needs to be established to deliver market off-Island power purchases in October 2018 for Holyrood displacement. While not apparently a timing risk, given the nature of the issue described, Nalcor should report on where delivery point designation stands at the next quarterly meeting, given the issue's connection to displacing supply from Holyrood.

The PSPPOA issue appears to have greater significance. The activity in question involves submitting the executed agreement for Board review. The agreement reportedly does not have a bearing on recall power availability. Management also reports that efforts to complete the agreement do not involve substantive operational issues, but concern commercial terms. The PSPPOA, however, will serve the major purpose of governing the sharing of economic benefits

resulting from combined operation of regulated and non-regulated assets to optimize sales and purchases to and from market participants outside Newfoundland and Labrador.

A need for dispatch arises from the interest in expediting the production of those benefits and in ensuring a fair and proper sharing of them at the earliest possible date. Therefore, it is important that the matter receive prompt attention and for the Board to be informed as soon as is feasible about the nature and content of the filing and the potential impacts of lost benefits if finalization is delayed.

Therefore, Hydro should expedite the execution of the agreement, and accelerate the date of its filing with the Board.

### **c. BTPO Support Contracts and Training Services**

Management reported needed support contracts with Hydro and with General Electric as “under review.” Questioning about the latter demonstrated that significant negotiation remains to be completed, given that General Electric has yet to agree to commercial terms (like payment) and a reduction in what had been its scope of work. We do not have a near-term concern with management’s arranging sources of support in addition to General Electric, but we do have concern about the fact that, with 1<sup>st</sup> power fast approaching, tying down needed support remains an open matter. Underscoring this concern is management’s recognition, with the TTO process already well underway, of the need to replace internal resources with contracted personnel, because it could not make sufficient hires on schedule.

Combining that observation with the late completion of activities encompassed within this “support” need underscores the importance of action to complete the agreements. Management acknowledged in its presentation to us that a greater than “moderate” slippage in site assessments dependent on General Electric would jeopardize the current 1<sup>st</sup> power date.

Given these circumstances, management should prepare (for use in continuing monitoring efforts) a plan for expediting completion of the support agreements and provide a report to us on status in executing that plan by June 15. The status report should specifically address quantitatively the exposure to 1<sup>st</sup> power that remains due to the status of activities encompassed by the support agreements.

Progress in training remains a concern as well. Management recognizes that current circumstances will leave material amounts of O&M operator training unperformed prior to 1<sup>st</sup> power. It has therefore turned to outside resources for support for training development and execution as well. The presentation made to us and responses to our follow-up questions indicate that execution of plans to secure and to employ those resources prior to 1<sup>st</sup> power remains a work in progress. Management’s June report should address status and efforts to close any remaining gaps as well.

### **d. Emergency Response Preparedness (ERP)**

The late filling of the person in the lead ERP position has led to delays, but none, according to management, affecting 1<sup>st</sup> power. Plans now call for the completion of operational readiness and mock trial runs by this coming October. Given the shortening period before the onset of the winter



season, management should prepare (for use in continuing monitoring efforts) by June 30, 2018 a summary report detailing progress in planning, scheduling, and executing all remaining activities to support the October ERP milestones.

**e. Technical Studies and Analyses**

At our request, management reported on a number of technical studies and analyses:

- Multi-year Reliability Compliance Program
- Options (*e.g.*, operating limits) to reduce UFLS
- MATPC emergency assistance and reserve sharing studies
- Re-strikes on the LIL-OHL
- ML-LIL interaction studies
- Voltage control impact on recall power availability
- Bay d'Espoir instability issues
- ML frequency controller study
- Teshmont analysis
- IIS performance with ML in and out of service
- Soldiers Pond site for 4th high inertia synchronous condenser.

Management has reported completion, or ongoing as part of Stage IV of the Operational Studies. We observed no significant concerns, apart from discussions earlier in this report about work that has been resource constrained. We will continue to monitor progress in reviewing progress made in the coming quarter.

## **7. Summary of Recommendations**

**a. Pace of General Electric Performance**

Management should create a formal program of regular executive-level meetings, supported by activity schedule and status details to ensure progress sufficient to meet schedule milestones and designed to secure specific, measurable commitments from General Electric. Monthly meetings at this date appear insufficient, particularly given the current 1<sup>st</sup> power need date. At least bi-weekly meetings, including reports specifically addressing prior week actions and next week expected actions should take place. We would hope to examine documentation from those meetings during our review of 2<sup>nd</sup> quarter 2018 TTO activities.

**b. Filling Internal Positions**

Management provided us with plans for filling positions, showing numbers by area by year. With filling of positions still proving difficult, and with June 30 still the schedule date for 1<sup>st</sup> power, the failure to break down by quarter the 2018 schedule for filling positions did not provide sufficient detail. Management reported the existence of more granular position-filling schedules and status - both in terms of dates and status of recruitment efforts already in progress. Accordingly, we asked for the detailed information, which proved more time consuming to provide than management

expected. The next table summarizes the information eventually provided, with data current through late April 2018.

**Planned Versus Actual Positions Filled by 2018 Q2 End**

Areas	2017	2018 Q2 End			Adds Remaining		
	<i>Number On Board</i>	<i>Total Planned</i>	<i>Adds Required</i>	<i>New Hires</i>	<i>Transfers</i>	<i>Number</i>	<i>Percent</i>
Transmission O&M	28	51	23	5	3	15	65%
Generation O&M	2	20	18	2	0	16	89%
Engineering	10	35	25	10	7	8	32%
Support	2	5	3	0	0	3	100%
<b>Total</b>	<b>42</b>	<b>111</b>	<b>69</b>	<b>17</b>	<b>10</b>	<b>42</b>	<b>61%</b>

The table shows that well more than half of the positions expected to be filled by June remain open and that the progress made in filling positions came significantly at the expense of taking personnel, particularly in engineering, from many positions likely requiring backfilling. Management does not consider the positions remaining open to be critical to 1<sup>st</sup> power, but indefinite openings of a large magnitude would clearly pose operational risks. In addition, the training needs of new personnel will need to be accommodated with reasonable dispatch as well.

We read the hiring data as requiring a concerted effort in the second quarter to close gaps in hiring and to ensure the prompt placement of adequate full staffing. Management should be prepared to provide a detailed update on second quarter staffing status and progress at our next quarterly update meeting.

**c. Assessing 1<sup>st</sup> Power Completion**

The expected May filing of Hydro’s next supply adequacy report will provide the latest information about needs for and expected contributions from the LIL and ML. That report’s data and analysis will provide the foundation for important review of 1<sup>st</sup> power status in relation to: (a) updated information about the full range of IIS supply resources and their availability, (b) expected demand for and usage of electricity, and (c) should 1<sup>st</sup> power remain pending, the magnitude of resources required to make single-pole LIL operation reliably available this coming winter.

**d. Spares and Parts Warehousing**

Management should identify all spares and parts necessary for storage at the converter stations, and provide for locating them there, and should develop a plan seeking to eliminate the distant, temporary location as soon as feasible, to avoid exposure to winter seasons following the one coming. This plan should also detail the efforts specifically intended to address efforts to minimize reported delays in addressing BTPO inventory. Management should complete this plan by the end of June to make it available for our next review session.

**e. Recall Power and Other Commercial Arrangements**

Hydro should develop and immediately begin implementation of a plan identifying all actions required to advance the execution of the PSPPOA and its filing with the Board, with the goal of advancing the Board filing date substantially. Management should complete this plan by the end of June to make it available for our next review session.

Management should report at our next review session on where Labrador delivery point designation stands, given the issue's connection to displacing supply from Holyrood.

**f. BTPO Support Contracts and Training Services**

Management should report to us by June 15 on the status of closing support agreements and quantitatively on the exposure to 1<sup>st</sup> power that remains due to the status of activities encompassed by the support agreements. This report should also address status and efforts to close any remaining gaps in O&M operator training resources, plans, and delivery as well.

**g. Emergency Response Preparedness**

Management should prepare a summary report detailing progress in planning, scheduling, and executing all remaining activities to support the October ERP milestones. Management should complete this report by the end of June to make it available for our next review session.

**h. Technical Studies and Analyses**

Management should provide a detailed summary addressing the technical study and analysis areas referred to on page 15. Management should complete this report by the end of June to make it available for our next review session.