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Subject: Final Version of Transmission Project Contracting and Packaging Strategy Risk Assessment
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Jason: Please find attached PowerAdvocate's final version of the referenced report. This version updates and replaces the draft sent on June 4 based on our final review and on the conversation we had with you earlier this week. Could you please distribute this version to the Nalcor team so that they can review in advance of our roundtable session next Tuesday?

Please let me know if you need a comparison run of the changes made to the June 4 draft.

Jim and I look forward to reviewing some of the findings in this report and otherwise participating in the discussion/debates at the meeting next week.

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Transmission Project Contracting and Packaging Strategy Risk Assessment

Submitted to:

Nalcor Energy

6/20/2012

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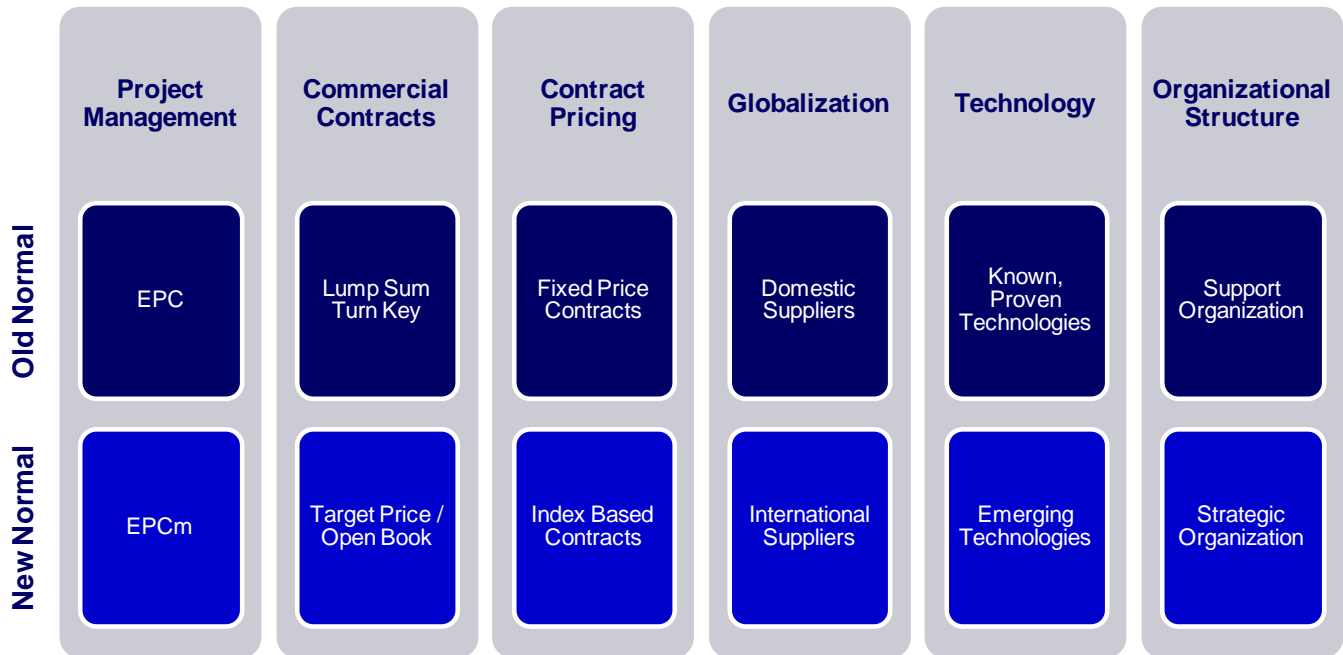
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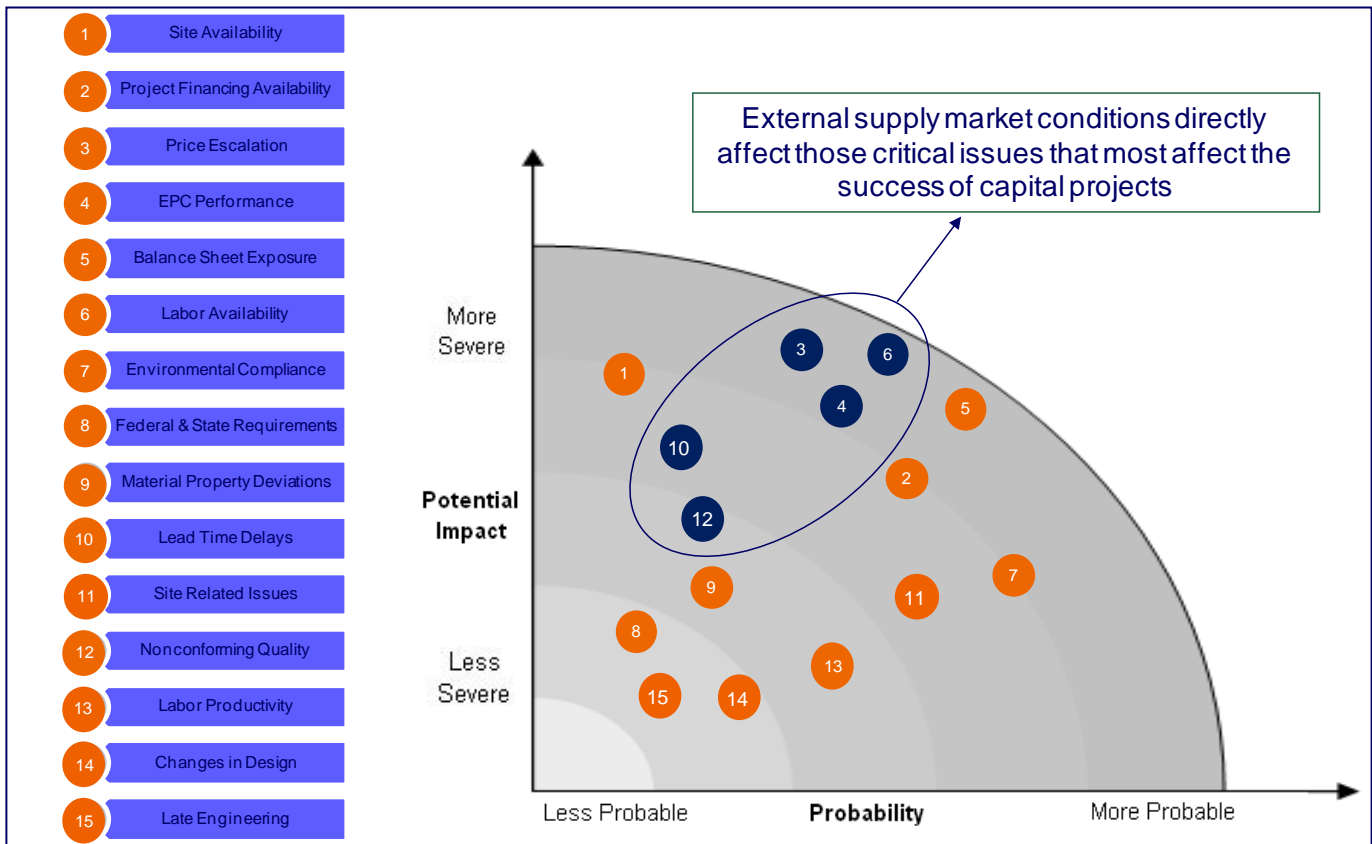
I. Purpose and Background

The purpose of this Assessment is for PowerAdvocate to deliver strategic insights (both risks and opportunities) to the Lower Churchill project team based on a “fresh” look at Nalcor’s contracting and bid packaging strategies and with a primary focus on the transmission line projects. In performing this Assessment, PowerAdvocate has reviewed the Overall Contracting Strategy, the LCP Master Package Dictionary, the Project Execution Plan, the Procurement Management Plan, and the Lower Churchill Project – Risk Management Philosophy. In addition, we leveraged our project structuring and sourcing experiences on, and our supply market data from, major Transmission and other capital projects across North America. We have not interviewed project personnel or performed other similar due diligence to confirm our understanding of the project and its risk profile beyond what is included in the documents identified above.

On a major project of the scale of the Lower Churchill project, risk can come in many shapes and sizes. In the Risk Management Philosophy, Nalcor divides risk into several buckets: financial, market and market access, occupational health & safety, environmental, technical, schedule, cost / financial, operational / reliability, and reputation / image. Over the past five years, utilities executing major projects are experiencing increased volatility, uncertainty and risk across those different risk buckets and those risks are appearing in many changing ways:



For many of the commonly faced major project risks, a utility’s understanding supply market conditions “outside its four walls” is a critical component to managing project risks and to identifying opportunities to improve project execution.



Given PowerAdvocate’s mission and focus, it is the risks and opportunities relating primarily to external supply market conditions (schedule and cost performance and quality/operational risks) that we prioritize in this assessment. We are not design and engineering experts or a construction firm, so our focus is not on design risks or on any selected construction means and methods. We are also not Legal Advisors, Financial Advisors or Insurance Advisors – Nalcor’s representatives from those groups will be helpful in formulating resolution strategies for several of the Risks/Opportunities we identify in this Assessment (e.g., Risks/Opportunities 6, 7 and 10).

Finally, even though **labor availability** is a critical project risk, we have purposefully not focused on labor availability risks/opportunities in this Assessment in part because it is a risk that Nalcor has clearly considered (see, e.g., pages 29 and 70 of the Project Execution Plan relating to staggering construction schedules to manage workforce peaks and engaging global contractors) and in part because we have not at this stage performed a detailed labor availability analysis focused on Newfoundland and Labrador – a precondition to developing insightful risk resolution approaches. Nonetheless, we would add one recommendation at this stage: to the extent possible under applicable agreements and regulations, work closely with the EpCM contractor, the construction contractors and the unions to ensure that any laborer from classifications that are resource constrained are only performing the specialized work for which that classification of laborer is needed. For example, if electrical linemen are resource constrained, do not have electrical linemen performing any site clearing or foundation work. We have seen across multiple projects a tendency to use electrical linemen to perform work that other classifications are qualified to perform.

II. Executive Summary

Nalcor has performed more advanced planning than any other owner with which we have worked on Transmission projects and has therefore set in place key preconditions to project success. The decision to use an EpCM model is well supported and is consistent with the most common contracting approach that we have seen used on Transmission projects (the so-called “multiple contract” approach). The EpCM model represents a reasonable effort to obtain most of the benefits and to minimize many of the drawbacks of the “multiple contract” approach.

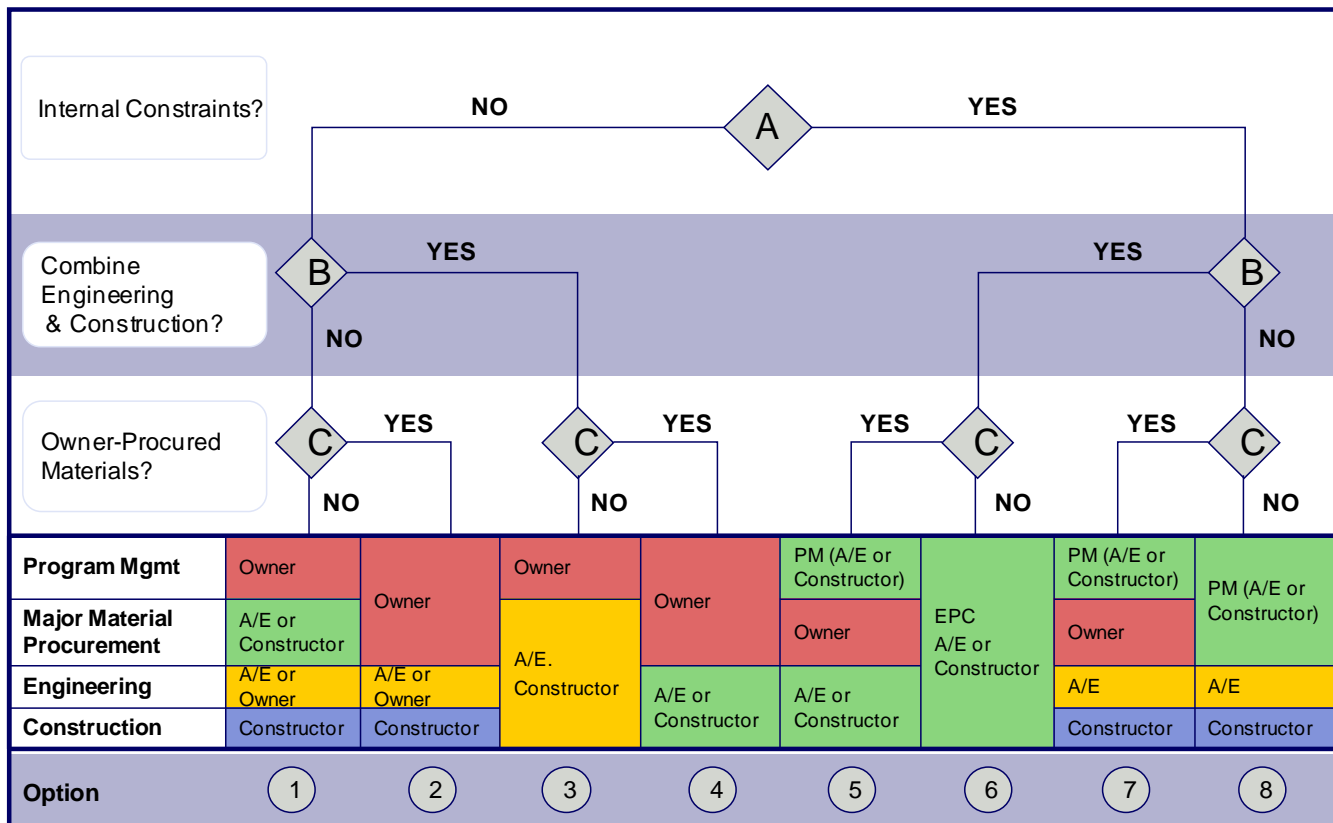
Nonetheless, there are still many risks and opportunities that will arise during the execution period that could negatively impact or promote the project’s cost, schedule and quality objectives. The main risks and opportunities relate to the following drawbacks of the multiple contract approach:

- the lack of a single point of contact and the increased risk of the deficient performance by one supplier/contractor impacting the cost or schedule performance of another; and
- the difficulty in setting up comprehensive risk sharing programs.

The strategic insights outlined in Section V highlight circumstances that have commonly arisen on other Transmission projects due mainly to the gaps that often accompany the “multiple contract” approach. And, most importantly the insights focus on the importance of making conditions as easy as possible for the line construction contractors.

III. Contracting Approach

PowerAdvocate uses the Contracting Approaches framework set forth below to focus its contracting strategy analysis for major transmission line and substation projects.





In our experience, **Approaches 2 and 7** (each a “multiple contract” approach with Approach 7 relying more extensively on outside Program Management expertise to perform a variety of tasks) represent the main contracting approaches on large transmission projects involving both transmission line and substation construction. The multiple contract approach is chosen by owners in most cases because the “in parallel” nature of many of the pre-construction activities on a Transmission project (route selection and acquisition, permitting, design, long lead time procurement) make it difficult to obtain a bid for, and execute on, a “true” fixed price, EPC approach and because the multiple contract approach is very similar to their traditional model for executing its normal Transmission project portfolio and allows its engineers to remain hands on in the design decisions.

Approach 6 (true “EPC”) is sometimes used for greenfield substation projects, which are better candidates for the EPC approach than a transmission line project because there is one fenced-in site with known site conditions and usually a scope of work that is well defined up front. In our experience, the EPC approach is often used on substation projects if those projects involve a new or different technology (e.g., GIS substations) with which the owner has limited design experience.

The EpCM model selected by Nalcor is, in our view, a “supercharged” version of Approach 7 in which the EpCM contractor performs a broad Program Management scope that includes construction management and also performs engineering and procurement assistance services. The EpCM model selected by Nalcor remains a multi-contract approach because Nalcor will contract directly for all materials procurement, construction services, and other specialty services.

For the many reasons outlined in the Overall Contracting Strategy, the selection of this EpCM approach has a solid and well analyzed basis. It is a model that is commonly seen on complex projects like the Lower Churchill project, which includes not only AC and HVDC transmission lines, but also the hydro facility and the converter stations. As a point of comparison, the EPCM model has recently been used by certain owners building petrochemical facilities which, like the Lower Churchill project, can be massive undertakings that often involve multiple sub-projects under one project umbrella.

Approach 7, like any contracting approach has potential benefits and drawbacks, in particular:

Approach 7 | Owner Procured, Multi Contract Approach

ProgramMgmt	Owner	Owner	Owner	Owner	PM (A/E or Constructor)	EPC A/E or Constructor	PM (A/E or Constructor)	PM (A/E or Constructor)
Major Material Procurement	A/E or Constructor	Owner	AE	Owner	Owner	Owner	Owner	Owner
Engineering	A/E or Owner	A/E or Owner	Constructor	A/E or Constructor	A/E or Constructor	AE	AE	A/E
Construction	Constructor	Constructor	Constructor	A/E or Constructor	A/E or Constructor	Constructor	Constructor	Constructor

Option 7

Potential **benefits** to Owner include:

- This approach is consistent with how projects have traditionally been executed at many utility owners.
- Provides the up-front engineering and program management support needed for regulatory and right-of-way approvals.

- Facilitates bidding the construction scope out under a competitive solicitation and awarding construction scope on a fixed price basis because the project spends the time up front acquiring the rights of way and developing the engineering.
- Can easily break substation and/or line construction into separate scopes or segments with different construction contractors responsible for each, which allows access to a larger pool of potential construction contractors as the scope may be more manageable than the full project scope.
- There are a greater number of contractors that can perform program management and “just” engineering or “just” construction management; fewer contractors can perform full program management, engineering and construction.
- Some construction contractors prefer not to perform program management services.
- Owner does not have to increase its internal staffing because, as specific project needs arise, program manager or other contractors can supplement.
- Facilitates a fixed price arrangement for the construction scope.
- Owner has significant input into final design and equipment/materials selection – which is often in line with its traditional execution approach.
- Can avoid multiple subcontractor mark-ups.

Potential **drawbacks** to Owner include:

- No single point of contact -- multiple interface points requires more comprehensive analysis of potential risks/gaps and development of risk mitigation techniques.
- Requires closer focus on commercial terms to identify and address potential cost and schedule impacts of poor performance by owner or by one supplier/contractor on another supplier/contractor.
- Greater owner oversight needed which may lead to schedule delays and/or increased cost due to duplication of resources.
- Having multiple contractors can result in more complex disputes as contractors may try to pin blame on others (the so-called “finger pointing risk”).
- If performed sequentially, up-front engineering may not get the benefit of a constructability assessment from a construction contractor, unless the program manager (or an EPCM contractor) has such responsibility and capabilities.
- Breaking construction into multiple segments or scopes:
 - may result in multiple interface points;
 - may require additional internal resources to manage scope overlap and contractor coordination; and
 - may introduce competition among multiple contractors for the same labor resources, thus driving up labor costs.
- Difficult to structure a comprehensive incentive program.
- Often does not allocate significant risk to the program manager (or, if applicable, the EpCM contractor) despite that party’s central role in project success.

In our view, the EpCM approach is an effective way to obtain as many of the potential benefits of Approach 7 as possible while minimizing as many of the potential drawbacks as possible. However, the approach does not completely eliminate the potential Approach 7 drawbacks and a few of those

drawbacks can have significant project impacts unless managed appropriately. Many of the strategic insights below can be tied to the two following potential drawbacks:

- The lack of a single point of contact and the increased risk of the deficient performance by one supplier/contractor impacting the cost or schedule performance of another; and
- The difficulty in setting up comprehensive risk sharing programs.

There is no “silver bullet” when it comes to contracting approaches and the best an owner can do is to make sure it is set up with appropriate resources and risk focus to obtain the benefits and to manage the drawbacks of the selected approach. Based on our review of the documents referenced earlier and our understanding of Nalcor and EpCM resourcing and compared with our other project experiences, we believe that the project team has sufficient resources, expertise and focus to manage these risks. The strategic insights outlined in Section V below are designed to help Nalcor and the EpCM prioritize its risk resolution and opportunity enhancement activities on the project.

IV. Packaging Approach – Methodology for Assessment

In addition to analyzing the risks relating to the EpCM contracting approach, PowerAdvocate also has reviewed the materials and services packaging strategies developed by Nalcor as outlined in the Packaging Dictionary and supplemented by the Project Execution Plan and Procurement Management Plan. In developing the strategic insights relating specifically to the packaging strategies, PowerAdvocate compared approaches used, and experiences on, past or ongoing Transmission projects (both major projects and capital investment programs involving multiple projects over several years).

The strategic insights in Section V that relate to packaging strategies are focused on “bigger picture,” more strategic issues than merely gaps and inconsistencies. However, as an initial insight, we would point out that there are some inconsistencies throughout the Packaging Dictionary. For example, in some places the documents indicate that certain packages use Unit Prices and elsewhere they refer to a combination of lump sum and unit prices for that same package. In the packages with a combination of lump sum and Unit Prices, we would recommend clarifying where possible the scope that is subject to each pricing type. We assume that the Packaging Dictionary is a work in progress (there are still “TBDs”) and will presumably be updated further prior to the bid events. We would be pleased to review these issues and to point out other packages that may benefit from smaller refinements (e.g., pulling wire and cable out of multiple packages and combining into one package).

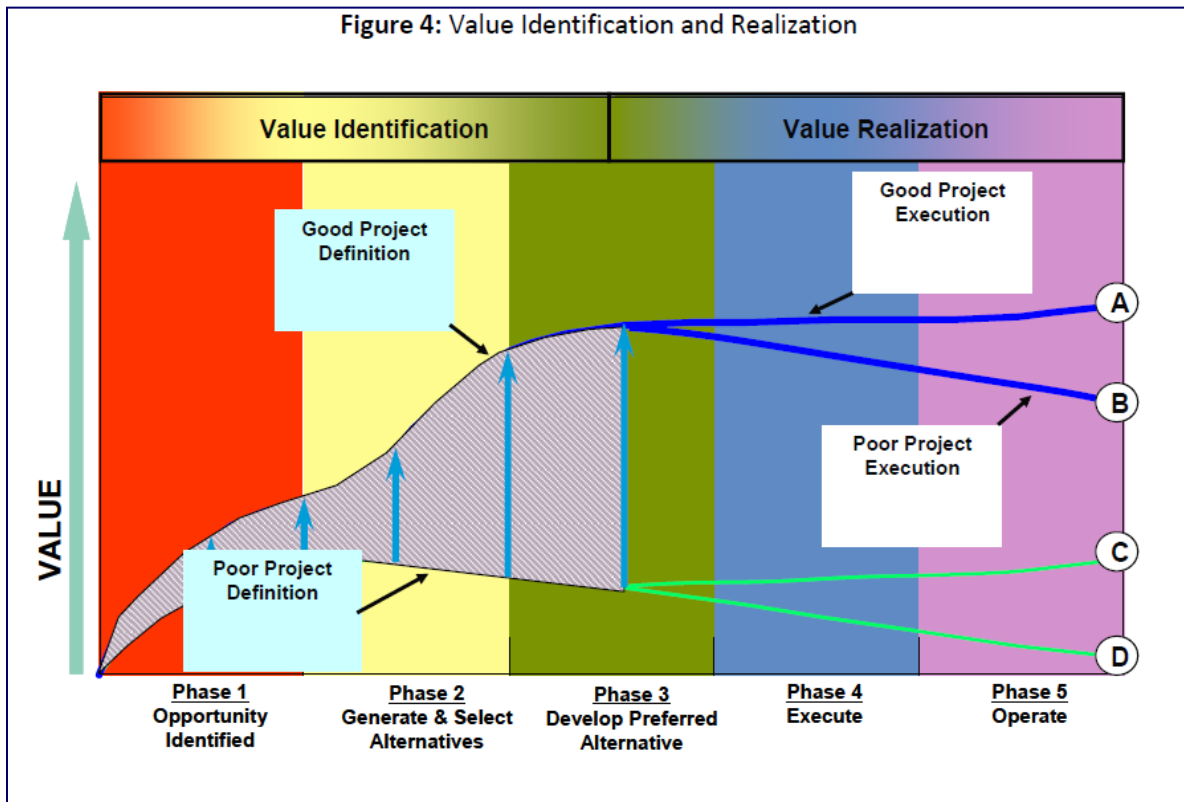
As to the bigger picture insights below, we would point your attention in particular to the discussion and recommendation in Risk/Opportunity 11. In that Risk/Opportunity, we recommend re-looking at the packaging strategy for the switchyard equipment items in PD 0505 (circuit breakers, disconnects, voltage transformers, insulators etc) and offer different approaches depending on Nalcor’s decisions around how to contract for the AC substations as a whole.

V. Strategic Risk Insights

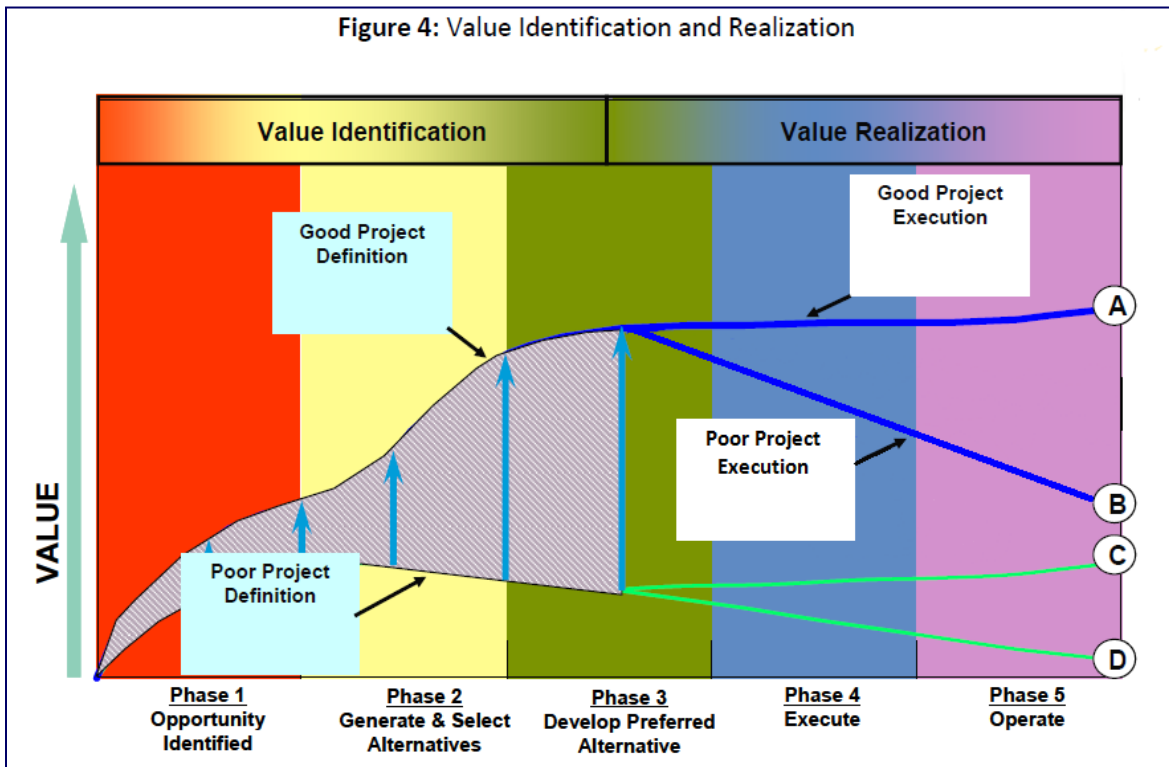
The strategic risk insights below include the identification of potential risks/opportunities for the project as a whole and/or relating to certain bid packages and of potential risk resolution approaches.

A core principle that informed Nalcor’s Overarching Contracting Strategy and continues to inform its execution approach is a desire to balance absolute cost against cost predictability. Structured and regular checks on key decisions (via the Gateway Process) are one example of how Nalcor is focused on

improving project and cost predictability. In Figure 4 of the Overarching Contracting Strategy entitled “Value Identification and Realization” and copied below, Nalcor asserts that spending significant time and effort during the value identification phase on identifying value enhancing opportunities to be implemented during the value realization phase can have a bigger relative impact on value realization (including cost predictability) than can good project execution during the value realization phase.



PowerAdvocate agrees with the concept that the upfront work has significant value and is critical to project success. However, based on our Transmission project experiences, it is our view that Figure 4 understates the potential loss of value that poor project execution can have during the value realization phase. With respect to Transmission line projects in particular, there are many unique execution challenges driven mainly by the fact that the “project site” expands across hundreds of kilometers and often impacts hundreds or thousands of landowners. This reality impacts, for example, the project delivery model by requiring the owner to execute multiple “in parallel” activities (e.g., permitting, site finalization and acquisition, engineering, and long lead time procurement) prior to the construction phase. It also requires a different way of executing construction and construction management activities during the value realization phase as managing workforces spread over hundreds of kilometers is different from the norm for more typical construction projects executed on one site within a fenced-in area (such as Nalcor’s hydro project). Given that much of the project extends mainly over Crown Land (and progress has been made with respect to ensuring access rights to other parcels), Nalcor is better positioned than most other owners with respect to right of way acquisition, access and landowner issues; however the construction and construction management challenges associated with these long distance projects remain. As such and as shown in the modified Figure 4 set forth below, PowerAdvocate believes that point B in Figure 4 should appear closer to point C in Figure 4.



In the end, obtaining point A is the ultimate objective under either Figure 4. Many of the strategic insights that follow focus on project execution risks that we think are important to resolve in part during the value identification phase and in part during the value realization phase to ensure that Nalcor achieves point A in either Figure 4.

Risk/Opportunity 1:

Cost Variability risk may be understated because deficient performance by any of several suppliers/contractors can negatively impact the construction contractors.

Description

In a few instances in the Overarching Contracting Strategy, we believe the risk of cost variability may be understated.

First, Nalcor asserts that lump sum contract amounts are subject to variation “only for changes in scope or for changed conditions which occur, or become evident, after contract award.” One could interpret the quoted phrase narrowly to mean that only (a) purposeful decisions by Nalcor to change the scope (e.g., changes to a specification or to the route) or (b) changes to site conditions or permit/approval conditions can result in a change in the lump sum price. In our view, this narrow interpretation understates the risk that lump sum contract amounts will be subject to variation. In our experience several other occurrences or impacts can result in a supplier or contractor’s seeking a change order that increases its lump sum price. Of particular importance, deficient performance, defective materials, and/or delays by one or more suppliers/contractors can materially impact the cost and timely performance of the construction contractors. The deficient

suppliers/contractors are rarely liable for the downstream impacts of their failures to perform; rather the Owner usually retains this risk.

As an example, if pieces of lattice tower are delivered to the construction contractor in the field and the construction contractor is responsible for assembly, the cost impact on the construction contractor of missing pieces or misaligned bolt holes can be enormous. The impacts include the loss in productivity and the increased cost that results from trying unsuccessfully to assemble the towers and from having to work with the owner and/or the tower supplier to fix the problem. It may cause a change in the planned order of activities and require the physical relocation of the construction labor force.

A second example involves delayed or restricted right of way access (whether due to permitting restrictions, landowner issues or right of way clearing delays) that prevents the construction contractor from moving its workforce efficiently from one part of the route to a contiguous part of the route. We have seen many projects that have had right of way/site access issues that have caused the construction contractor to relocate its workforce to other areas of the project route and then to circle back and complete the work later once the access restriction is eliminated.

Second, in section 9.8 of the Overarching Contracting Strategy, Nalcor states that “[t]he remaining cost exposure for lenders at [Financial Close], from greatest to least, will be [m]arket driven exposure, [q]uantity driven exposure and [t]ime driven exposure.” In our view “execution driven exposure” relating to the impact on the transmission line construction contractors of deficient or delayed performance by another supplier or contractor (or of route access restrictions) should be included on this list and ranked first or a close second.

Finally, we note that in each package in the Packaging Dictionary, Nalcor and the EpCM contractor identify “Interface with Other Packages.” Our sense of that analysis is that the team has looked more at physical interfaces and has a mindset of managing interfaces in the “division of responsibility” context. These are important concepts, but our point in this Risk/Opportunity 1 is that “interface risk” needs to be thought of more broadly to include downstream impact risk (and particularly the downstream impact on the construction contractors).

Potential Risk/Opportunity Resolution

This risk is inherent in the “multiple contract” approach. As noted earlier, the EpCM model is a supercharged version of the “multiple contract” approach and, by engaging an EpCM contractor with primarily a construction (as opposed to engineering) mentality and focus, Nalcor has already implemented an important risk resolution step that many other owners have failed to implement. In addition, by packaging services in a manner that seeks to match contractors more closely with their core competencies, Nalcor has taken another step to mitigate the risk.

These steps set Nalcor up well to manage the risk better than other owners so long as the EpCM brings that construction focus and expertise to its role. To supplement these risk resolution steps, we would add the following:

1A. On its transmission projects, Nalcor should specifically focus on the potential impacts of deficient performance by suppliers or other contractors on the costs and schedule of the transmission line construction contractors as the construction contractors’ costs typically represent 50% to 60% of the overall transmission project cost. In making key execution decisions and/or in its periodic risk assessment meetings, Nalcor (and its EpCM contractor) should repeatedly and regularly ask the question: “will taking this action or making a specific

investment materially reduce the likelihood of any delays in, or impacts to, the orderly (including geographically sequential) and timely performance of the transmission line construction contractors?” The cost-benefit analysis of any such action or investment should give significant weight to the benefit of avoiding any cost or schedule impacts on these construction contractors. We note Nalcor’s focus on FEED and, while we do not disagree with the value of FEED, we have seen examples of Transmission project owners over-investing in engineering and design activities and under-investing in activities that are more focused on reducing impacts on the construction contractors. This often happens with owners that are used to executing generation projects and use the same approaches and methodologies to execute a Transmission project.

1B. If possible, finalizing the route selection and obtaining 100% of the rights of way, siting the tower locations, siting the materials yards, and defining any access road needs and requirements (see Risk/Opportunity 8) prior to construction will increase the confidence in the fixed price nature of the construction bid price and will reduce the number of events that could cause the construction contractor to alter its construction plans during execution.

1C. Other strategic insights represent examples of this risk in action and provide potential risk mitigation strategies. In particular, refer to Risk/Opportunity 3 and Risk/Opportunity 4 which focus on the importance of materials management and on the quality of lattice tower suppliers on the construction contractor’s work.

1D. Ask the EpCM contractor to identify other similar examples of construction contractors being delayed or hampered by the deficient performance of other suppliers/contractors from its past project experiences and to describe how it would propose to resolve the risk. It has been surprising to us how very experienced Program Managers on major transmission projects have encountered the steel tower risks identified in Risk/Opportunity 4 but have failed to bring that insight and appropriate risk mitigation approaches to its next project. We are not suggesting that is the case with Nalcor’s EpCM contractor (and, indeed, we would suggest that the risk is greater when the Program Manager is primarily an engineering firm with an engineering mindset as opposed to one that has primarily construction expertise and a construction mindset as we would expect from Nalcor’s EpCM contractor); rather, to the extent it has not specifically asked this question already, we are suggesting that Nalcor proactively seek the input from the EpCM contractor on where it has previously seen construction contractors negatively impacted by deficient performance of another supplier/contractor. Does it share concerns around lattice tower and materials management? Are there other deficiencies or delays that have delayed or modified the construction contractor’s work plan in your prior experience?

1E. Finally, we would recommend that Nalcor add to the project estimate relating to the cost of transmission line construction a reasonable contingency above the contracted-for, lump sum pricing to address the risk that other suppliers/contractors will impact the construction contractors (i.e., give “changes in scope” a broader interpretation than that first described above in this Risk/Opportunity 1).

Risk/Opportunity 2:

Escalation can have a material impact on project costs and escalation provisions can and should be actively managed.

Description

Both cost variability and absolute cost are likely to be impacted by the volatility in commodities/metals pricing. Nalcor states on page 44 of the Overarching Contracting Strategy that there should be a limited number of contracts that will have escalation provisions – mainly contracts for long-term material supply or permanent equipment. In addition, Program Manager contracts typically allow annual escalation to the mutually agreed hourly rates (see Risk/Opportunity 6 for a brief discussion on managing the EpCM contractor's costs and escalation).

On other transmission projects, we have commonly seen escalation provisions in steel tower, steel pole, conductor and transformer contracts – especially if there is any delay between when the contract is executed and when the order(s) is/are ultimately placed under that contract. Escalation provisions can become very important if a project is delayed (not an uncommon occurrence on major transmission projects) and orders are delayed or suspended. Project estimates that are made prior to bidding for these materials are subjected to escalation risk (although, in Nalcor's case, this risk has been mitigated by Nalcor's factoring in escalation forecasts available in the market in developing its estimates).

We will focus our thoughts on three metals that have the greatest impact on transmission projects: steel, copper and aluminum.

Steel. Steel is used extensively in transmission projects for structural steel, towers and poles, construction equipment, and electrical equipment. The cost of steel typically comprises approximately 6% of total transmission project costs and more than 11.5% of total converter station costs. As a result, an unexpected increase in the price of steel could add millions of dollars to the estimated cost of a transmission project. Steel prices have experienced significant volatility over the past five years as a result of demand from the developing world and increased steel production from China. Steel prices have jumped by as much as 66% in a single year due to rapid changes in global demand. After peaking in 2008, however, steel prices lowered slowly and have flattened over the past few quarters and have become less volatile than copper prices (see below).

The outlook for the U.S. steel industry remains positive, albeit weak overall, as a result of easing measures in the industrial credit markets and the fact that job growth has remained strong enough to support the U.S. economic recovery. However, domestic steel producers will not be able to improve output and pricing without long-term funding for transportation and infrastructure. In addition, U.S. steel producers will continue to face tight margins as raw materials costs are likely to remain at record high levels through the end of 2012. Slowing growth in China coupled with record Chinese steel output remains the greatest risk to global steel prices. The Chinese government has revised its target growth rate for 2012 down to 7.5%, which, if realized, would be China's lowest growth rate in more than two decades. China's softening growth places greater pressure on other nations to compensate for China's insatiable demand for raw materials and steel products. At the same time, China is rapidly expanding steel production to record levels, which has driven up the cost of iron ore and will ensure that the steel market remains oversupplied in the near-term. The combination of falling demand and increasing supply will help to moderate

increases in steel prices.

Due to the tepid economic recovery in North America and slowing growth in China, steel prices are only expected to increase modestly over the next few years. PowerAdvocate expects that steel prices will increase at a compound annual growth rate of 3.72% over the next two years and 4.08% over the next five years as the modest economic recovery in North America offsets downward pressure from the oversupplied steel market. Therefore, while steel has experienced tremendous volatility within the past five years and that volatility justifies an owner paying close attention to ongoing conditions, that volatility is not expected to continue in the near future insofar as steel is concerned.

Copper. Copper is a key nonferrous metal that is used in transmission lines and electrical equipment for substations and converter stations. Copper comprises approximately 23% of total substation costs, 8% of total converter station costs, and 2.2% of total transmission project costs. Copper is the bellwether of the metals market and is highly influenced by changes in the equity markets and global economy. After increasing by more than 220% from 2004 to 2008, copper prices plunged by 67% immediately following the 2008 Financial Crisis. In 2011, the combined impact of the European debt crisis, slowing growth in China, and the tenuous economic recovery in the U.S. roiled the commodity markets and sent copper prices into a second tailspin. Improved economic indicators from the U.S. and recovering manufacturing demand has helped to support an uneven recovery in copper prices.

After the 2008 Financial Crisis, several traditional avenues for investment disappeared and many banks and hedge funds shifted their capital to the commodities sector. As a result, base metals of late have increasingly responded to equity markets rather than to the physical market. Equity markets tend to be more volatile than traditional commodity markets and react more quickly and sharply to macroeconomic events. Since mid-2011, movements in the equity markets in reaction to Europe's sovereign debt crisis, U.S. debt downgrade, and contracting Chinese growth have led to falling base metal prices.

Copper continues to show significant volatility in the face of conflicting market results. Chinese demand is the primary determinant of base metal prices, and over the near-term, a contraction in manufacturing demand, high copper inventories, and a significant drop in capital spending in China will create a natural cap on base metal pricing. Bullish macroeconomic indicators from the U.S., the second-largest copper consumer, and the news that manufacturing in the U.S. expanded at a faster pace than expected in 1Q2012 helped to drive copper demand and support higher copper prices.

PowerAdvocate expects that copper prices will be more volatile than steel prices over the next few years with forecasted increases at a compound annual growth rate of 4.26% over the next two years as Chinese growth stabilizes and 9.68% over the next five years as the return to growth in China and the U.S. starting around 2014.

Aluminum. Aluminum is the largest driver of transmission conductor costs. For conductor on a 125 mile, 345 kV transmission line project, aluminum comprises 34.9% of the total conductor costs. As a result, transmission conductor prices are strongly influenced by movements in the price of aluminum.

Aluminum prices have historically been extremely volatile as a result of demand from the developing world and increased aluminum production from China. Aluminum prices increased by 86.3% from 2004 to 2008 due to rapid changes in global aluminum demand and financing deals

that have kept supply artificially tight. In 2008, aluminum prices fell by 54.6% immediately following the financial crisis and have rebounded slowly as the tepid economic recovery in North America and slowing growth in China weigh on prices.

Aluminum prices remain below the marginal cost of production of many aluminum producers, which has increased pressure on producers' margins and forced shutdowns in smelters in Europe, Canada, the United States, India, and China. However, the majority of producers that are currently operating at a loss have not shut down enough capacity to reduce the chronic oversupply of aluminum and bring balance to the market. In fact, Chinalco, the aluminum corporation of China, has increased production in order to profit from production cutbacks in the U.S. and Europe and to avoid the high cost of shutting down and restarting smelters. As a result, prices are likely to remain relatively flat in the near-term as bullish demand for aluminum helps to counteract downward pressure on pricing from the oversupplied market.

China currently consumes approximately 40% of global aluminum and its demand for aluminum is expected to grow at an estimated 8-10% per year for the next five years, which will drive a rebound in aluminum prices over the long-term as China returns to growth. PowerAdvocate expects that aluminum prices will increase at a compound annual growth rate of 2.71% over the next two years as Chinese growth stabilizes and 5.91% over the next five years as China and the U.S. return to growth.

Potential Risk/Opportunity Resolution

2A. Nalcor should assess the proposed indices closely and not just accept any index proposed by the suppliers. There are many different indices that may be proposed for use in tracking the escalation (and de-escalation) of each of steel, copper and aluminum as part of an escalation provision. The specific indices matter as some are much more volatile than others despite covering the same metal. During the RFP evaluation and negotiation process, Nalcor should assess the history of the proposed indices and determine if a different index and/or combination of indices may better suit Nalcor's objectives. The commodity comparison tool in Cost Intelligence can help Nalcor evaluate which indices are most favorable for an index-based contract.

2B. Likewise, Nalcor should pay close attention to the proposed escalation formula to ensure that the percentage of cost subject to escalation is commensurate with the percentage of item cost represented by the metal in question. In particular, we have seen escalation provisions that escalate 100% of the cost of the item even though certain costs (e.g. overhead and profit) should seemingly be fixed. In addition, Nalcor should look for reasonable opportunities to reduce exposure to copper in the mutually agreed formula given the expected volatility.

2C. In support of 2B, in the relevant RFPs, ask suppliers to provide the materials cost breakdown for the equipment items they are supplying.

2D. Beware of "home made" supplier indices. Prioritize use of publicly available and reputable indices.

2E. Track and confirm escalation versus contract formula as part of invoice confirmation process. The contract model feature in Cost Intelligence can help Nalcor model out the final price of its index-based contract.

2F. Negotiate for escalation adjustments that occur no more often than an annual basis. Consider negotiating for upper limits on the annual allowed escalation.

2G. Given expected increases in copper three to five years out, look at procurement schedule for electrical equipment that is sensitive to copper prices (e.g., optical ground wire, transformers, capacitors, and surge arresters) and look for opportunities to go to market as early as possible and, if possible, to fix price those contracts prior to any such increases.

Risk/Opportunity 3:

An effective materials management strategy/approach is critical to reducing the risk that defective, delayed, damaged or lost materials will negatively impact the performance of the construction contractors.

Description

One of the largest potential cost variability risks arises out of any delays in performance by, or negative impacts on the productivity of, the construction contractor as a result of defective, delayed, damaged or lost materials. The materials management plan presents a significant opportunity to resolve this risk.

We are unsure of the full breadth of the EpCM contractor's materials management scope, including whether the EpCM contractor has responsibility for acquiring and/or operating the marshalling yards (development of the materials management plan is clearly within its scope) and some of the risk resolution concepts set forth below may be impacted by commitments that may already have been made to the EpCM contractor. As we understand it, the current materials management strategy includes the following elements:

- Nalcor will require all Transmission materials suppliers to deliver materials to one of two marshalling yards to be built for the project (whereas materials relating to hydro site/substation materials are to the Lower Churchill site).
- The Project Execution Plan states that the estimate assumes "just in time" delivery, but it is not clear to us if that is the actual execution plan.
- The materials will be free issued to contractors from the yards.
- Nalcor will be responsible for safeguarding equipment and materials at the yards up until the point of free issued to the contractors. Nalcor is considering whether to engage a freight forwarder to operate the yards.
- The EpCM contractor is currently developing a materials management plan.
- Freight forwarding, inspection, expediting, logistics/customs clearing and other such specialty services that impact the quality and timeliness of materials delivery will be performed by various specialty contractors.
- The project will engage local and global suppliers.
- Section 12.5 of the Project Execution Plan indicates that quality is a shared responsibility among all project participants.

Potential Risk/Opportunity Resolution

3A. If actual materials management responsibility (as opposed to management of those with the responsibility) has not yet been committed to the EpCM contractor, consider going to market for the materials yard management services for the transmission projects, including as a base scope locating and acquiring, managing, and providing security at the marshalling yards; tracking materials in the warehouses and free issued to contractors (e.g., RFI/bar coding technology).

3B. In addition, consider allowing those bidders to propose as an alternative a broader materials management scope that includes QA/QC inspection at suppliers' sites during fabrication (especially for towers), expediting, logistics, and customs clearing. The current packaging strategy breaks these services within the broader scope into separate packages for specialty providers. Engaging a materials management contractor for this broader scope is not the typical approach on major transmission line projects; however, based on our interaction with the supply market, we believe that by allowing suppliers to propose both the base scope and an alternative scope, Nalcor may obtain a solution with more significant risk sharing components (see 3C).

3C. While many of the suppliers of materials management services will minimize their risk profile by limiting their liability to physical damage caused by their negligence while materials are in their possession; in our experience, others have offered to take on larger risk associated with the downstream construction cost impacts resulting from any defective, delayed or damaged materials. The RFP for this package should ask specific questions around the risk profile that a supplier is willing to take on. For example, Nalcor might ask the suppliers "Are you willing to take any risk relating to cost and delay impacts on the construction contractors resulting from defective, delayed or damaged equipment being delivered to the construction contractors in the field? If so, please describe the risk profile you would assume, specify any proposed limitations on the risk, and identify any scope or other conditions to your accepting this risk." In addition, the RFP would ask about prior experience in these areas (and, in particular, the breadth of the services scope), the value proposition resulting from reduced losses etc., and any preferred bar coding or other technology solutions.

3D. If not already done, consider identifying and securing the materials yards (or securing an option to acquire the materials yards) as soon as possible after finalization of the route so that materials suppliers and construction contractors know the exact locations for materials delivery and pick up prior to bidding for their respective scopes of work.

3E. For all the reasons highlighted in Risk/Opportunity 1, eliminate from the project plans the concept of "just in time" delivery of materials. Ensure that there is schedule cushion between the scheduled delivery date and the construction contractor need date. Note that attention must be paid to any warranty impact of early delivery and storage at the materials yards.

Risk/Opportunity 4:

Investing in rigorous QA/QC (beyond industry norms) during fabrication of lattice towers can save time and money during construction.

Description

One risk that has surfaced on multiple Transmission projects relates to the quality and/or timeliness of lattice towers. The risk has arisen most often due to one or a combination of a rigid specification by owners (limiting the size of the pool of qualified steel suppliers for the tower manufacturers to use), limited capacity of supplier to self perform certain key elements of fabrication (galvanizing and plate fabrication), insufficient (in our view) QA/QC during fabrication (random sample testing of bolt hole alignment), and post-installation cracks. Many of the qualified tower suppliers are global suppliers with manufacturing facilities far away from the project.

Potential Risk/Opportunity Resolution

Below are several potential approaches to resolving this risk based on our project experiences. As noted in Risk/Opportunity 1, the main reason to invest behind these enhanced QA/QC concepts would be to mitigate the risk that the construction contractors are delayed or impacted in the field.

4A. In the RFP for steel towers, ask detailed questions around the QA/QC process used by the supplier to ensure that bolt holes are aligned – in particular, ask what percentage of the bolt holes are checked for alignment prior to the shipping of the tower pieces. We assume the answer will be well below 100% (more likely in the 10-25% range). Ask the suppliers to provide the price impact of requiring 100% testing of every bolt hole. In that way, Nalcor will be able to perform a more effective cost-benefit analysis of requiring 100% testing (with the benefit tied to avoided construction costs and delays in the field).

4B. Also ask questions in the RFP about any prior experience with cracked steel and for commercial input as to the supplier's responsibility for the cost to remove and re-install a tower in case of a defect (see "in and out" cost risk discussed in Risk/Opportunity 7). Obviously reference checks can help as well in this regard.

4C. Another QA/QC measure would be to have a QA/QC representative and an expeditor performing inspections and expediting on site throughout the fabrication and testing process.

4D. Consider carefully (with input from the EpCM contractor) the pre-shipping testing regimen for towers. In some projects, owners have required that all families of towers be tested.

4E. If the supplier is an international supplier, consider logistics and customs clearing test run with an initial container. Note that a single party responsible for materials management would handle all aspects of logistics, customs clearing, unloading from ships and loading on trucks or rail – if there are multiple parties involved, the hand-offs will need to be well defined and closely managed.

4F. Canadian tower suppliers may be desirable from a logistics standpoint. While there are qualified Canadian tower manufacturers, there are also global sources that are potentially lower cost (to be determined in RFP). Other projects using international suppliers (including India) have succeeded, so proximity is not a necessity; however, it can be one risk resolution action for

consideration during the evaluation process.

4G. Co-location or other similarly close interaction with the tower supplier during the final design phase can reduce any scope uncertainties and confirm quality expectations.

Risk/Opportunity 5:

Nalcor can take steps to gain better transparency into fairness of Unit Prices.

Description

In many of PowerAdvocate's transmission engagements, key stakeholders have expressed a desire to use a unit price contracting approach for their transmission construction projects. They often look at the distribution group and want what they have, but given the highly variable nature of transmission projects (compared to the more consistent and repeatable distribution projects), they often hesitate and continue forward executing projects using familiar approaches.

Transmission construction projects are commonly executed using a multiple contract approach with both cost reimbursable and lump sum pricing depending on the scope. When an owner has the ability to perform sufficient front end engineering and design (FEED) and has overcome most of the significant scope risks such as regulatory, environmental and ROW acquisition, the owner will often obtain a lump sum price for the construction scope. With this approach the owner can pass some risk to the construction contractor and reduce burden on internal resources. As long as the proposed price is within budget, the owner is typically satisfied with the result. When scope is not as firm and significant risks have not been overcome up front, a cost reimbursable pricing approach is typically used. This approach is straightforward and familiar to both Owners and contractors alike. When properly managed by the owner or an agent of the owner, this approach can be extremely effective and can reduce overall cost because the contractor may lower its risk premium. However, if not properly managed by the owner with sufficient resources to perform the required oversight, the end result from both a cost and prudence perspective is not usually desirable.

The primary reasons why most owners building Transmission projects do not utilize a unit price approach are:

- Many unique factors affect the cost of transmission construction on each project, including geography, access, weather, environmental factors, land owners, and type of infrastructure;
- Owners find it difficult to adequately define or quantify the units; and
- Given the nature of historical data, owners cannot properly evaluate unit prices.

The reason in the first bullet above almost always applies to owners with large geographical service territories, but can also cause concerns for mega projects. The larger the number of variables, the more complicated it is to develop and manage a unit price contract. While we see many references throughout the Packaging Dictionary to unit pricing, it is unclear to PowerAdvocate where the process stands in terms of defining the units associated with this work. PowerAdvocate understands that significant effort has gone into the determination of quantities (units) for unit based scopes of work for the LCP, and agrees this is integral in obtaining cost certainty. However, in PowerAdvocate's experience, the determination of quantities is only one of

several important steps needed to properly develop and manage a unit price contract.

In addition, one of the biggest challenges that Owners face with the use of unit pricing is determining whether the unit prices proposed by bidders represent fair market prices. While it is easy to compare across the bidders to determine which bidder has provided the best price, it is often difficult to understand whether or not even the low bid made on a unit price basis is a reasonable price. PowerAdvocate believes an understanding of what reasonable prices are for all the given units is a key component of any successful unit based contracting strategy.

Potential Risk/Opportunity Resolution

PowerAdvocate would like to offer several insights related to the development of unit price contracting approach to mitigate associated risks which hopefully will supplement and/or complement the input from Nalcor's EpCM contractor.

5A. In the development of the technical specification, it is extremely important to define upfront all terms related to the work. Efforts should be made to reduce any and all ambiguity throughout the specification. Nalcor should ensure that all particulars associated with each unit are identified properly (e.g., assuming a unit rate of \$/m for stringing conductor, does that rate include the time required to access the site?) and that a single term is consistently used to denote the same type of work through all relevant documents (e.g., foundations vs. footings).

5B. How the denominator of each unit (e.g., \$/m or \$/kg) is selected should be given due consideration. Nalcor must decide (with help from the EpCM contractor) what is best given the project specifics. To provide a simplified example, if all insulators on a line are the same then \$/ea may make sense, but if type/size vary along line, another denominator would need to be selected.

5C. Although much work has gone into the determination of the quantities, it remains critical to ensure that qualified Nalcor/EpCM personnel remain on site during the work to record the actual inventory performed, most importantly for unit work that can vary depending on actual conditions (such as footing installation which may vary based on soil conditions). This type of project control techniques and processes will in part reduce the level of effort associated with post work field inspections, allowing inspectors to focus more on the quality of construction.

5D. A central component of a unit price contract is the Contractor must be permitted to retain control of its work and operations. Nalcor/EpCM contractor should ensure these divisions of responsibility are clear and accept that they are solely responsible for managing the process and evaluating the results not managing the day to day operations of line contractor.

5E. With respect to the issue of obtaining comfort and confidence that the proposed unit rates are fair and reasonable PowerAdvocate offers the following insights:

- There are a number of ways an Owner can achieve this. That said, given the schedule requirements of the project the number of ways to resolve the risk is somewhat limited.
- One method, that can still be leveraged, includes requesting bidders to submit the underlying cost data or the buildup of their proposed unit rates. While some bidders may push back, PowerAdvocate has seen Owners successfully solicit this data.
- With underlying costs in hand Nalcor with the help of its EpCM contractor and its experience with similar projects can better evaluate if the proposed unit rate is a reasonable cost.
- Nalcor should ensure that properly qualified personnel with the appropriate construction

experience are included throughout the evaluation.

- Typical questions to consider include, has the bidder included the right number and proper mix of craft personnel?; is the equipment and level of supervision commensurate to activity in question?; and does the estimate time seem reasonable?

Risk/Opportunity 6:

Nalcor should negotiate a risk sharing/performance incentive program with the EpCM contractor and take other reasonable actions to ensure appropriate oversight of the EpCM contract.

Description

In our experience, Program Managers under Approach 7 have brought important expertise and skills to managing projects, but have traditionally taken very minimal commercial risk tied to project success. The Program Managers tend to be risk adverse by nature and argue that they do not have direct contracts with the various suppliers/contractors so they do not directly control the actions of those parties. Some Program Managers assert that focusing on KPIs will reduce the team-based, owner-aligned approach to execution. Similarly, in our meeting with Nalcor a couple of months back, Nalcor expressed concern that performance-based contracts with the EpCM contractor would not work because it would cause the EpCM contractor to lose big picture focus and instead focus on the next milestone/guarantee.

We believe that a risk sharing/performance incentive program with broad project success metrics and a reasonable risk reward profile can be established with the EpCM contractor in a manner that keeps Nalcor and the EpCM contractor's focus aligned. The EpCM contractor has so many "R"s next to its name in Appendix A to the Project Execution Plan that it does exert significant control over project success. In addition, the EpCM contractor has the opportunity to earn significant profit on this project and it seems reasonable to require that project achieve "success" before full payment is made to the EpCM contractor for its services. In addition, it seems reasonable to offer upside to the EpCM contractor if the project meets or exceeds certain stretch targets. Finally, aligning Program Manager incentives around broad project success metrics (such as overall project cost and schedule) satisfies one of the key lender concerns outlined on page 34 of the Overarching Contracting Strategy.

While not the norm on Transmission projects, there have been instances in which Program Managers and owners have implemented a risk sharing program. In one example, the Program Manager guaranteed (on virtually an excuse-free basis) that the project would be energized by X date. The Program Manager recognized its central role in driving project execution, believed that "putting skin in the game" demonstrated its "alliance based" commitment to project success, and determined that the risk-reward profile for the project as a whole justified putting a portion of its fee at risk.

Potential Risk/Opportunity Resolution

6A. As permitted under the EpCM contract (Exhibit 4) and prior to the commencement of the execution phase (Phase 4), negotiate a risk sharing/performance incentive program with the EpCM contractor that penalizes (through fee at risk) the EpCM contractor based on the project's failing to meet a limited set of metrics that would define "project success" and rewards the EpCM contractor (with bonuses) if the project achieves certain stretch goals.

6B. For purposes of the risk sharing/performance incentive program, we recommend the use of a more limited number of broad "project success" metrics (as opposed to monthly deliverable due dates and other narrower performance metrics such as many of the risks tracked in the monthly performance management plan described in section 13 of the Project Execution Plan) to improve likelihood of alignment between Nalcor and EpCM on the bigger picture project success definition. These metrics (and the associated target and stretch target) might include

- actual project cost meeting or beating the budgeted target price (as a whole or perhaps for just the construction scopes);
- the Transmission lines being energized by a guaranteed completion date (with no excuses other than permit restrictions, change in law or similar governmental interference) – consider establishing a couple of key project dates that a set of key project contractors are all required to put money at risk against on a "no excuse" basis;
- certain key project risks identified in the Risk Register (or elsewhere in this assessment) being well managed - such as limiting the number of change orders requested by the construction contractors.

Also consider the use of a more subjective "team focus" or "going above and beyond" metric – some contractors argue that subjective metrics are not fair and leave too much discretion with the owner, but others see it as an opportunity and are confident in their ability to be customer-focused and to execute in a way that will please the owner.

6C. Require the EpCM contractor to put a portion of its profit at risk if it fails to achieve the target for the various metrics and award the EpCM contractor through bonuses for meeting or exceeding stretch targets for the metrics.

6D. Beyond the risk sharing/performance incentive plan, we would highlight the following actions for your consideration in managing the EpCM contract:

- If not already completed and/or planned, the determination of the estimated hours for Phase 4 (against which a dollar amount is multiplied to determine the fixed fee for that Phase) should be determined based on a detailed review process that looks closely at the EpCM contractor's scope expectations, the division of responsibilities among the various project participants, and the resource requirements to satisfy those obligations. In our experience, "open book" reviews with Program Managers have proven extremely helpful in defining scope, controlling cost, and ensuring that the right resources are on the team to perform the required scope.
- As part of that detailed review, obtain a project organization chart that defines for each position the scope expectations and the expected "level" of the person filling the role (what level of expertise is needed to perform the specific role?). In this way, Nalcor can manage both under-qualification and over-qualification risks.
- Define the qualifications required for a person to be considered within each level (or grade).

- Ensure that all personnel provided or proposed by the EpCM contractor have the qualifications defined for the level of the position they are filling. In other projects, we have seen construction management roles filled by people that look like engineers (we would not expect this to occur with Nalcor's EpCM contractor given its construction expertise).
- Consider whether internal promotions and salary increases awarded by the EpCM contractor during the life of the project should justify a change in the salary charged to Nalcor. Any limits?
- Consider an annual cap to salary increases (not to exceed increases based on a mutually agreed escalation model).

We understand the need to develop team harmony and believe that this recommendation can be professionally implemented if both parties agree that a shared approach to risk/success is good for the team. We have seen many examples of poorly managed cost reimbursable, Program Manager contracts and we believe that avoiding that circumstance can improve overall project harmony and help ensure that the right resources are filling the right positions on the team.

Risk/Opportunity 7:

Gaps in commercial terms often leave the owner responsible for unanticipated costs – e.g., warranty provisions.

Description

Page 48 of the Project Execution Plan states that “Suppliers will be held fully responsible for the technical compliance and performance of equipment/systems provided in addition to competency and performance of Suppliers personnel. The provision of quality materials, equipment and workmanship, as well as meeting schedule or delivery commitments will be achieved by including (and, if necessary, exercising) holdbacks, performance securities (performance bonds Letter of Credit (LOC) and/or parent company guarantee) and incentives/disincentives in the Supplier contracts.” Building on the insights delivered under Risk/Opportunities 1, 3 and 4, we believe the term “fully responsible” may be overstated.

Under the multiple contract approach, the ultimate risk of gaps in coverage in commercial provisions under various contracts is most often left with the owner. One particular example involves warranties. First, supplier or contractor warranties may be conditioned upon certain requirements being met by the owner or by other suppliers. For example, a materials warranty may be conditioned upon certain maintenance or operational conditions/requirements being satisfied during operations. Second, remedies for a breach of warranty may include repair or replacement, but may exclude the cost of transporting the defective materials back to the place of fabrication and may exclude responsibility for “in and out” costs – for example, the labor costs required to remove (and then transport) a tower that was installed before the defect became evident. “In and out” costs are traditionally a bigger issue on a generation project where it is very difficult to predict the potential cost because the defective equipment may very difficult to access once installed depending on the specifics of the plant layout. In the Transmission context, the issue is less the unpredictability of the potential amount of the “in and out” costs associated with the difficulty of access, but is instead more the responsibility for the “in and out” costs given the multiple parties involved in the fabrication, delivery and installation of the equipment.

Potential Risk/Opportunity Resolution

7A. Expressly pass “in and out” costs (in particular, any costs of the construction contractor to remove defective equipment) along to the suppliers of the defective materials.

7B. Identify and track any warranty conditions in all contracts; ensure that satisfying warranty conditions is within a specific project participant’s (another supplier or otherwise) scope of work or responsibility. A similar effort should be undertaken around any performance guarantees and associated conditions (this will impact the hydro project in particular).

7C. If Nalcor is able to engage a materials management contractor willing to take risk around defective or delayed materials in the manner suggested to be possible in Risk/Opportunity 3, that approach would help with this risk as well.

7D. Ensure an adequate level of spares are on site with potential excess for any higher risk materials and/or for materials that would require significant time to replace. Based on our review of the Packaging Dictionary, Nalcor will have spares of key materials and our recommendation is to confirm the number/level of spares based not only on the expected failure rates over time, but also on the potential impact during the construction period of any failures.

Risk/Opportunity 8:

Access Roads can have a material (and often unanticipated) impact on absolute cost of the project.

Description

Given the number of access roads required for the project, and depending on the post-construction repair or replacement obligations, access roads can have an outsized and often unanticipated impact on total project cost.

The overall project has significant access road requirements. Several packages including CH 0004 (described below), CH0006, CH0023 and CH0024 include the construction of access roads. Package SH0021 provides for the maintenance and upkeep of the Southside Access Road and various other roads that will likely see regular traffic.

Nalcor has provided detailed information in the packages for certain critical roads (in particular the roads nearer to the hydro project site). For example, in Package No. CH0004 Nalcor provides specific site, schedule, environmental and safety conditions related to the Southside Access Road whose length is approximately 22 km. The two packages associated with the Reservoir Clearing of the North and South Bank have very long access roads (64.8 km and 93.0 km) and also contain detailed scope information similar to CH004.

There is not as much detail associated with the access roads needed for the transmission line construction. Package CT0341 – Clearing of Right-of-Way for 315 kV HVac Transmission Line (MF to CF), Package CT0343 - Clearing of Right-of-Way for HVdc Transmission Line – Section 1, and Package CT0345 - Clearing of Right-of-Way for HVdc Transmission Line – Section 2 include the following scopes:

- Preparation and construction of the Contractor’s own access roads, corduroy roads, stream crossings, etc., as per the requirements of the Owner supplied permits;

- Supply and installation of temporary bridges, culverts, etc. that are necessary for right-of-way (ROW) clearing purposes, as per the requirements of the Owner supplied permits

Package CT0319 – Construction of 315 kV HVac Transmission Line (MF to CF), Package CT0327 - Construction of 350 kV HVdc Transmission Line – Section 1, and Package CT0346 Construction of 350 kV HVdc Transmission Line – Section 2 include the following scopes:

- Enhancement of access previously created by the clearing contractor, as required for lines construction, as per the requirements of the Owner supplied permits;
- Supply and installation of temporary bridges, culverts, etc. that are necessary for construction purposes, as per the requirements of the owner supplied permits

While PowerAdvocate assumes that some of the documents referenced in the specific environmental provisions will dictate procedures for executing the work, due to the lack of definition around the approximate lengths of the temporary access roads and limited scope detail in the package dictionary, it appears that the scope may not be fully developed at this time.

Potential Risk/Opportunity Resolution

8A. While we understand that the volume and type of traffic on the temporary access roads needed to perform ROW clearing the construction of the transmission lines are different than the many of the critical roads associated with the hydro site, nonetheless we recommend that a commensurate level of scope detail be included in the packages relating to the transmission line access roads.

8B. Consider giving the ROW clearing contractors full responsibility for building the access roads (i.e., they build the roads to the requirements of the Transmission line construction contractor). Transmission line construction contractors usually subcontract this scope of work as it is often not their direct expertise. We note that Package CT0342 - Construction of AC Transmission Lines – Island, bundles ROW clearing together with the transmission line construction (we assume because of the short distance of this line), so in that case this recommendation would not apply (unless the ROW scope were split out separately in a manner consistent with the other line packages).

8C. Also consider giving ROW clearing contractors the responsibility of installing all temporary bridges, culverts, etc. that will be needed for access to the route by the Transmission line construction contractors. There may be efficiencies gains in mobilizing only one resource (the ROW contractor) to get the site ready for access rather than having the transmission line contractor return later to enhance the roads. In addition, this will give Nalcor and the EpCM contractor (perhaps together with the line contractor) the chance to see/confirm that the route is fully accessible before the transmission line construction company is mobilized, thereby reducing the likelihood of delays once the transmission line construction contractors start work.

8D. Consider ways to foster greater collaboration (interfacing) between the ROW contractor and the transmission line construction contractors during pre-construction planning phase to drive optimal support for transmission line construction contractors' construction plans. We have seen this work for owners executing a program of multiple projects under which the owner has pre-selected preferred ROW clearing contractors and preferred line construction companies. On this project where the contractors are not pre-selected, consider combining the line construction package and the associated ROW clearing package under one RFP and asking bidders to propose a team approach. This will allow each line construction companies' bids to include its own ROW access plan based on its construction approach. Allow Nalcor the flexibility to contract

directly with the primary line company and the primary ROW contractor that form the bidding team in order to avoid markups. Note that a similar approach (i.e. asking line construction companies to identify member of team responsible for foundations and allowing Nalcor to contract directly if it so chooses) might be used with respect to foundations as transmission line construction contractors often subcontract out that scope.

8E. Define (and ensure estimate includes) any post-construction access road repair or replacement requirements in line with any obligations made to landowners or under applicable permits. Check estimate assumptions against these requirements, if any.

8F. As the scope is further developed and clarified, ensure no redundancy in scope and ensure responsibility is clearly defined for maintenance and emergency repair (with unit rates). For example, it is not clear to us who has the responsibility of maintaining the forest access roads throughout the execution of packages CH0023 and CH0024.

Risk/Opportunity 9:

Ensure that traditional strategic sourcing principles are not fully sacrificed in the name of other risk mitigation concepts as these principles also mitigate key risks.

Description

Traditional strategic sourcing principles include the following:

- invite as many reasonably qualified bidders to the RFP as possible to ensure price competition and to hear as many unique solutions/approaches as the market has to offer; and
- structure RFPs to allow bidders to offer alternatives – e.g., to bid on complete package or elements of package.

Larger bidding pools can result in significant cost reduction opportunities. Owners often restrict the size of bidders' pools either through a rigid EOI/qualification process in the name of managing the risk of awarding work to unqualified suppliers/contractors or in order to reduce the procurement team's workload during the evaluation process.

Nalcor's Procurement Management Plan (page 16) provides that: "Bid lists will be compiled from suppliers that submit expressions of interest and after completion of a prequalification process. Where practical and possible, two (2) quotes will be obtained for items over \$5,000 CDN but less than \$25,000 CDN. For items over \$25,000 CDN preferably two (2) formal quotes are required through a formalized competitive sealed bid process." We believe that 2 quotes is not sufficient for most services and materials if, as stated, absolute cost (balanced against cost predictability) is a key project goal. In 2009, PowerAdvocate analyzed approximately one thousand bid events that were hosted on its on-line RFX platform, Sourcing Intelligence, and found (to our amazement) that the average difference in bid price between the high and low bidder across those thousand events was 80%. Not as surprisingly, we also found that the percent difference between the high and the low bid in most cases increased with each incremental bidder that was invited to the RFP:



Number of Bidders	Percent difference from high bid
2	33%
3	57%
4	80%
5	95%
6	110%
7	122%
8	98%
9	104%

Risk/Opportunity Resolution

9A. Prioritize inviting more bidders to RFP over eliminating bidders during the qualification process. That is, only eliminate bidders during the pre-qualification process if they fail to meet minimum standards. Eliminating a bidder from contention due to concerns about financial viability and experience can still happen during the RFP evaluation process, but that decision can better be made in the context of that bidder’s price and offering.

We have seen creditworthiness requirements differ significantly from owner to owner. We would recommend a close look at LCP’s Contractor Creditworthiness Evaluation Procedure to reconfirm that the creditworthiness criteria and procedure strike the optimal balance for Nalcor’s project objectives and desired risk profile taking into account the foregoing thoughts on the importance of allowing bidders to participate.

We understand, and do not mean to underestimate, the risk mitigation that comes with ensuring that only rigorously qualified contractors and suppliers perform on the project. However, we believe a better balance is obtained by making that decision after bids are received from bidders that meet minimum requirements as determined during the EOI.

9B. Allow bidders to provide alternative approaches to Nalcor’s base scope/approach and to “sell the value” of that alternative approach. In this way, Nalcor will benefit from unique insights from the suppliers/contractors based on their past experience and Nalcor would finalize its approach only after obtaining all relevant information from the supply market. In a few cases, it appears that Nalcor contemplates exactly this approach – as do our recommendations in Risk/Opportunity 3.

9C. One other sourcing principle to consider - where possible, develop the evaluation criteria and scoring prior to RFP issuance to ensure RFP asks relevant questions to support the evaluation. We saw a reference to developing these criteria after the RFP is issued.

Risk/Opportunity 10:

Because Nalcor has chosen to implement an OCIP, there may be commercial provisions that can be modified to result in a beneficial project cost impact.

Description

Owner Controlled Insurance Programs can be very beneficial for a complex project because, among other things, they might reduce administrative burdens, the risk of subrogation claims, and the likelihood of redundant insurance costs. The OCIP allows the owner (with input from the financing parties) to select the appropriate insurance coverages and deductibles (at least insofar as loss relating to physical damage is concerned).

In our experience, however, the commercial terms in the contracts are often inconsistent with the original rationale for the OCIP and we highlight a couple of examples below. We are not insurance or legal experts and assume that Nalcor will consider these and other insurance related matters with its experts in these areas. As such, we have flagged a few common issues/uncertainties we have experienced with OCIPs, but do not make specific recommendations.

Potential Risk/Opportunity Resolution

10A. Responsibility for Deductibles. If the OCIP covers all project participants (and those project participants are not expected to purchase any additional insurances to cover the risks covered by the policies included in the OCIP), will project suppliers/contractors that cause insurable damages be expected to pay for the deductible?

If so, those suppliers/contractors will likely purchase insurance to cover the deductible risk and pass that cost onto Nalcor, thereby effectively changing the decision Nalcor made as to the acceptable deductible level/cost. If not, then it may behoove Nalcor to have a low deductible (which will of course impact the premium level).

10B. Risk of Loss. If the OCIP covers physical damage, does Nalcor have risk of loss at all times during project execution? Or, do the suppliers/contractors have risk of loss until delivery or substantial completion as under “traditional” contracts, but with their liability limited to the proceeds obtained under the OCIP?

Nalcor could see reduced supplier/contractor pricing by either retaining the risk of loss or limiting the liability of suppliers/contractors for physical damage to the proceeds of the OCIP. On the downside, Nalcor would run the risk that the insurer will reject coverage or that the proceeds of insurance will otherwise not fully cover the loss.

10C. Other Insurances. Ensure that Nalcor is clear as to what insurances are included in the OCIP (and therefore presumably the suppliers/contractors are not expected to obtain those insurances) and not included in the OCIP (and that remain an obligation for suppliers/contractors to provide - e.g., errors and omissions?)

Risk/Opportunity 11:

Substations are candidates for an EPC contracting approach. If Nalcor elects not to use an EPC approach, then there is an opportunity to package the switchyard equipment differently.

Description

It is our understanding that Nalcor desires to maximize the number of EPC, lump sum contracts. A review of Nalcor’s Overarching Contracting Strategy reveals that Nalcor has to date identified nine (9) packages to be executed on EPC, lump sum basis:

Muskrat Falls Generation

Package CH0030: Supply and Install Turbines and Generators

Package CH0031: Supply and Install Mechanical and Electrical Auxiliaries (MF)

Package CH0032, CH0033, CH0034, CH0046: Material Supply and Installation Contracts

Labrador – Island Transmission Link

Package CD0501: Supply and Install Converters and Cable Transition Compounds

Package CD0534: Supply and install Soldiers Pond Synchronous Condensers

SOBI Crossing

Package LC-SB-003: Submarine Cable Design, Supply and Installation

For most of the contract packages listed above, Nalcor has provided the following rationale for the decision to execute on an EPC, lump sum basis:

- the scope of supply is well understood with a selection of competent contractors available;
- work scope is well suited to experienced suppliers which typically execute this work on an EPC lump sum basis;
- the package can be isolated from other segments of the project for both engineering and construction work allowing scope of supply limits and interfaces to be identified and managed;
- interfaces are minimized; and
- a similar strategy has previously been successfully used on comparable projects.

While an EPC approach is generally not used to execute transmission line construction projects in part because of the “in parallel” nature of many pre-construction activities (route selection and acquisition, permitting, design, long lead time procurement) and in part because owners are used to being more directly involved in transmission project execution, PowerAdvocate has seen many examples of the EPC approach being used to execute greenfield substations. The EPC approach is appropriate for these substations because there is one fenced-in site with known site conditions and usually a scope of work that is well defined up front. Furthermore, PowerAdvocate believes that each of the reasons referenced above apply to construction of greenfield AC substations.

Various scopes relating to the AC substations are currently spread among several packages in the Package Dictionary. Package CD0502 includes items to be purchased under two separate packages:

- Package PD0537: Supply Power Transformers, AC Substations at CF, MF and SP
- Package PD0505: Supply Switchyard Equipment-AC Substations at CF, MF and SP

Package PD0537 includes four (4) autotransformers and two (3) power transformers, while Package PD0505 includes a wide variety of AC switchyard equipment ranging from termination hardware to high voltage circuit breakers. Construction of AC Substations and Synchronous Condensers Facilities includes the civil and electro-mechanical work associated with the Churchill Falls, Muskrat Falls and Soldier's Pond switchyards as well as the construction of the synchronous condenser facility at Soldier's Pond. Nalcor has stated that this strategy will help to avoid the risk of schedule delay and will help to attract large experienced contractors. It is unclear to PowerAdvocate how this strategy helps avoid the risk of schedule delay, and PowerAdvocate believes that there may be greater opportunities under different approaches to attract large experienced contractors.

Potential Risk/Opportunity Resolution

11A. Consider using the EPC approach for the two greenfield substations - Muskrat Falls 315-138-25 kV south side ac substation and Soldiers Pond 230 kV ac substation.

11B. If Nalcor uses the EPC approach for the Muskrat Falls and Soldiers Pond greenfield substations, then include in the list of invited bidders the contractors that are invited to bid on each of the converter stations also to bid for the adjacent AC substation work. Those contractors should be well positioned to offer a compelling solution given that they will already be mobilized to perform work at adjacent sites. However, do not limit the bidders list for the Greenfield substations to the same bidders list as the converter station contractors in case their solution is not overly compelling.

11C. To the extent risk is removed from the EpCM contractor by increasing the amount of work executed on an EPC basis by others, factor this into the risk-reward profile when establishing the risk sharing/performance incentive program recommended under Risk/Opportunity 6.

11D. If Nalcor elects not to use an approach for the greenfield AC substations, then revisit the strategy for Package PD0505. Consider packaging each of the switchyard materials into its own package. Package No. CD0512 Construction of Construction Power Facilities includes a significant amount of "free issued materials" supplied under nineteen (19) separate contract packages. This approach of bidding the switchyard materials in separate packages by material item is more in line with how PowerAdvocate has seen equipment sourced on other projects and increases the size of the bidder pools for each material item.

VI. Fundamental Factors of Success

Finally, in response to the point that Mr. Martin made at the end of our meeting in March in Newfoundland that, while a close attention to risk and risk mitigation is important, it is equally important not to lose sight of the higher-level "fundamental factors" that drive project success. PowerAdvocate understands that Nalcor has done a lot of thinking and received significant input on these fundamental factors to date, including recommendations around rigorous up front planning. We have developed a few of our own that may supplement and complement the prior insights given our unique perspective and supply market focus.

In our experience, the following are fundamental factors that can drive project success:

- Internal Resourcing. Ensure that internal resources are sufficient in number to manage the selected contracting approach and are capable of being “hands off” and managerial with a focus on the big picture and long-term project success.
- Managing Cost Expectations Up Front. Establish project cost expectations with the public that include sufficient contingency and allowances to manage key project risks.
- Stakeholder Communications. Be responsive promptly to requests for information and over-communicate with public and other stakeholders as to the complexities, uncertainties and volatility impacting supply markets and these massive projects – do not let stakeholders think this is easy.
- Program Manager/EpCM Contractor. Develop trust (including by openly addressing disagreements), inspire/expect creativity, and establish common expectations for excellence with Program Manager/EpCM contractor.