Long-Term Planning of Energy Corridors in Absence of SEA

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Abstract

In Canada, electrical transmission and pipeline projects are typically the subject of cumbersome and protracted project Environmental Impact Assessment (EIA) and energy utility commission reviews. This is in part due to the absence of a strategic environmental assessment (SEA) or other comprehensive planning processes. Project EIA is often conducted in isolation from other projects with little thought given to future long-term energy corridor and land use needs. This presents a significant impediment to strategic long-term planning and more importantly, investment in energy projects. The authors explore the regulatory regime in New Brunswick, Canada, where a strategic planning initiative has commenced to identify future potential energy corridor needs (>50 years) for the region. The ultimate objective is to designate energy corridors well in advance of the future need to streamline future project EIA within such designated corridors, supporting a positive investment climate for the province. The initial phase of this work employed a facilitated industry and government stakeholder workshop to identify future energy opportunities and needs, and subsequently GIS-based analysis by engineering and environmental professionals to identify candidate future corridors. The paper describes this process and comments on the next steps needed to balance the environmental, socio-political and economic impacts of restricting future land use for anticipated future public need.

Introduction

New Brunswick (NB) is a largely rural province rich in natural resources with a few towns and cities located proximal to the large energy markets of northeastern North America. Two-thirds of NB is represented by Crown Lands owned by the Province. Its location is pivotal for the wheeling of energy between emerging energy development opportunities in eastern Canada and these markets as shown in Figure 1. The government of NB is interested in developing energy infrastructure in support of the Province's goal of achieving long-term self-sufficiency.

Based on the authors' experience, the development of large-scale energy projects in NB and other Canadian provinces can present substantive economic opportunities and is typically guided by many factors including environmental, land use, regulatory and socio-economic considerations. However, in the absence of a SEA process, the availability of land and the uncertainty associated with regulatory and environmental requirements can represent an investment disincentive for a prospective proponent. For example, energy projects being considered today face considerable challenges relating to land availability surrounding existing energy infrastructure, particularly in urban areas. Currently there is no provision for SEA in the New Brunswick *Environment Impact Assessment Regulations*. Indeed, as an example, the recent Brunswick Pipeline Project, a natural gas project from the City of Saint John, NB to the United States border met exceptional public opposition around land use considerations, particularly within the City even though the selected route used existing corridors to the greatest extent possible. The hearings and related EA process were cumbersome and the proponent burdened with the responsibility of dealing with land use conflict in the absence of any strategic planning by municipal and provincial governments.

The associated uncertainty and expenditure as illustrated in this recent example is an impediment to project proponent investment.

To attract investment in energy in NB, the Province identified the need to develop a plan similar to an SEA aimed at investment encouragement. To meet this goal the Province initiated an Energy Corridor Land Use Planning Study to assist in the identification of potential multi-use energy corridors considered critical to future energy development in the long-term future (50 years and beyond). Although focused on the energy sector, this study also considered several non-energy linear corridor opportunities including potential transportation, rail and telecommunication requirements.

Methodology

The methodology employed in this planning study consisted of two components including identification of existing resources and potential energy markets and a preliminary corridor assessment, as described below.

Identification of Existing Resources and Potential Energy Markets

To identify existing resources and potential energy markets, Stantec facilitated a workshop of knowledgeable energy, transportation, planning and economic development stakeholders from the public and private sector to explore potential NB-based energy and communications/transportation infrastructure opportunities and requirements into the future. In particular, workshop participants represented senior managers and technical specialists responsible for pursuing new development opportunities in sectors ranging from electrical generation and transmission, oil and gas and petroleum refining to provincial government departments responsible for highway development. Initial research and stakeholder interviews on existing and future resources, infrastructure, energy markets, and potential energy corridors were conducted by Stantec to seed the workshop discussion.

Participants were asked to provide their expert opinion based on the results of the preliminary research findings and their knowledge of the industry. Workshop participants were also asked to provide their input from the perspective of the provincial interest of NB, as opposed to an individual organization or affiliation. In addition, the discussion was not limited by current restrictions (*e.g.,* financial, policy, regulatory) as the goal of this study is to forecast potential opportunities that may exist in the next 50 years or beyond. Therefore, the results represent, in many cases, best-case opportunities for the Province as recommended during the workshop session.

The workshop was structured to encourage a thorough discussion of the various potential projects within multi-use corridors. To achieve this, the workshop was divided into three discussion topics: oil and gas resources and markets and potential corridors; electricity resources and markets and potential corridors; and overall corridor selection and priority. Although the potential corridors discussed at the workshop were developed based on energy opportunities, stakeholders were encouraged to explore multiple uses in their assessment to include other linear developments (*e.g.*, transportation, rail, and telecommunication).

The workshop participants were presented with potential energy corridors, based on initial research and stakeholder interviews, and asked to comment on their feasibility and relative importance. This discussion included consideration of whether the opportunity or need was imminent or in the longer-term,

and what the likelihood of development might be. The discussion was facilitated by Stantec, but the priority and feasibility of corridors was provided by workshop participants. In some cases new corridors in addition to those identified through prior research were proposed based on participant input. At the conclusion of the workshop the participants developed a list of high priority corridors to be studied further in a broad-based corridor constraints analysis.

Based on the comments from workshop participants, several opportunities were identified as critical for NB's future energy growth. These included:

- Natural Gas Transmission to New England;
- Natural Gas Transmission to Quebec;
- Shale Gas Development and Underground Storage Potential for Natural Gas and Liquefied Petroleum Gases (LPG) in south-central NB;
- Electrical Transmission from Quebec;
- Electrical Transmission to and from Prince Edward Island;
- Electrical Transmission to and from Nova Scotia (and possibly Newfoundland and Labrador); and
- Electrical Transmission to and from New England.

Based on these market opportunities, highest priority corridors, as identified by stakeholders, were carried forward to the corridor study. The high priority potential corridors reflect the opinion of the workshop participants, stakeholders and study team that these show the highest potential for future development based on a synthesis of resources, markets, and infrastructure.

Preliminary Corridor Assessment

The objective of the preliminary corridor assessment was to provide a broad-based constraint analysis, described in more detail below, of the high priority corridors identified above. Each preliminary corridor was set at a width of 1 km to allow for flexibility of routing for individual linear facilities. The preliminary assessment included the following tasks:

- collection of publicly available constraints data for the location of high priority corridors identified in Phase 2 using a Geographic Information System (GIS);
- development of maps for each high priority corridor highlighting critical potential land use, environmental and engineering constraints, and importantly, existing linear infrastructure for co-location;
- convening of a panel (*i.e.,* working meeting) of Stantec experienced transmission and pipeline professionals and a transmission design engineer from the provincial utility to assess potential constraints for each corridor, and narrow the corridor to that anticipated to be required for designation; and
- development of a preliminary corridor assessment report to present key findings from the constraints analysis and provide recommendations for future areas of study.

The Project working group used their professional expertise to consider constraints within the context of land-use, environmental and engineering considerations. The constraints used to assess the corridors are generally classified as:

- Class 1 – constraints where mitigation may not be feasible. These would include constraints like ecological sites, mining areas, wetlands and municipalities.
- Class 2 – constraints where mitigation is more likely to be feasible. Examples include agricultural lands, deer wintering areas, old growth forests and water supplies.
- Class 3 – constraints where special construction practices may be required, and the environmental consequences of development are considerably less and/or the mitigation may be less onerous to implement than for Class 2. This may include topography (slopes > 20%) considerations, mineral claims and water bodies.

Stantec conducted a real-time GIS constraints analysis of the high priority corridors. In this exercise, GIS information was layered over topographic mapping to provide the working group with a dynamic visual representation of the corridor route. Some of the GIS information layers used included land use, mapped watercourses, utility corridors, elevation contours, depth to water tables, First Nation lands, Federal Parks, protected well fields or watersheds and ecologically significant areas.

To initiate the analysis of each high priority corridor, the working sessions began with the identification of the start and end points. These points were used to perform a high level analysis using a dynamic scale (approximately 1:250,000 resolution maps) of any potential constraints that may be encountered along the path of the potential corridor (*e.g.,* regionally difficult terrain, concentrations of non-compatible land use). At this stage, significant constraints were identified and used to guide the development of the corridors to avoid major concentrations of routing constraint that warranted deviation from a straight line between end points (the lowest cost solution in the absence of substantial constraint). Upon completion of the broad-based review, the working group initiated a detailed review of each high priority corridor (1:15,000 resolution maps) carefully considering individual and regional constraints. Segments of the corridors were broken into a series of control points to highlight key features or decision points along the corridor (*e.g.,* turning points to avoid severe topography, sensitive land use or habitat). The control points define straight line segments where corridor alignment deviations are required to negotiate constraints beyond the defined segment. These segments defined by control points were connected to define the centreline of the selected one kilometre corridor. This analysis is perhaps relatively easy in New Brunswick with its 73,500 square km of land mass and an approximate population of only 750,000.

This process involved a real-time analysis of constraints, presented as layers over base maps (typically showing topography, water features, and existing linear infrastructure) and satellite images. The mapping was projected onto a large screen to allow for the simultaneous participation of all working group members. The process of selecting the corridor alignment involved the addition and removal of constraint layers to allow the working group to make key routing decisions based on particular routing constraints.

Results and Discussion

The products of the working meetings included individual maps for each selected one kilometre-wide, high priority potential corridor. In particular, key constraints and selected control points used to navigate constraints were provided. Ultimately, the high priority corridors identified by stakeholders, illustrated in

Figure 1, relate to natural gas transmission from southern NB to Central Canada and New England as well as the transmission of electricity from NB to Nova Scotia, Quebec and New England markets.

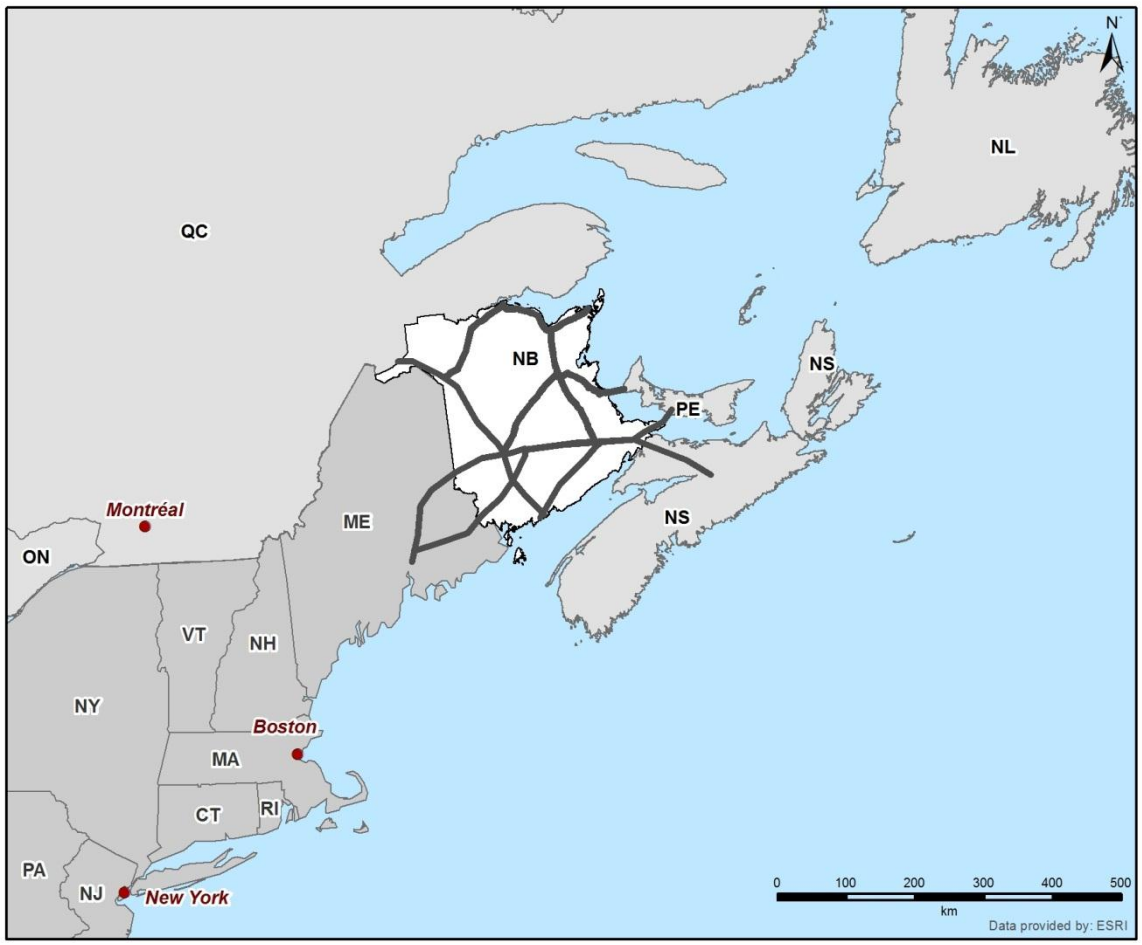

Figure 1 Energy Markets Proximal to New Brunswick (NB)

Accordingly, the next step towards the successful implementation of these strategic corridors would be for NB to explore the designation of these corridors under a formal land use zoning process and consider options for policy change to support the long-term goals of the Province. This may include possible cost-recovery options for the land tenure and tariff structure of future projects located within the corridors. As such, the Province may engage government experts to evaluate potential policy initiatives that support not only the designation of land use corridors in the provincial interest, but also such factors as energy, transmission market rules and regulations, communications and land use planning, and environmental permitting processes. In the absence of SEA under the NB EIA Regulation, the Province may instead consider conducting a high-level environmental assessment on each of these corridors for specific energy project types. Thus, proponents wishing to develop an energy project in one of the designated corridors would be subject to a streamlined environmental assessment process within an area of land already zoned for their proposed activity. This would provide the proponent with more certainty in the overall process and minimize their perceived risk in developing projects in NB.