

Analyzing Northern Pass Transmission project

Executive Summary

May 18, 2011



Highlights

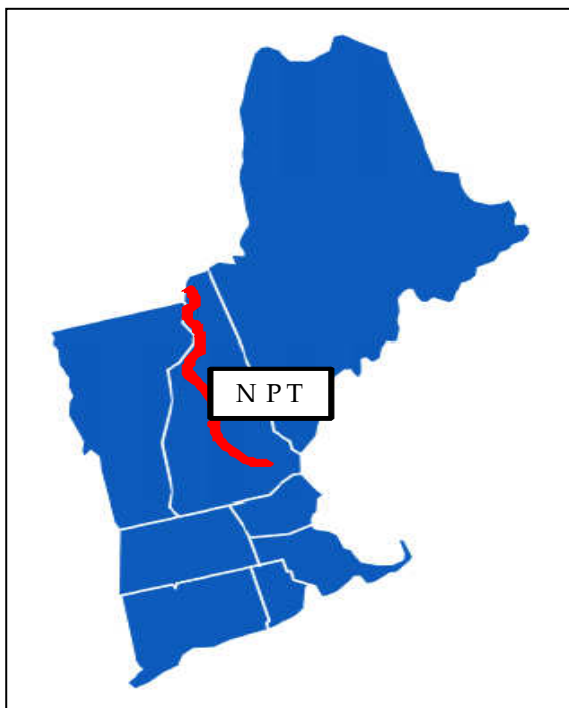
- The Northern Pass Transmission project proposes to build a new transmission line that will bring up to 1,200 MW of hourly energy and associated electric generating capacity into New England. For comparison, 1,200 MW is approximately equal to the energy production capacity of the Seabrook nuclear power plant.
- Northern Pass electricity will be delivered from the low-carbon, predominantly hydroelectric Québec system, sourced across Québec's many hydroelectric storage reservoirs. Given the transmission technology employed and given Hydro Québec's system, the energy flows will be very controllable, improving system operations and reliability. The energy will be competitively priced when compared to New Hampshire and New England's existing energy resource base. Because of this, it will displace other more expensive and higher-carbon emitting sources of electricity.
- Hydro-Québec has committed to financing all capital and operating costs of the transmission project. It is willing to take the market risks in exchange for the long run opportunities to sell its generation. As a result, there will be no direct investment risk for New Hampshire or New England consumers, a significant benefit of the project.
- The New England wholesale power market is a fully integrated one that spans across state borders, covering six states. Northern Pass will create direct energy market benefits for all electricity consumers in New Hampshire and New England, including spot market energy price reductions, carbon reductions, fuel diversity and improved reliable energy supply. In addition, there will also be substantive macroeconomic benefits for New Hampshire residents.
- With no direct cost obligations and such significant and concrete benefits, the cost-benefit proposition of Northern Pass is very compelling, confirming the need for this project from the New Hampshire consumers' perspective.
- Northern Pass also provides insurance against "game changing" events that would lead to higher energy and capacity prices. In particular, it will improve the reliability of electricity service in New Hampshire and the New England region by increasing resource adequacy.

Northern Pass provides insurance against game changing events that could otherwise lead to higher energy prices and deteriorating resource adequacy and reliability of electricity service in New Hampshire and the New England region.

- Northern Pass fits well within New Hampshire’s energy policy framework. It meets a number of fundamental objectives, including: the need to transition to lower-carbon renewable energy, minimizing government market intervention, containing costs for consumers, and making viable and reasonable long-term plans for the state’s energy future.

Project Overview

Northern Pass strengthens New England’s inter-ties with Québec.



The Northern Pass project refers to the U.S. portion of a new transmission facility that will interconnect the Hydro-Québec TransÉnergie (TransÉnergie) transmission system to the ISO-NE administered New England power market. The new transmission proposed for this project consists of a 140-mile, above-ground HVDC transmission line that extends from the international border to a new direct current to the AC converter terminal to be located in the City of Franklin, New Hampshire (HVDC Line).

The project also includes a 40-mile, radial 345 kV transmission line extending from the southern terminus of the HVDC Line in Franklin, NH to the existing Public Service of New Hampshire (PSNH) Deerfield substation in Deerfield, New Hampshire (AC line), where the project will interconnect with the ISO-NE operated transmission network. The length of the AC Line

is approximately 40 miles. These new HVDC and AC transmission lines will be able to deliver up to 1,200 MW of energy and capacity from Hydro-Québec’s predominantly hydroelectric system.

Different from other reliability-driven transmission projects across New England, the Northern Pass project is a participant-funded transmission project, with a FERC approved transmission service agreement (TSA). The participant or transmission customer (Hydro-Québec) will be responsible for paying for all the capital and operating costs and will bear all the risks of investment.

The New England wholesale power market is a fully integrated one that covers all six states in the region. As a result, Northern Pass will create direct energy market benefits for all electricity consumers in New Hampshire and New England.

Continuation of the current oversupply and low price market environment across New England is tenuous given the various uncertainties in key fundamentals.

Currently, New England is in a state of oversupply and with relatively low average energy and capacity prices. Without substantial retirements and under “normal” or average weather conditions, we do not foresee a generating capacity shortfall in New England in the next decade. However, such a “business as usual” outlook is filled with many uncertainties, as described further below.

New England is exposed to natural gas market volatility.

New England is highly exposed to gas market variability given the composition of the existing supply mix. In 2000, gas-fired generation was approximately 22% of the fuel mix, while today it stands at over 45%. There is over a 90% correlation between gas prices and electricity prices. Indeed, ISO-NE reports that natural gas-fired generation set the price of electricity in the energy market for over 60% of hours in the year.

Natural gas prices have been low over the past two years as a result of new shale gas supply, which bodes well for electricity prices in the region. However, the continued availability of shale gas is not a guaranteed outcome for the long-term due to environmental concerns associated with the extraction process. Although low probability, any moratorium (temporary or permanent) in shale gas extraction would dramatically reduce gas commodity supply and therefore raise prices.

Furthermore, US northeast markets continue to face constraints in gas deliverability. Delivered gas prices were more than double commodity price levels in many periods during the 2010/2011 winter season. For example, in the third week of January 2011, delivered gas prices rose to as much as \$11.2/MMBtu although US gas commodity prices were no higher than \$4.6/MMBtu. High delivered prices of natural gas were a result of unexpected high demand for gas for residential heating combined with local distribution bottlenecks. Similar events unfolded six years ago, commonly referred to as the “2004 Cold Snap.” During these periods of gas supply constraints, plants with dual-fuel capability will switch to burning oil, thereby further increasing emissions and spot market electricity prices.

Given such issues, higher gas prices and gas supply constraints are certainly a factor to consider when discussing the future outlook; however, the timing and persistence of the high gas prices and gas supply constraints are difficult to predict.

The energy transported by the Northern Pass project would not be sourced from natural gas-fired generation, given the system characteristics of Hydro-Québec, and therefore would not be contingent on natural gas infrastructure or natural gas price levels. Indeed, the price suppression effect arising out of Northern Pass - which has been estimated to be as much as \$3/MWh on an annual average in the long term - would hedge against the electricity price increases otherwise resulting from high gas price levels.

Over 14,000 MW of existing generation capacity in New England is at risk for retirement.

New England's supply fleet is aging, with a substantial increase in capital expenditure needed for ongoing maintenance and mandated environmental improvements. For example, EPA recently proposed regulations that would put additional pressure on oil and coal-fired capacity in the region. If market revenues are insufficient to cover such fixed costs, retirement is likely. There are approximately 7,000 MW of older, less efficient oil-fired plants that are already not typically being used for energy production because they are not competitive with newer resources. These plants face the prospect of retirement under the continued moderate market price conditions and more stringent environmental regulations. The current market price conditions are also taxing on baseload fossil fuel-fired plants. Over the last twelve months several coal-fired units were shut down or sought approvals for retirement, citing economic and environmental constraints. In addition, several nuclear generating plants in the region are also facing a variety of regulatory and legislative challenges to continued operation.

As some of the capacity will be retired, energy previously provided by retired capacity will need to be replaced by gas-fired capacity. It will put additional pressure on gas infrastructure and potentially increasing frequency of gas shortages.

In total, over 14,000 MW of capacity – 46% of the current supply base in New England – is at some risk for retirement. The energy flowing on the Northern Pass project would be an additional generation resource for ISO-NE to dispatch and rely on for system operations, making up for the system-wide resource inadequacies created by some of these possible retirements.

New generating capacity may not come into service as planned.

Although there is a substantial development pipeline in New England (a total of 16,099 MW of capacity in the interconnection queue as of May 1, 2011), it is unlikely that the entirety of this proposed new generation fleet will achieve commercialization. Indeed, over the last fifteen years, only 21% of projects in the interconnection queue (IQ) at ISO-NE have been completed; and only about 7% of the proposed wind projects in the IQ have been completed.

In today's market environment, projects are developed and financed contingent on securing a long-term power purchase agreement (PPA) with a credit-worthy counterparty. There have been less than a dozen such contracts awarded to renewable projects in the last five years and market signals – for example, capacity clearing prices from the Forward Capacity Auctions – are similarly discouraging for new investment.

Northern Pass will allow for the delivery of low carbon, competitively priced energy from Québec. At the projected annual maximum production of 8.9 TWh, this energy on the Northern Pass project is comparable to the generation of approximately 1,500 MW new gas-fired CCGT operating at a generic 65% load factor or over 3,000 MW of new on-shore wind plants operating at a generic 32% load factor.

Northern Pass is needed to address New England’s long-term requirements in the face of market uncertainties.

Northern Pass is insurance against higher prices and more demanding environmental regulations. It will deliver concrete benefits for New Hampshire residents and consumers of electricity across the region.

The various uncertainties around the “business as usual” outlook for the New England power market – and New Hampshire consumers – make obvious that we should be expecting rising electricity prices and increased volatility over time. Northern Pass can provide a hedge against the “game changing” events that will otherwise raise the costs of electricity to New England consumers. Northern Pass provides a physical investment hedge against high gas prices, shortages in generating supply, and resource inadequacy. With the participant funding of the entire transmission project, New England consumers do not bear the burden of the capital investment costs or the ongoing operating costs. New England consumers will receive many energy market benefits, such as lower energy prices, decreased carbon emissions, fuel diversity, and additional reliability (through improved resource adequacy).

The direct cost-benefit analysis is substantially positive for Northern Pass from the perspective of consumers, making a compelling case for why we “need” Northern Pass. New Hampshire consumers may also benefit from a Purchase Power Agreement that would be negotiated as a result of the project.

Northern Pass also provides a cost-effective mechanism for moving towards a cleaner energy supply in the region.

Northern Pass is expected to reduce prices in the ISO-NE energy market by displacing fossil fuel energy production, primarily gas-fired generation. Northern Pass will therefore free up natural gas for alternative uses and, according to James A. Muntz’s testimony, “*the ‘freed up’ gas is enough to heat and supply hot water for nearly 1 million homes.*” The displacement of fossil fuel fired generation also creates carbon emissions benefits for New England residents. It is estimated that greenhouse gas emissions will be reduced by 5 million tons of CO₂ per year. At the current RGGI carbon allowance prices of approximately \$2/ton, this translates into \$10 million of saving per year. At a hypothetical future potential carbon allowance price of \$25/ton (as referenced in proposed 2010 Federal legislation for a “cap and trade” regime for carbon), the monetary savings from avoiding carbon emissions rise to as much as \$125 million per year.

The reduction in carbon emissions projected from the Northern Pass project is significant in economic terms, as well as in terms of environmental benefits. The carbon reductions from Northern Pass across New England are analogous to taking off the road nearly 900,000 cars annually. With Hydro-Québec taking the investment risk, the Northern Pass project is a “win-win” proposition for policymakers that want to improve the environmental condition in the state of New Hampshire as well as regionally, while also containing costs for consumers.