



Connecting Need and Opportunity

A Thought Leadership Discussion on Renewable Energy and New York's Future

Summary Report

August 22, 2011

Convened by the Regional Plan Association

On August 22, leaders from both the public and private sector from New York and Quebec gathered to devise strategies to meet future energy needs across state and national boundaries through the scaling up of renewables, particularly hydro power from Quebec and off-shore wind. One such strategy discussed which deserves further study and vetting was the creation of a joint high-speed rail and utility corridor from New York City to Quebec.

The possibility of a convergence of upcoming power plant closings and new regulations may pose serious challenges for meeting the New York region's electrical power needs. These include the potential closure of Indian Point, the early retirement of Oyster Creek, the retirement of three power plants on Long Island, New York State's Department of Environmental Conservation (DEC) Cooling Water Rule, and the U.S. Environmental Protection Agency's January 1st air rulings, which have all forced city and state officials to take a serious look at the long-term clean energy plan and priorities for the State of New York and the metropolitan region.

Deepwater Wind estimates that in New York State, DEC's Cooling Water Rule alone would affect 5,145 megawatts (MW) of New York City's power, cost approximately \$2 billion in compliance costs, and increase costs by 10-20 percent for power generators.

All of these rulings and retirements are scheduled during a period of steady and continued population growth in the metropolitan region. RPA estimates an additional 3.8 million more residents in the 31-county NY-NJ-CT metropolitan region and 18 million more residents in the Northeast megaregion by 2050, placing added pressure on our already constrained generation and transmission infrastructure.

New York City's Energy Reality

The City of New York's Sustainability Plan - PlaNYC - has set a 30 percent reduction goal of greenhouse gases by 2017. City officials have declared that goal to be unattainable with the closure of Indian Point without a clean energy replacement strategy. If both units of Indian Point were to shut down, the City and Con Edison estimate that by the summer of 2016, we would be violating the "1 in 10 year" rule, which means that the region could be subject to more than one blackout day every ten years. There are simply not enough generation projects in the pipeline to replace this power, and the transmission infrastructure is inadequate to bring in clean power from other areas. Energy efficiency alone is insufficient to meet the reliability standard. Both Con Edison and the City have studied the closure and concluded that GHG and NOx emissions will rise in the event of an Indian Point closure, as replacement power would largely come from non-renewable sources. The City of New York recently conducted a study on its long-term clean energy plan and found that greenhouse gases will increase by only 5 percent if the Indian Point replacement strategy employs hydro and off-shore wind, rather than the 15 percent rise with traditional sources. If new transmission systems were constructed to bring additional renewable power to the New York City market, greenhouse gas emissions would be further reduced. The City of New York and Con Edison agree that the retirement of Indian Point would have real economic repercussions without a clean replacement capacity investment. According to Con Edison, the closure will increase electricity costs to consumers by 6 percent.

The City anticipates approximately 75 MW of clean power from city-owned sites by 2015 and up to 100 MW from the private sector in optimistic scenarios, mostly from small scale projects through New York State Energy Research and Development Authority (NYSERDA) and the New York Power Authority (NYPA). This still leaves an enormous gap that has to be met from importing energy from outside of the city.

Hydro and Off-Shore Wind Offer a Potential Solution

The Department of Environmental Protection estimates that Canadian hydropower could provide 1000 MW of power and off-shore wind could provide 500 MW. However, it is important to note the capacity factor. While 500 MW of off-shore wind may be developed, the generation may only produce 30-40% of that capacity on average. With these potential new renewable sources on-line, the City would still suffer from a 500 MW gap from the closing of Indian Point, which would have to be filled by natural gas and other smaller generation sources such as solar (or from additional renewable sources not foreseen by the City's study). A portfolio of clean energy and infrastructure investments is needed to meet future demand in the downstate metropolitan region.

Hydro and off-shore wind, bundled together, offer a low-carbon option for New York and the metropolitan region. There are several large, existing hydroelectric facilities in southern Canada that have excess capacity. Coupled with off-shore wind, they have the potential to satisfy a large portion of the region's needs. With the right transmission access, the pairing of hydro and off-shore is symbiotic – as wind energy is produced, it can be stored in hydro facilities and released during peak periods. While wind and storage hydro do have compatible characteristics, physically storing and releasing energy produced from wind resources in downstate New York by hydro resources located in Quebec would require major transmission developments dedicated to delivering downstate wind to Quebec. This could be achieved through dispatching and scheduling hydro output located in Quebec to match intermittent wind generation in downstate New York assuming both the hydro and the wind have transmission access to the region. Hydro-Quebec has storage capacity of 175 terawatt-hour (TWh) from 26 reservoirs, thereby providing a very dependable storage partner for intermittent renewable sources such as wind and solar during their low generation periods.

New York is strategically placed to take advantage of off-shore wind. New York's coastal waters offer some of the strongest winds in the United States and have optimal depths for turbine construction. In addition, New York has high energy prices and demand close to shore. Moreover, off-shore wind sources generate a more consistent energy supply on average than land-based wind farms. Off-shore wind also has the advantage of "peak coincidence": capacity is highest during peak demand. It is estimated that "peak coincidence" is almost four times higher for off-shore than for on-land wind farms. Deepwater Wind, a major wind developer in the Northeast, estimates that the downstate region has the potential for 5,000-8,000 MW of wind power. To put this in perspective, Indian Point currently produces 2,000 MW, of which the City consumes 25-30 percent. However, the average capacity factor for nuclear is much higher than projected off-shore wind projects in New York. Therefore the energy produced by 2,000 MW of nuclear which operates at full capacity over 90% of the time is much higher than 2,000 MW of off-shore wind operating 30% of the time. As a result, 8,000 MW of wind would equate to 2,400 MW while 8,000 MW of nuclear would be 7,200. In addition, large wind tur-

bines require that special port facilities be constructed, which creates local jobs that are not prone to being sent elsewhere. A 500 MW wind project, for example, creates approximately 350 construction jobs.

Canada's energy demand peaks in the winter and has excess capacity in the summer – an ideal scenario for selling power to New York, with the Hydro-Québec Strategic Plan (2009-2013) estimating that 24 TWhs of energy will be available for export by 2013. However, current transmission infrastructure is inadequate to bring this power to the downstate New York market. Current transmission infrastructure allows for a maximum of approximately 1700 MW from Quebec to upstate New York. Increasing this quantity for delivery to the downstate market would require substantial new transmission development from Quebec to New York City. The largest bottleneck in the grid occurs about 75 miles north of New York City, in Pleasant Valley, New York. A partnership between New York and Quebec would have a particularly beneficial advantage in balancing peak and off-peak demand.

Transmission Challenge

Hydro power and off-shore wind have the capacity to fuel the growth of the downstate metropolitan region and provide a clean replacement for retiring generation sources. However, there are major constraints at the local transmission level to deliver to downstate customers. New transmission capacity will have to be constructed to connect need and opportunity.

When constructing new transmission lines, policy makers and developers will be confronted with choices in technology as well as available rights of way. The transmission system in New York State is composed mostly of traditional alternating current (A/C) lines. One project considered by several utilities and developers is increasing transmission capacity from Canada into downstate New York Area. As it were, it is possible that enough right-of-way already exists to expand the existing AC transmission from Canada down into New York City. Another option is to build a new Direct Current (D/C) transmission line along a new path into New York City or Westchester. It is likely that expanding the existing A/C transmission system would be cheaper and provide a more flexible trunk line for other sources of power in New York State to interconnect into it than a new DC line. A new DC line does, however, provide unique attributes. It is controllable and can provide electrical capacity as well as energy.

No matter what type of transmission current is selected, it would be challenging for either type to proceed beyond Westchester County. This portion of the corridor would represent a third or more of the total cost of constructing a transmission line from Canada to New York City. Con Edison recently constructed a transmission line between Yonkers and New York City, called M29. The M29 line required a new dedicated underground tunnel. As discussed below, a unique opportunity may exist to build new tunnels that service both power transmission as well as high-speed rail into New York City.

NYPA commented that AC lines can be upgraded to DC lines. However, there is regulatory and price uncertainty that hinders these upgrades. One such regulatory issue is New York Independent System Operator's (NYISO) consideration of the creation of a new regulatory zone.

The geographic imbalance of renewable portfolio standards (RPS) funds within New York State also poses a problem for the downstate region: 40-50 percent of RPS funds originate from downstate utilities, yet the majority of those RPS funds go towards upstate beneficiaries. Only 3 percent is invested back into the city because RPS funds go towards the lowest-cost project. Unfortunately, this model does not support long-term investments into more costly but beneficial clean energy projects for downstate residents.

Conservative estimates predict that the city's energy demand will increase by approximately 1 percent, or 100-200 MW, per year. This is subject to some debate, however, and some estimates place this number as high as 2 percent. The figure could rise even higher if unforeseen demand sources arise, such as electric vehicles. This uncertain and incremental growth rate may make it difficult for utilities to justify the long-term investment of building of new transmission infrastructure. At the same time, the incremental growth will create long-term pressures that could handicap the region and affect its ability to remain economically competitive, manage electricity prices for ratepayers, meet greenhouse gas and NOx reduction goals, and provide a resilient grid. If the region waits to invest in these large transmission infrastructure projects, it will be too late to meet demand—particularly because these projects have long construction timelines. The New York City region already has both the highest electricity rates in the country and suffers from occasional brownouts and blackouts.

Joint High-Speed Rail and Utility Corridor Offers a Potential Solution

One potential solution discussed was a joint high-speed rail and utility corridor. Similar to electricity transmission lines, high-speed rail is a long-term infrastructure project that requires both high upfront capital investments and a relatively straight, dedicated right-of-way. By combining these investments in a joint transportation/utility corridor, there may be the potential to combine revenue and political support for both projects. In addition, these two uses could compliment each other, as transmitted energy could be used to run the trains and train energy could be returned to the grid through regenerative braking. With renewable energy powering these trains, the carbon footprint of high-speed rail would be very favorable when compared to competing modes. In short, a joint corridor could offer a win-win scenario for a seemingly intractable infrastructure, design and funding challenge.

The ultimate feasibility of a joint corridor will require further study. The impact of joint transmission on the train line—whether it represents a cost savings or an additional cost burden, must be analyzed in detail. On the transmission side, the type of transmission line used may impact its feasibility. If a D/C transmission is desired, the new right-of-way built for high-speed rail would be particularly beneficial. If transmission is to be provided through the upgrading of existing A/C lines, however, a dedicated right-of-way might not be necessary. The interconnection points with the system in particular will dictate the cost of the project.

If New York State were to commit to building a high-speed rail project connecting New York City to Montreal, this might be a political and economic driver for a transmission project. Similarly, it may offer the national high-speed rail

program further justification for rail investments if these corridors could be used to solve long-term regional energy needs. The benefits and opportunities of a joint transportation/utility corridor could be significantly larger than each project could achieve on its own.

Conclusion

While natural gas prices have plummeted, the severe price volatility of fossil fuels suggests that continued reliance on them is not a sustainable strategy – both financially and environmentally. While it may be cost effective in the short term, long-range planning for the region for 2030 and 2050 requires new transmission investment decisions to be made now. The 1970's oil crisis is a stark reminder that relying on one fuel type is dangerous for the local, regional and national economy.

Leaders have concluded that the region is indeed entering a supply side crisis. However, a transmission line between Canada and downstate New York is unlikely to pay for itself, requiring some level of public assistance. Regulatory and price uncertainty make such a project highly challenging. Moreover, existing energy infrastructure is in the ownership of many different entities, with each pursuing the interests of their shareholders. This results in a fragmented decision making process for determining what is in the best, long-term interest of the state.

Hydro and wind may not yet be the lowest cost solution to replacing lost capacity, but they do offer the best low-carbon and long-term alternative for large power generation. The lowest cost solution is likely a combination of repowering and some new natural gas generation. However, the DEP estimates that repowering would only cover up to 500 MW, with about four current proposed projects and three in the queue.

It is crucial for New York State and Quebec leadership to devise a bi-state/bi-national strategy to finance new or upgraded transmission infrastructure from Quebec to New York City. There is a need for a long-term contracting mechanism to decrease risk and ensure the project does not become derailed due to price volatility or political cycles. A cost-benefit analysis, which includes job growth and emissions reductions alongside a properly constructed long-term contracting strategy could justify significant new energy investments for the region. A broad consortium of private and public sector entities could pay for the transmission line, which would, over time, increase reliability, reduce electricity prices for downstate customers, create jobs, ensure our air quality remains at its current levels, and plan for future load growth.

A joint high-speed rail and utility corridor is one possible solution to the creation of this broad consortium of stakeholders that deserves further attention, study and discussion. Obtaining permits and land acquisition to assemble the right-of-way is one major challenge. Designing the corridor as a dual benefit utility and passenger rail corridor may provide cost savings during construction and operation.

Further Studies Required

- Load growth projection for 2030 and 2050
- Current ROW potential (both A/C and D/C) for a joint HSR and utility corridor
- Cost and operations analysis: savings and operational challenges with a joint HSR/utility corridor for utilities, regulators, train operators and consumers
- Devise a long-term contracting strategy
- Cost analysis: long-term contract
- Explore ways to distribute costs across region or beneficiaries



Regional Plan Association is America's oldest and most distinguished independent urban research and advocacy group. RPA prepares long range plans and policies to guide the growth and development of the New York- New Jersey-Connecticut metropolitan region. RPA also provides leadership on national infrastructure, sustainability, and competitiveness concerns. RPA enjoys broad support from the region's and nation's business, philanthropic, civic, and planning communities.

RPA's current work is aimed largely at implementing the ideas put forth in the Third Regional Plan, with efforts focused in five project areas: community design, open space, transportation, workforce and the economy, and housing.

For more information about Regional Plan Association, please visit our website, www.rpa.org.

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