New York's Transmission Challenges and Opportunities: An Overview

By: Dr. Matthew Cordaro

2012 is shaping up to be the year of the grid.

Governor Cuomo has proposed an "energy highway" aimed at finding ways to relieve transmission bottlenecks and deliver lower cost power from upstate and western New York to downstate.

Separately, the Champlain Hudson Power Express (CHPE) line, a controversial $11 billion project to bring 1,000 megawatts from Canada to New York City, has met strong opposition from business and labor groups, as well as Con Ed. And for good reason.

The CHPE means higher electric bills, higher electricity reliability risks, and lost jobs. It amounts to sending New York dollars to Canada for a product that can be more efficiently and reliably made in New York.

Governor Cuomo announced his plans for an energy highway task force in January, during the state-of-the-state address. The New York Energy Highway Task Force has already held a major conference with stakeholders to discuss the vision and challenges at hand for the highway and issued a Request for Information (RFI).

The RFI will enable the state to obtain the insights and expertise from experienced, knowledgeable parties, including the State's investor-owned utilities, private developers, investors, and others. These and other stakeholders are invited to propose and discuss projects that will advance one or more the State's specific objectives, as outlined in the RFI.

By the end of the summer, the task force plans to issue its Energy Highway Action Plan. Meanwhile, the New York Public Service Commission is evaluating the CHPE proposal and will make a decision by October. Regardless of the PSC decision, many other regulatory approvals will be necessary.

With transmission issues so much in the news, and the center of energy policy discussion in the state, the staff at the New York Affordable Reliable Electricity Alliance (New York AREA) has compiled background information on transmission issues. It is a helpful primer and can also be a useful reference for the months ahead. The information follows.

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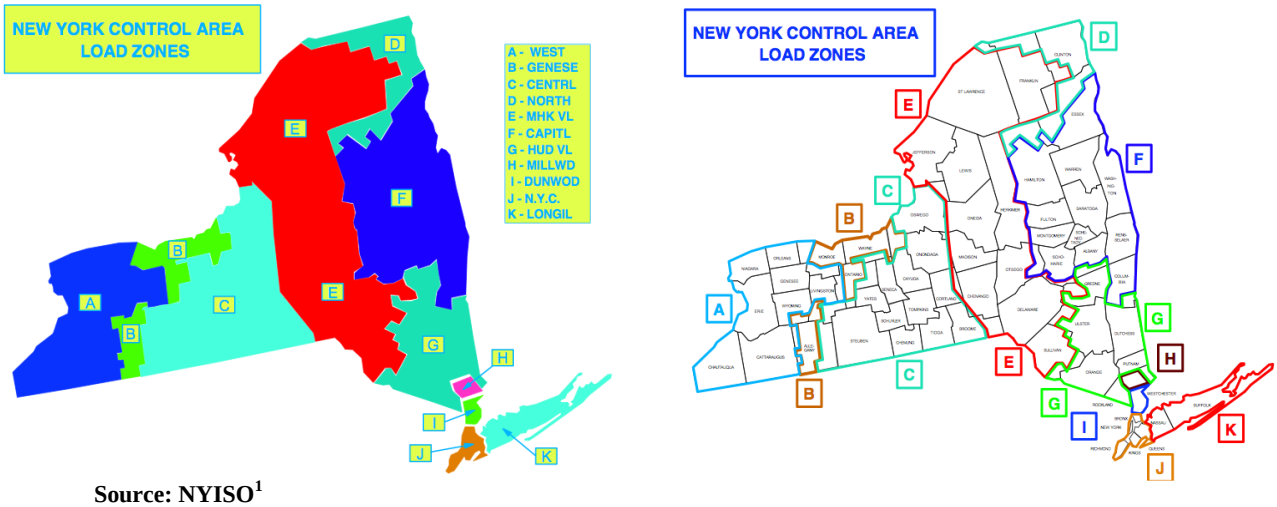
The following information is provided by the New York Affordable Reliable Electricity Alliance (New York AREA) to give policymakers and the public a general understanding of existing transmission infrastructure in New York, the role it plays in efficiently transporting power throughout the state, and the effects of deficiencies within the transmission system.

TRANSMISSION 101

Transmission distribution facilities are the arteries through which electrical power is delivered to customers. To transmit electricity effectively over long distances while minimizing power losses, utility companies use high-voltage transmission lines.

The New York Independent System Operator (NYISO), the entity responsible for operating the state's grid, divides the state into areas called load zones that are used to study and manage the overall reliability of the system. Below is a depiction of the New York Control Area by load zones.

Figures 1 & 2: New York Control Area Load Zones



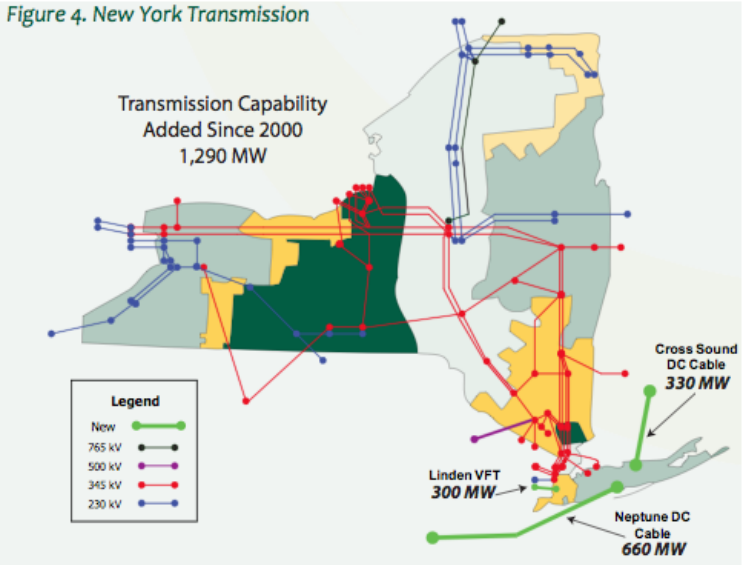
Source: NYISO[1]

There are two types of high voltage transmission lines, overhead and underground. Both types of transmission have unique advantages and disadvantages in different situations. These transmission lines operate on either alternating current (AC) or direct current (DC), although most existing transmission is AC. There are no effective ways to store the electricity carried by these lines and as an essential feature of their operation, voltage levels must be regulated to ensure that power is delivered on an uninterrupted basis. Ultimately the voltage of transmission lines is reduced at substations to levels appropriate for customer distribution.

According to NYISO's 2011 Power Trends report, New York has more than 11,000 circuit miles of transmission.[2] This is depicted in Figure 3 based on operating voltage and power rating.

[1] "New York City Real-Time Market Zone Maps," New York Independent System Operator, May 2012.
[2] "Power Trends 2011: Energizing New York's Legacy of Leadership," NYISO, April 25, 2011, p. 54.

Figure 3: New York Transmission



Source: NYISO

In Figure 3, the blue lines represent 230 kilovolt (kV) transmission that is largely located in the central and western parts of New York. NYISO notes that these areas have low performance because of "widespread degradation in voltage performance […] caused by load growth and unit retirements."[3] The red lines represent 345 kilovolt (kV) transmission, which is widely utilized in New York.

Transmission congestion results when the level of demand in different load zones begins to exceed the capacity of transmission lines to deliver the power required. Such congestion also results in additional costs for transporting power. Since the cost of transmission congestion is reflected in wholesale prices in the NYISO market, wholesale prices in New York City rise above those upstate. When demand for electricity grows in the city, the wholesale price goes up as more expensive units located in the city are dispatched to meet demand.[4] According to NYISO, the top three congested lines in the state are Central East, Leeds Pleasant-Valley, and Dunwoodie Shore Road. These transmission lines comprise part of the main "highway," or transmission route, for power travelling between upstate and downstate New York. An indication of the significant costs associated with congestion is presented in the following table which lists the 15-year aggregate congestion costs for each line.

Table 1: 15 Year Aggregate Congestion Costs

Load Zones	Transmission Line	Line Length	Aggregate Congestion Cost
E, F	Central East	90 miles	$ 3,009,000,000
G, H	Leeds Pleasant-Valley	39 miles	$ 3,370,000,000
I	Dunwoodie Shore Road	10 miles	$ 1,829,000,000

Source: NYISO

[3] "2009 Congestion Assessment and Resource Integration Study," NYISO, January 12, 2010, p. 19.
[4] "Wholesale electricity prices in New York City are the highest in the contiguous U.S.," EIA, July 11, 2011.

In order to address congestion, NYISO in 2009 initiated the Congestion Assessment and Resource Integration Study (CARIS). The completed Phase 1 of this study developed a methodology for evaluating the cost benefit of different ways to relieve congestion through transmission projects, as well as generation additions, demand side management, and efficiency programs. Phase 1 determined it would be difficult to come up with a solution where the benefits outweigh cost because of the large number of complex variables involved with addressing the congestion issue. Nevertheless, Phase 1 was successful in developing a model that could be used to assess the merits of future proposals to reduce negative impacts of congestion.

New York's transmission owners are also conducting their own investigation into the state's long-term transmission needs. They released Phase 2 of their State Transmission Assessment and Reliability Study (STARS) on April 30, 2012. Phase 2 identifies the most suitable, cost effective alternatives for providing additional transfer capability, while also considering how to both address the state's aging transmission infrastructure and integrate renewable sources into the grid.

One of the major findings of Phase 2 is that approximately $25 billion will have to be spent over the next 30 years to replace 4700 miles of transmission along New York's existing bulk power system.[5] Phase 2 also identified a need to conduct $2 billion in incremental upgrades to the state transmission system in the shorter term in order to ease congestion and increase transfer capability.

These upgrades could be constructed on or with minor expansion to existing rights of way. Other analyses conducted as part of the study showed that increases in upstate generation or imports from Hydro Quebec would challenges system reliability and require the construction of additional transmission capacity.

FACTORS INFLUENCING TRANSMISSION EXPANSION

Transmission expansion is driven by a confluence of factors and faces multiple hurdles. Most of the challenges are common across various jurisdictions and power markets; however, one main obstacle is cost allocation and recovery for new projects, or simply determining who pays for transmission development. Usually the guiding principle in making that determination is "whoever benefits, pays," but historically the issue has not been easy to resolve.

As a result, cost allocation and recovery is a major reason why transmission owners are reluctant to invest in new transmission projects. A secondary factor is that clear metrics and cost recovery mechanisms are not consistent or available for those looking to invest in transmission projects. Additionally, conflicting state and federal regulatory policies, which often result in "trapped" or "stranded" costs for utility companies, further complicate the transmission development process.

In this context, "NYISO's Comprehensive System Planning Process includes studies of possible transmission expansions that are not required to meet reliability criteria…."[6] This process allows for other qualitative policy objectives to be considered regardless of cost.

For the most part, generating facilities in the downstate region operate at high capacity levels for much of the time, with little to no room to increase their generating capacity. This creates an opportunity to expand New York's transmission system so that upstate generators can sell more power downstate The problem with this, however, is that it could have a negative price impact on power rates upstate given "the 'demand pull' from downstate.

[5] "New York State Transmission Assessment and Reliability Study (STARS): Phase 2 Study Report," NYISO, April 30, 2012, p. 17.

[6] "Expanding Transmission: Bringing Power to People," Consolidated Edison, January 16, 2009.

This is evidenced by the Long Island Power Authority's (LIPA) and New York Power Authority's (NYPA) long-term contracts for inter-regional transmission projects into Zones J and K."[7] Extending this thinking further, when market volatility for natural gas pricing is considered, it becomes clear that transmission lines alone "may not fully resolve this issue" of supplying enough affordable electricity given increased power plant operating margin capacities.[8]

Other factors influencing in-state transmission expansion include uncertain load growth projections, which will be determined by how quickly and how well the state recovers from the economic downturn, and the stability of fuel price projections. Further, uncertainty over increases to generating capacity in the eastern and downstate regions, as well new wind generation in the northern and western regions of the state create additional challenges with regard to transmission expansion. Some other factors taken into consideration by transmission developers include uncertainty about the effectiveness of statewide energy conservation programs and the fate of previous, as well as current, transmission proposals.

CONCLUDING OBSERVATIONS

At this point, even with aging transmission and generation infrastructure, transmission congestion is not impacting reliability. However, there are a number of potential factors that may affect both reliability and congestion along New York's grid in the coming years.

This includes pending environmental regulations which could lead to the retirement of generation at critical locations within the system. In addition to the loss of capacity, such resource retirements could lead to a reduction in fuel diversity and an increased dependence on natural gas.

The Indian Point Nuclear plant, which provides 30% of New York City's electricity, is also very important for grid reliability. According to an August 2011 report for the New York City Department of Environmental Protection conducted by the environmental consulting firm Charles River Associates, Indian Point's closure would likely have significant environmental, economic, and reliability impacts on both the city and state.

Developing solutions to address congestion along New York's transmission system and to accommodate future demand growth is a complicated and dynamic process. In the end, the solutions will be costly, multifaceted, and require careful analysis and study.

New and revitalized transmission facilities between New York's upstate and downstate regions are certain to play a role in resolving congestion issues. Generation resources located in or near the major load centers in southeastern New York will also be essential, as will demand reduction and energy efficiency resources located in major load centers.

[7] "Transmission Expansion in New York State: A New York ISO White Paper," NYISO, November 2008.
[8] Ibid.