Power Grid Study Component Study Approaches

This document extracts the study approaches for the Initial Report and Appendices C, D, and E in the Power Grid Study.

Initial Report on the New York Power Grid Study

The Utility Study responds to the following guidelines established by the PSC in its May 2020 Order:

- Evaluate the local transmission and distribution system of the individual utility service territories, to understand where capacity "headroom" exists today;
- Identify existing constraints or bottlenecks that limit energy deliverability;
- Consider synergies with traditional capital expenditure projects (i.e., aging infrastructure, reliability, resilience, market efficiency, operational flexibility, etc.);
- Identify least-cost upgrade projects to increase the capacity of the existing system;
- Identify potential new or emerging solutions that can accompany or complement traditional upgrades;
- Identify potential new projects that would increase capacity on the local transmission and distribution system to allow for interconnection of new renewable generation resources; and
- Identify the possibility of fossil generation retirements and the impacts and potential availability of those interconnection points.

Utility Local T&D Infrastructure

The Utility Study responds to the following guidelines established by the PSC in its May 2020 Order:

- Evaluate the local transmission and distribution system of the individual utility service territories, to understand where capacity "headroom" exists today;
- Identify existing constraints or bottlenecks that limit energy deliverability;
- Consider synergies with traditional capital expenditure projects (i.e., aging infrastructure, reliability, resilience, market efficiency, operational flexibility, etc.);
- Identify least-cost upgrade projects to increase the capacity of the existing system;
- Identify potential new or emerging solutions that can accompany or complement traditional upgrades;
- Identify potential new projects that would increase capacity on the local transmission and distribution system to allow for interconnection of new renewable generation resources; and
- Identify the possibility of fossil generation retirements and the impacts and potential availability of those interconnection points.

Utility Group Advanced Technologies

While the Power Grid Study did not model the implementation of advanced transmission technologies, this section offers recommendations on the need for integrating such technologies expeditiously into both local T&D and bulk transmission investment plans because of the substantial potential for cost-effective un-bottling of renewable generation that is offered by these technologies.

In Part 3 of Utility Study as filed in Case 20-E-0197.27 the Advanced Technologies Working Group (ATWG) explored the capability of advanced transmission technologies to: (a) alleviate transmission system bottlenecks to allow for better deliverability of renewable energy throughout the State, (b) unbottle constrained resources to allow more hydro and/or wind imports and the ability to reduce system congestion, (c) optimize the utilization of existing transmission capacity and right of ways, and (d) increase circuit load factor through dynamic ratings. The group then evaluated seven groups of advanced technologies:

- Dynamic line ratings and improved transmission utilization;
- Power flow control devices (both distributed and centralized);
- Energy storage for transmission and distribution services;
- Tools for improving operator situational awareness;
- Transformer monitoring;
- Advanced high-temperature, low-sag (HTLS) conductors; and
- Compact tower design.

Offshore Wind Study Findings and Recommendations

The Offshore Wind Integration Study conducted by DNV-GL, PowerGem, and WSP addresses four questions:

- At which onshore substations are there good opportunities to inject 9,000 MW of OSW into the bulk power grid of New York City and Long Island in a feasible, reliable, and least-cost manner?
- What are the environmental/permitting challenges associated with bringing OSW to existing onshore substations?
- Considering (a) the 1,825 MW of OSW that have recently been procured, (b) the onshore substations with identified capacity to interconnect future OSW, and (c) the environmental/permitting constraints, what are plausible planned transmission strategies for collecting and delivering the remaining 7,175 MW?
- How does a networked offshore transmission solution compare to a reference case "business as usual" scenario that utilizes only radial connections?

Zero Emissions Electric Grid by 2040

Study Findings and Recommendations

The Zero Emissions Electric Grid by 2040 study (Zero Emissions Study) is a resource planning study prepared by Siemens to analyze transmission, generation, and storage scenarios for meeting New York's goals of zero-emission electricity by 2040 and achieving interim targets of 70% renewable generation by 2030.

The study approach is organized into six steps, with the two initial steps followed by four iterative steps:

1. Define Objectives and Assumptions: Key objectives include reaching 70% renewable energy by 2030, reaching zero emissions by 2040, preserving the "1 in 10 years" loss of load event (LOLE) resource adequacy standard, supplying sufficient flexible resources to manage ramping needs, minimizing costs, curtailment, new transmission, and imports.
2. Define load and Distributed Energy Resource (DER) forecasts: The Study drew upon the New York Decarbonization Pathways Study70 and utilities' forecasts as input to develop the base and alternative scenarios for the load and DER forecasts (distributed behind

the meter solar). The Study developed two scenarios: an “Initial Scenario” and a “High Demand Scenario.”

3. Simulate Optimal Capacity Expansion for 2030 and 2040: Optimal capacity expansion simulations were performed using the AURORA simulation tool with zonal resolution.
4. Transmission Reliability Assessment: The TARA reliability study tool was used to analyze thermal and voltage violations for pre-contingency and local and design criteria contingency conditions.
5. Congestion Assessment: Nodal analysis was performed using the PROMOD production cost simulation tool to identify congestion and renewable curtailments.
6. Define Transmission Solutions: Transmission expansions to address reliability or congestion challenges found in prior steps were identified and their likely cost-effectiveness assessed in terms of benefit to cost (B/C) ratios.