May 2, 2023

By e-mail to PublicPolicyPlanningMailbox@nyiso.com

LS Power Grid New York Corporation I ("LS Power") submits the following comments to the Long Island Offshore Wind Export PPTN Report Appendices presented at the April 25, 2023 ESPWG meeting, as well as a response to the comments of Propel NY posted with the April 25, 2023 meeting materials. LS Power will not respond to all of the criticisms posted by Propel NY, but would like to clarify the record on one key point.

In the comments dated April 19, 2023, Propel "asserts that a larger CRM value must be used for solutions that use any form of DC…due to non-responsiveness of the DC lines immediately after a contingency. " Propel NY's description of DC as "non-responsive" directly contradicts the actual benefits of controllability of DC systems described in the Tier 4 proposal of Clean Path New York.[1] Attached are portions of Section 14 of the Clean Path New York proposal, which identifies an HVDC system as:

- "providing distinct advantages in controllability and flexibility"[2]
- "can be turned on and off many times per cycle and thus is very controllable"[3]
- "reduces the stresses on the remaining AC transmission lines after a certain relevant contingency"[4] including when operating under an AC-line emulation mode.

An HVDC system can provide much more flexibility and responsiveness than assumed in the CRM analysis presented in the Appendices.

One other point related to the CRM analysis is that T035 would effectively eliminate the CRM problem under a scenario of multi-terminal operation. Offshore wind generators will be attracted to the new Points of Interconnection created by all proposals. T035 is distinguished in that, with proper coordination, generators can connect directly to T035 in a multi-terminal configuration, avoiding the need to site additional HVDC terminals in Long Island, and saving hundreds of millions of dollars. If multi-terminal operation were to be implemented, it would also allow offshore wind generation to be scheduled to Zone K and Zone H, and allow for differences between the schedule and real time operations to be assigned to Zone H, where it could be better addressed, and avoid the need to increase the CRM for Zone K.

If the NYISO includes consideration of the CRM analysis in the comparative analysis, it should recognize the true benefits of the responsiveness of HVDC equipment.

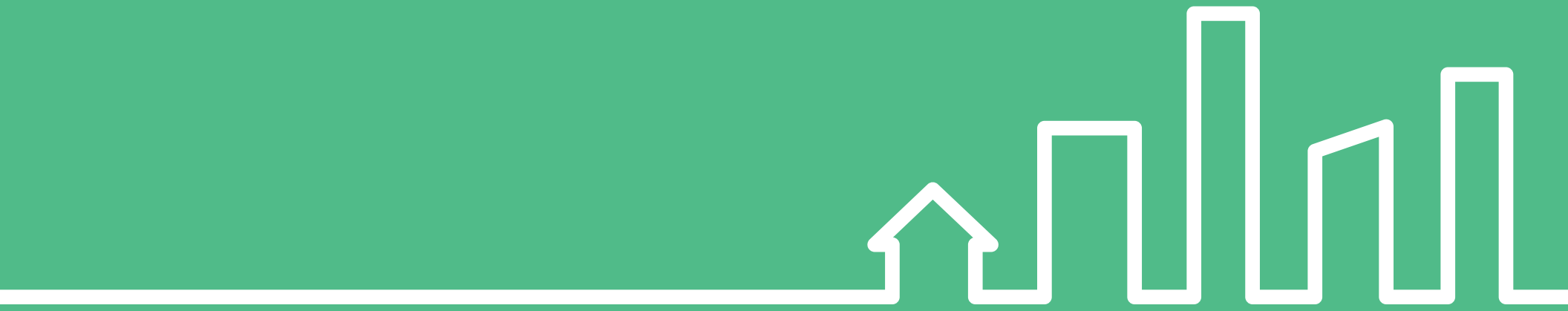
Sincerely,

Tim Lundin
Regulatory Policy Manager

[1] https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Programs/Clean-Energy-Standard/Tier4-Step-2-Bid-Submission-Response/Clean-Path-NY.pdf. Note the New York Power Authority is a partner in both Propel NY and in Clean Path New York.
[2] Page 231
[3] Page 232
[4] Page 233

Section 14

Operational flexibility and peak coincidence



14 Operational flexibility and peak coincidence

14.1. Contributions of project to operational flexibility and peak coincidence in Zone J

Operational flexibility

Introduction

Clean Path New York has conducted extensive modeling and system analysis and has engaged in an iterative approach to improve the proposed New Transmission. Clean Path New York goal is to reliably export Tier-4 RECs to New York City (Zone J) and to help provide additional system benefits such as operational flexibility, relief of congestion, and reduced curtailment. The below subsections provide additional explanation on such benefits.

Assisted by PowerGEM, Clean Path New York modeled the reliability and wholesale energy market impacts of the Resources portfolio and the New Transmission. The analysis covered the years 2025, 2030, and 2035. Three scenarios were modeled for each year studied; they are summarized below as they will be referred to in the subsequent sections:

1. **A Reference Case:** This case uses a base case without the New Transmission and the proposed portfolio of Resources portfolio.
2. **A Resources Only Case**, which is the Reference Case plus the portfolio of Clean Path New York Resources.
3. **A Resources and New Transmission Case**, which is the Resources Case plus the Clean Path New York New Transmission (a 1,300 MW HVDC interconnect between Fraser substation in Zone E and Rainey substation in Zone J).

More details on the modeling conducted by PowerGEM and the associated assumptions is provided under Appendix 7.

The technology

Clean Path New York proposes to build a New Transmission line that will utilize state-of-the-art high-voltage direct current (HVDC) technology that can deliver a capacity of 1,300 MW. The proposed technology will utilize a voltage source converter (VSC) configured as a symmetrical monopole. A +/- 400 kV operating voltage was selected as the optimal voltage to maximize capacity.

This state-of-the-art configuration recommended by Clean Path New York is a feasible and attractive technology that will provide distinct advantages in controllability and flexibility. The proposed New Transmission is designed to manage challenges mainly arising from

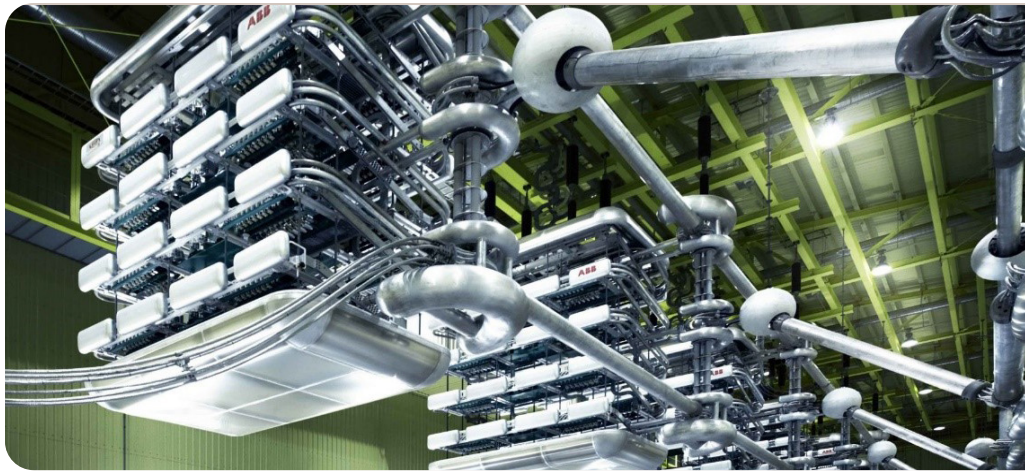


Figure 14-1. Inner view of a VSC-HVDC converter (image courtesy of ABB).

the large renewables Resources portfolio and the associated increase in the level of intermittency and unpredictability of generation connecting in to the NYISO system.

The New Transmission will provide more flexible power flow control to intelligently maximize the utilization of the Resources while relieving transmission bottle necks and managing the difficulties of obtaining new transmission corridors in New York State. Additional benefits to NYISO and the grid include the ability to independently control active and reactive power and to provide very fast control response and black start ability.

The VSC-based converters offer a great amount of flexibility. The converter employs an Insulated Gate Bipolar Transistor to switch the DC voltage. It can be turned on and off many times per cycle and thus is very controllable. This switching commutates the DC voltage to the expected AC voltage of the grid to which it is delivering power. The transistors operate based on information provided by the control systems, increasing the control of real and reactive power with reactive compensation capabilities.

The proposed configuration uses a single transformer secondary that feeds a simple pole. The center of the DC bus of each converter station is grounded, and the converter stations are connected to two transmission links at equal and opposite potentials (the HVDC poles or the cables): the positive pole and the negative pole. A schematic of the New Transmission is shown in Figure 14-2.

The project will include two VSC HVDC converter stations at each end of the transmission link: Fraser in Zone E (withdrawal point) and Astoria in Zone J (delivery point). At the withdrawal point, the northern converter station will connect to the NYSEG Fraser 345kV yard by installing a new breaker in a spare bay position in the existing breaker-and-a-half substation. At the delivery point, we plan to connect the southern converter station to the CECONY 345 kV Rainey Substation by installing two new breakers and expanding the existing ring bus to meet CECONY operations procedures and reliability standards.

The symmetrical monopole link will include a buried section of two 2,500 mm^2 underground cross-linked polyethylene (XLPE) HVDC cables. A fiber optic communication link will connect the two converter stations, with submarine portions of single-core 2500 mm^2 armored copper XLPE cable in the Hudson, Harlem, and East Rivers, to Zone J.

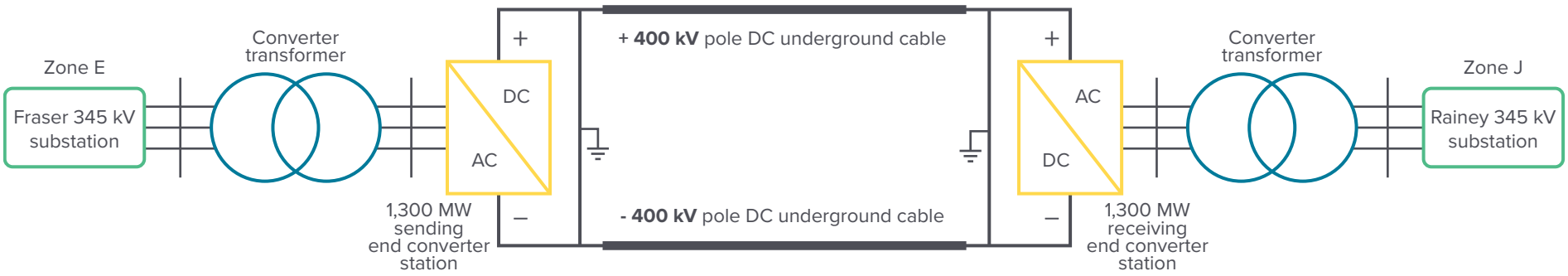


Figure 14-2. New Transmission schematic.

Enhanced system reliability

Clean Path New York New Transmission technology enhances the system reliability to include capabilities to respond and mitigate certain contingency events on the system. The VSC HVDC link controls can be configured, and the link can be scheduled to NYISO's requirements to respond to specific contingency events.

Clean Path New York reliability attributes can be summarized as follows:

- The New Transmission VSC HVDC terminals and their inherent performance characteristics can maintain and potentially increase significantly the transmission transfer capability (TTC) if considered as an integral part of TTC. Under contingency events, the VSC HVDC link controls can be configured, and the link can be scheduled to NYISO's requirements to respond to specific contingency events. This is not novel or unique: At multiple global and local projects, HVDC is an integral part of the existing internal control area interface and is managed by the relevant independent system operator. The Mackinac project in Michigan is an excellent example.[1] This can be done by measuring voltages and currents locally at the HVDC terminals and having the HVDC controls respond to changes in such data to meet NYISO TTC requirements and remain compliant with NERC requirements.
- The New Transmission VSC HVDC can emulate an AC line in terms of responding to a contingency. This can be done by automatically changing the power flow on the line based on sudden changes to the voltage phase angle at the terminals. This requires only locally measured signals at both ends, without the need for a wider communication protocol. In summary, the VSC is capable of automatic power changes (e.g., as part of an AC line emulation functionality) in the event of major disturbances that give a large change in the AC network impedance. This reduces the stresses on remaining AC transmission lines after a certain relevant contingency. Additionally, a VSC HVDC system design has an embedded fast reactive power control. The converter station at each end can independently act as a STATCOM device, offering reactive power support even when one terminal is out of operation. VSC stations have no minimum short circuit capacity requirement and can thus be used to black start one terminal from the other and quickly energize a blacked-out AC network.

Load savings

As New York progresses towards its CLCPA targets, the percentage of renewable generation on the system is expected to significantly increase. With this increase, congestion and curtailment must be addressed to ensure that benefits of these renewables are adequately captured. Clean Path New York will play a pivotal role in reducing congestion, reducing curtailment, and decreasing total load costs to customers and ratepayers as more and more of New York State's energy is generated from renewable sources.

Figure 14-3. Clean Path New York will play a pivotal role in increasing renewable generation.

[1] https://www.atc-projects.com/projects/mackinac-hvdc-flow-control-project/