NYISO BOARD OF DIRECTORS' SUMMARY OF PROPOSED MODIFICATIONS TO DRAFT AC TRANSMISSION PUBLIC POLICY TRANSMISSION PLANNING REPORT AND PROPOSED SELECTIONS

December 27, 2018

INTRODUCTION

NYISO staff submitted the draft AC Transmission Public Policy Transmission Planning Report ("Draft Report") to the NYISO Board of Directors ("Board") on June 19, 2018 for its review and action. The Draft Report summarized NYISO staff's analysis and recommendations concerning proposed solutions to address the AC Transmission Public Policy Transmission Needs identified by the New York Public Service Commission ("PSC"), which include the need to increase Central East transfer capability by at least 350 MW ("Segment A") and UPNY/SENY transfer capability by at least 900 MW ("Segment B").

In the Draft Report, NYISO staff recommended that the Board select as the more efficient or cost effective solution to address the AC Transmission Needs the Segment A Project T027 proposed jointly by North American Transmission ("NAT") and New York Power Authority ("NYPA") and the Segment B Project T029 also proposed by NAT and NYPA.

The Board provided interested parties with the opportunity to submit comments and to make oral presentations for the Board's consideration prior to its taking action on the Draft Report. Based on this input and the Board's independent review of the Draft Report, the Board directed NYISO staff to conduct certain additional studies and analyses.

After careful consideration of the initial Draft Report, comments provided by interested parties, and the additional analyses performed by NYISO staff, the Board concludes that the more efficient or cost effective solution for Segment A is Project T027. The Board also concludes that the most efficient or cost effective solution for Segment B is Project T019, which was jointly proposed by Niagara Mohawk Power Corporation d/b/a National Grid ("National Grid") and the New York Transco, LLC ("Transco"). The Board has directed that the Draft Report be modified accordingly.

The additional analyses and the Board's conclusions are summarized below and are detailed in an Addendum to the Draft Report prepared by NYISO staff ("Revised Report"). In accordance with the NYISO's tariff, the Revised Report is being returned to the Management Committee for further review and comment. Following the Board's consideration of these

comments, the Board will make its final determination on the Revised Report and the selection of the Public Policy Transmission Projects to address the AC Transmission Needs.

BACKGROUND

A. Board's Role in Approving Public Policy Transmission Planning Report and Selecting Public Policy Transmission Project

Section 31.4 of the NYISO's Open Access Transmission Tariff ("OATT") establishes the requirements for the NYISO's Public Policy Transmission Planning Process ("Public Policy Process") by which the NYISO addresses transmission needs that are driven by public policy requirements identified by the PSC. Pursuant to these requirements, NYISO staff develops a draft Public Policy Transmission Planning Report that sets forth its analyses and recommendations concerning proposed solutions to address a Public Policy Transmission Need. The draft report is submitted to the Electric System Planning Working Group ("ESPWG") and Transmission Planning Advisory Subcommittee ("TPAS") for stakeholders' review and comment and then forwarded to the Business Issues Committee and Management Committee for discussion and an advisory vote. Following the Management Committee vote, the draft report, with stakeholder input, is forwarded to the Board for its review and action.

The Board is ultimately responsible for selecting the more efficient or cost effective solution to address a Public Policy Transmission Need in accordance with the selection metrics established in the tariff. Section 31.4.11.2 of the OATT establishes the process for the Board's review and action on the Draft Report. Specifically, the "Board may approve the Public Policy Transmission Planning Report as submitted or propose modifications on its own motion, including a determination not to select a Public Policy Transmission Project to satisfy a Public Policy Transmission Need." If the Board proposes any changes to the report, "the revised report shall be returned to the Management Committee for comment." Furthermore, "[t]he Board shall not make a final determination on a revised report until it has reviewed the Management Committee comments, including comments regarding the Market Monitoring Unit's evaluation."

B. AC Transmission Process

In accordance with the OATT, NYISO staff developed the Draft Report, which summarized staff's analyses and recommendations based on its evaluation of proposed solutions to address the AC Transmission Public Policy Transmission Needs identified by the PSC. NYISO staff recommended as the more efficient or cost effective solutions to address the AC Transmission Needs (i) Segment A Project T027 proposed jointly by NAT/NYPA and (ii) Segment B Project T029 also proposed by NAT/NYPA.

NYISO staff reviewed the Draft Report with stakeholders at ESPWG/TPAS meetings and then forwarded the Draft Report first to the Business Issues Committee and then to the Management Committee for their review and advisory votes. On June 26, 2018, the Management Committee conducted an advisory vote on the Draft Report. The Management Committee approved the motion with 80% of the vote in favor (with abstentions) and Con Edison, National Grid, and Orange & Rockland voting against the motion.

NYISO staff then submitted the Draft Report to the Board for its review and action. Along with the Draft Report, NYISO staff provided the Board with the comments submitted by stakeholder and developers during the committee process. In addition, the Board invited stakeholders and developers to submit additional comments and to make oral presentations for the Board's consideration. At its July 2018 meeting, the Board heard oral presentations by NAT/NYPA, National Grid/Transco, and NextEra. National Grid/Transco also provided additional written comments at the oral presentations.

OVERVIEW OF MODIFICATIONS TO THE DRAFT REPORT

After careful consideration of the initial Draft Report, the comments and oral presentations provided by developers and stakeholders, and the additional analyses provided by NYISO staff, the Board has determined that certain changes are required to the Draft Report. The Board agrees that, as recommended in the initial Draft Report, the more efficient or cost effective solution for Segment A is Project T027. However, with respect to Segment B, the Board reaches a different conclusion than that recommended in the initial Draft Report.

The Board finds that the more efficient or cost effective transmission solution for Segment B is Project T019 rather than Project T029. The grounds for this conclusion are summarized below, and supporting data and analyses are included in the Addendum to the Revised Report.

Transfer Capability

In evaluating Segment B projects, the Board concludes that Project T019's additional transfer capability drives superior performance across a number of important selection metrics. As described in the Draft Report, transfer limits significantly impact metrics such as Cost-per-MW and Operability, as well as estimated Installed Capacity cost savings, among others. The Board directed NYISO staff to conduct additional analyses related to the calculation of transfer limits for each of the proposed projects and to evaluate the resulting impact on key metrics, as discussed below.

Project T019 provides significantly greater transfer capability across the Upstate New York to Southeast New York ("UPNY/SENY") transmission interface as compared to all other

Segment B projects. This additional transfer capability provides several important benefits, as described below.

Project T019 provides important benefits by alleviating, to a greater extent than any other Segment B project, constraints that limit the economic flow of power between upstate resources the downstate load centers. In addition, Project T019's incremental transfer capability across the UPNY/SENY transmission interface will significantly improve grid resilience grid during stressed system conditions and disruptive events. Further, the Project T019's superior transfer capability will provide for greater future operating flexibility, particularly for managing generator outages or retirements in the Lower Hudson Valley. This will improve grid resilience and support the continued evolution of New York's energy landscape.

The additional transfer capability provided by Project T019 will make the greatest use of the Segment B corridor now, and it will allow New York to realize even greater benefits under a variety of future system conditions. The Board concludes that the Performance metric should take into account the increased utilization of the Segment B corridor and the additional benefits that a project would provide in the future if downstream limitations are alleviated, which potentially could be achieved without significant additional transmission development.

Evaluating the transfer limits assuming all facilities in service (N-1), NYISO staff produced a supplemental calculation of the Cost-per-MW ratio, which is contained in the Addendum. Based on the independent cost estimates provided by the NYISO independent consultant Substation Engineering Company (SECO), for each project and the revised transfer limits, the recalculated results continue to show that Project T019 has the lowest Cost-per-MW ratio of all Segment B projects.

The Board requested further evaluation of the extent to which each of the Segment B projects could accommodate additional generation retirements within the Lower Hudson Valley, should they occur, while maintaining reliability. Project T019 performs best among Segment B projects in this analysis as a result of its greater transfer capability. Under certain scenarios examined, Project T019 would accommodate significant additional generation retirements from the Lower Hudson Valley as compared to other Segment B projects. The Board views this to be a significant benefit that should be recognized under the Operability metric and impact project ranking.

This aspect of the Board's rationale for selecting Project T019 for Segment B is similar to its rationale for selecting Project T027 for Segment A. The superior transfer capabilities of these projects provide significant benefits that exceed those offered by the other proposed projects. The Board concludes that it is critically important to maximize the transmission capacity of these important rights-of-way at this juncture, especially when considering that no major AC transmission infrastructure has been developed in New York in over 30 years.

Installed Capacity Cost Savings

In the Draft Report, estimated Installed Capacity cost savings were identified for purposes of supporting a Board decision to select a project, rather than to differentiate among specific projects. The Draft Report provided estimated capacity cost savings for projects in Tier 1 and 2. NYISO staff did not evaluate the capacity benefits for Project T019, however, as it was initially classified as a Tier 3 project.

The Board views relative Installed Capacity cost savings as an appropriate and important consideration, among others, when comparing overall project performance. The Board notes that Installed Capacity costs are identified as a potential selection metric in the NYISO tariff. Therefore, the Board asked NYISO staff to conduct further analysis evaluating whether particular Segment B projects, including T019, are likely to produce greater Installed Capacity cost savings relative to the other proposed projects.

The additional analysis indicates that Project T019's configuration provides the potential for materially greater Installed Capacity cost savings than the competing projects. While it is difficult to predict these future cost savings with precision, NYISO staff, with assistance from GE, calculated reasonable estimates using the "optimizer" tool accepted by FERC for purposes of calculating Locational Minimum Installed Capacity Requirements (LCRs). These estimates show that T019's incremental Installed Capacity savings range from $160 million to $224 million over 20 years as compared to other proposed projects. The NYISO's Market Monitoring Unit ("MMU"), Potomac Economics, developed an estimate using a different methodology indicating incremental Installed Capacity cost savings associated with T019 ranging from $19 million to $69 million. The MMU emphasized that its calculation methodology is sensitive to various assumptions and noted that the expected cost savings is likely to be higher.

While the estimates vary under different calculation methodologies and scenarios, Project T019 has been shown to consistently produce the highest level of Installed Capacity cost savings among the proposed Segment B projects. This is a significant finding that is important to consumers. The Board therefore concludes that it should be considered in the project ranking.

Resilience Benefits

Value of Structures that Exceed Minimum Standards

The foundations and structures proposed for Project T019 are designed to specifications that exceed minimum engineering standards. The Draft Report recognized that benefit under the Operability metric.

The Board asked NYISO staff to provide further information on how the design of these structures provides additional resilience benefits. These benefits include the ability of the towers to withstand a higher level of icing and wind storm events. The structures proposed by Project

T019 could potentially avoid, or mitigate the extent of, catastrophic tower collapses, including cascading structure failures, such as those experienced in the 1998 ice storm in northern New York. The Board is particularly cognizant of the importance of resilience and the need to prepare the electric grid for extreme weather events and other contingencies.

While the cost associated with the structures is higher, the design provides benefits that are not provided by any other proposed project. The Board concludes that the incremental benefit of this design should be recognized more prominently in the Operability metric and in the project ranking.

Value of Additional Transfer Capability

Improving transmission capability within New York State has the additional benefit of improving the resilience of the transmission grid during stressed system conditions and disruptive events. These events can occur because of many different factors; examples include extreme storm conditions which can result in a large number of bulk electric system transmission outages or during events when critical supply resources are forced out of service or otherwise unavailable.

Therefore, the Board has concluded that the resilience benefit of the additional transfer capability provided by Project T019 should be reflected in the Operability metric and in the project ranking.

Structure Height

The Draft Report considered structure height to differentiate among projects. The Board acknowledges that the risk of obtaining siting approval is an appropriate metric for the NYISO to consider in accordance with its tariff. However, the Board views structure height as a siting issue that is more appropriately addressed through the Article VII siting process.

This finding is consistent with statements made by the PSC in its Order finding a Public Policy Transmission Need. In its December 17, 2015 order establishing the AC Transmission Needs, the PSC stated that "[a]s to structure heights, the Commission will not mandate criteria to be applied by the NYISO . . . ." Instead, the PSC stated that "all proposers of transmission solutions should be aware as they prepare their submissions that minimization of structure heights will be an important issue in the siting review process so applicants should be careful not to lock themselves into designs that could not later be approved." Moreover, the PSC said that "a change in structure types and structure heights of the types contemplated may have local, site specific visual impacts" that would be addressed by the Commission and the Staff in the Article VII siting process. Finally, with respect to visual impacts from a reduction in the total number of structures used, the PSC determined that "the NYISO would not have sufficient information to determine such impacts and the Commission does not want to convert the NYISO process into a

siting process. Those matters will be further addressed by the Commission in the Article VII siting cases."

Taken together, these statements are consistent with the view that the PSC, not the NYISO, should address the visual impacts resulting from the number and height of structures used by developers and that the PSC will determine whether to require modifications to address these issues in Article VII siting proceedings. Accordingly, the Board concludes that structure height as a risk to project siting should not be used to differentiate among projects.

Series Compensation

National Grid and Transco proposed a series compensation element as part of Project T019. The Draft Report identified a potential for subsynchronous resonance ("SSR") caused by the interaction of the proposed series compensation and nearby synchronous generators. The Draft Report indicated this to be a potential risk to project completion.

National Grid and Transco submitted an initial screening study that indicated that the proposed series compensation would not present a material SSR risk. However, a subsequent System Impact Study for T019 completed in the NYISO's interconnection process found that SSR potentially could be an issue.

In light of these preliminary study results and related stakeholder comments, the Board requested that NYISO staff conduct further analysis to examine potential mitigation measures for SSR risk and the estimated cost of such measures. NYISO staff engaged ABB to perform an independent assessment that concluded that potential SSR issues caused by the series compensation feature of T019 can be mitigated through cost effective upgrades. ABB identified a range of viable mitigation approaches, the most costly of which was approximately $5 million.

Based on the ABB assessment, the Board is satisfied that any potential SSR issues resulting from the series compensation can be adequately mitigated in a cost effective manner. The need for, and design of, the appropriate mitigation measures will be determined in the interconnection process and design phase for T019. The Board therefore concludes that series compensation and the potential for SSR should not negatively impact T019's ranking.

The Board also asked NYISO staff whether there are potential operational benefits associated with the series compensation capability of Project T019. NYISO staff advised that series compensation provides an improved level of control of Segment B power flows. Specifically, the NYISO can direct the proposed series compensation to be switched in or out of service in response to grid reliability needs or to provide for more efficient use of the New York State transmission system, which can result in lower overall energy market costs and provide benefit to consumers. The NYISO has realized similar operational benefits, both from a grid reliability and energy market administration perspective, by directing the switching of the existing series compensation on the Marcy-South transmission lines based on expected summer

and winter seasonal congestion patterns. The Board concludes that this benefit should be reflected in the Operability metric for T019.

Production Cost Analysis / Carbon Pricing

In the Draft Report, Project T019 produced incremental production cost savings of $50M over Project T029. The Board asked NYISO staff to perform additional production cost analyses to evaluate the potential impact of incorporating carbon pricing in the NYISO's wholesale market on the relative cost-effectiveness of the proposed Segment B projects.

NYISO staff evaluated Segment A Project T027 in combination with the proposed Segment B projects under a carbon pricing scenario.[1] NYISO staff's analysis found that while there were increased production cost savings offered by all relevant Segment B projects, with Project T019 demonstrating a marginal $3M increase in production cost savings, the inclusion of the social cost of carbon did not alter the comparative ranking of projects with regard to production cost savings relative to capital cost.

Middletown Transformer

Project T029 and Project T030 included as part of their proposals the replacement of an existing transformer at Orange and Rockland's (O&R's) Middletown substation with a new transformer with higher ratings.

O&R expressed concerns over the physical feasibility of this upgrade. O&R also identified a potential need for additional Network Upgrade Facilities at the Middletown substation, the Middletown – Shoemaker 138 kV line, and Shoemaker 138 kV substation and raised concerns related to the space required for the proposed transformer, permitting, and outage coordination.

In response to O&R's concerns, the Board asked NYISO staff to conduct additional review on the feasibility issues surrounding the proposed transformer replacement. NYISO staff directed SECO to conduct a site visit to perform an independent physical feasibility evaluation and environmental assessment. O&R was present at the site visit. SECO determined that the larger transformer would fit in the existing available space in the Middletown substation. SECO also determined that the installation of the proposed transformer is physically feasible without impacting the nearby wetlands.

[1] Simulations were not performed for T030 (North America Transmission/NYPA) because in all CES cases it underperforms T029 in production cost savings.

SECO noted that additional equipment at Middletown Substation would have to be replaced and/or relocated. Any additional upgrades associated with the Middletown transformer replacement identified in the system impact study would have be further evaluated in the Facilities Study. This study would refine upgrades identified with respect to equipment, design detail and cost, as applicable. It was additionally found that the Middletown transformer would not provide significant incremental UPNY/SENY transfer capability benefits under transmission outage conditions when considering the alternate generation dispatch methodology described in the Addendum. On balance, the proposed Middletown transformer replacement was not a material factor in the Board's selection.

Synergy v. Diversity

The Draft Report considers the potential impact of cost savings in the event that the same developer constructs both Segment A and Segment B. This is consistent with the PSC Order that indicated that such savings "may be considered" in such event. NYISO staff sought input, reflected in the Draft Report, from its independent consultant on the categories of costs that may experience savings. Based on this data, NYISO used a value of 5% potential synergy savings.

The Board asked staff to consider whether having a *diversity* of project developers (*i.e.*, different developer for Segments A and B) could provide benefits unrelated to project costs. NYISO staff evaluated the issue and sought input from its consultant. While NYISO staff was unable to quantify a dollar value associated with diversity, NYISO's consultant indicated that having different developers for each segment could bring qualitative benefits, such as diversifying financing risks of the projects and increasing the availability of additional resources to support project development. The Board concludes that such qualitative benefits are relevant to the Board's selection.

Additional Observations

The Board notes the additional conclusions from the Draft Report:

- Project T019 produces the greatest incremental voltage transfer limits across the Central East and UPNY/Con Ed interfaces.
- Project T019 has the lowest UPNY/SENY Cost-per-MW.
- Project T019 produces the greatest baseline production cost savings.
- Project T019 produces the greatest production cost savings for the CES+Retirement scenario.
- Project T019 produces greater CO_2 reductions.
- Project T019 produces the greatest 20-year incremental energy flow across UPNY/SENY and Central East interfaces.

Conclusion and Next Steps

Based upon the additional analysis and due diligence and careful examination of various findings in the original Draft Report, the Board concludes that Project T019 demonstrates superior performance across a broader range of metrics when compared to T029 and all other Segment B projects. This superior performance warrants the estimated additional costs of Project T019 compared to other Segment B projects, and this Project T019 will best serve the interest of New York ratepayers.

The significant distinguishing factor among the proposed Segment B projects is Project T019's additional transfer capacity across the UPNY-SENY transmission interface, which drives superior performance across a number of important metrics. The Board finds this especially compelling in recognition that Segment B of the AC Transmission Public Policy Transmission Need was focused specifically on increasing the transfer capability of this critical transmission interface.

Therefore, the Board concludes that Project T019 is the more efficient and cost effective Segment B project. Final selection of the projects will only occur after stakeholders have had the opportunity to comment on the revised report and the Board has had the opportunity to consider those comments.

Over the past six months, the Board has considered inputs from a number of sources including the Draft Report; the developers' proposals; assessments by several independent consultants including GE, SECO, and ABB; oral and written stakeholder comments; and input from the independent MMU, Potomac Economics. The Board has diligently weighed these inputs against the various metrics set forth in the NYISO tariffs and exercised its judgment on a wide variety of engineering, operational, economic, and other issues. Recognizing the NYISO's dual roles as transmission system operator and wholesale market administrator, this Board's challenge is to select the more efficient or cost effective transmission projects to address New York State's public policy needs. Subject to consideration of further comments from stakeholders and the MMU, the Board has identified the two projects that will best serve the interests of New York's electric consumers well into the future.

Attached to this memo is the Revised Report. The Addendum to the Revised Report reflects the Board's proposed changes to the recommendations in the Draft Report and details the additional analysis described above. Pursuant to Section 31.4.11.2 of the OATT, the Revised Report will be returned to the Management Committee for further comment. Following the Board's consideration of these comments, the Board will make its final determination on the Revised Report and the selection of the Public Policy Transmission Projects to address the AC Transmission Needs.

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