ATLANTIC
ECONOMICS

MEMORANDUM

DATE: March 2, 2021

TO: Mike DeSocio and Nicole Bouchez

FROM: Mike Cadwalader

RE: Prioritizing Medium-Term and Long-Term Grid in Transition Recommendations

---

On December 7, 2020, the ISO presented its proposal for prioritizing recommendations made in the Grid in Transition report[1] (as well as some other reports, such as the Climate Change Phase II report). It categorized those proposed changes as:

- Short-term or underway, consisting of projects that "should be considered over the next 3+ years."[2]
- Medium-term, consisting of projects that "should be considered beyond 3+ years or after all Short-Term items have been considered."[3]
- Long-term, consisting of projects that "are not pressing and should be considered after Short-Term and Medium-term items have been considered."[4]

The ISO sought comment on this proposed prioritization. Specifically, the ISO indicated that it most urgently needs comment on (1) recommendations that it identified as short-

---

[1] Reliability and Market Considerations for a Grid in Transition (Dec. 20, 2019), available at: https://www.nyiso.com/documents/20142/2224547/Reliability-and-Market-Considerations-for-a-Grid-in-Transition-20191220%20Final.pdf/61a69b2e-0ca3-f18c-cc39-88a793469d50.

[2] Nicole Bouchez, Proposed Approach for Considering Grid in Transition RecommendFations (Dec. 7, 2020) ("December 7 Presentation") at 20, available at: https://www.nyiso.com/documents/20142/17450815/20201201%20NYISO%20-%20Approach%20for%20Considering%20Grid%20in%20Transition%20Recommendations%20FOR%20POSTING.pdf/72e26e3e-448f-36e3-7a7f-7d5f3920fa65.

[3] *Id.*

[4] *Id.*

10 Tower Office Park, Suite 408, Woburn, MA 01801
T: 781-281-0553 C: 617-875-7723 mdc@AtlanticEconomics.com

term projects that should not be short-term projects, and (2) recommendations that it did not identify as short-term projects that should have been short-term projects, to inform the ISO's resource allocation decisions for 2021.

In the interest of responding to the ISO's inquiry as quickly as possible, the Transmission Owners' ("TOs")[5] provided comments on January 19 addressing those two questions. At that time, the TOs indicated that they would return later with additional comments that would address the other aspects of the ISO's proposed prioritization that was described in the December 7 Presentation. This memo contains those comments.

- The first two sections of this memo address medium-term projects.
    - The first section lists recommendations that the ISO identified as medium-term projects in cases where the TOs would like to suggest modifications, or require further information.[6] In several cases, when the TOs believe that multiple projects should be undertaken simultaneously, we address more than one recommendation at a time.
    - The second section lists additional recommendations that the TOs believe should be classified as medium-term projects.
- The third and fourth sections of this memo address long-term projects.
    - The third section lists recommendations that the ISO identified as long-term projects in cases where the TOs would like to suggest modifications, or require further information.
    - The fourth section lists an additional recommendation that the TOs believe should be classified as a long-term project.

[5] The NYTOs are: Central Hudson Gas & Electric Corporation, Consolidated Edison Company of New York, Inc., New York Power Authority, New York State Electric & Gas Corporation, Niagara Mohawk Power Corp. (d/b/a National Grid), Orange and Rockland Utilities, Inc., Long Island Power Authority, and Rochester Gas and Electric Corporation.

[6] This memo contains comments on most, but not all, of the medium-term and long-term projects proposed by the ISO in the December 7 Presentation. The TOs concur with the ISO's recommendations regarding the projects that were included in the December 7 Presentation that are not addressed in this memo.

I. RECOMMENDATIONS THAT THE ISO IDENTIFIED AS MEDIUM-TERM PROJECTS

Non-continuous and long-duration Energy Storage Resources ("ESRs") (page 23)[7]

Develop the ability to manage energy limits over a day or more (i.e., more than 24 hours) (page 31)

The ISO originally intended for its ESR participation model to accommodate three-state ESRs—i.e., ESRs that could be in an injection state, a withdrawal state, or an idle state. However, while concerns about the ability of the software to produce solutions quickly enough when there are large numbers of three-state ESRs led the ISO to defer that plan, it also became apparent that few, if any, of the ESRs in the interconnection queue would benefit significantly from the implementation of this proposal, as their cost structures could adequately be reflected by the ESR model that the ISO implemented, which models ESRs as being continuously dispatchable between their maximum withdrawal levels and their maximum injection levels.

To the TOs' knowledge, there has not been an influx of ESRs into the generation queue that would benefit significantly from this functionality. Given that, we question whether developing the software changes that would be necessary for ESRs to have this capability should be a medium-term project. Instead, developing this capability should be a long-term project.

The project proposed on page 31 of the December 7 Presentation is similar to the second part of the project proposed on page 23. Unless the ISO can show that ESRs that will need this functionality are likely to be developed within the next few years, the TOs believe that developing this capability should be a long-term project, not a medium-term project. (Modifications to RTC that would improve its ability to determine schedules for shorter-duration ESRs may also address the needs of longer-duration ESRs, so this aspect of the project may be unnecessary.)

Enabling improved demand participation through evolving SCR and EDRP programs (page 23)

As the grid relies more heavily on intermittent resources, it will be very important to facilitate increased demand participation, because it will likely be necessary to rely more heavily on demand response not just during peak hours, but also at times when output from intermittent resources is less than had been forecasted. With that noted, it is unclear what the ISO envisions it would do under this project that it is not already planning to do in the "Engaging the Demand Side" project, which the ISO will

[7] All page references are to the December 7 Presentation.

undertake this year. Under that project, the ISO will "work with … stakeholders to identify opportunities to enable more demand side participation in the wholesale markets, such as including flexible load as supply in the price formation in the Installed Capacity and Energy markets…. Potential changes to [the] SCR program to better align with … operational needs may also be considered."[8] Similarly, the ISO's DER participation model should facilitate the ability of demand-side resources to participate in wholesale markets. Therefore, before the TOs can state an opinion on whether this project has been correctly prioritized, the TOs will need additional information from the ISO clarifying how this project would differ from or build upon efforts to facilitate demand side participation that are already underway or are about to begin.

Sunset other market products (page 23)

In general, the TOs believe that eliminating the need to maintain unused or lightly used products is a reasonable medium-term suggestion that would facilitate future project development. However, it will be necessary to evaluate these proposals on a case-by-case basis to ensure that it would be reasonable to eliminate individual products.

Is the NYISO getting significant amounts of demand response providing operating reserves? If not, why not? (page 27)

The TOs believe this should be a long-term proposal, rather than a medium-term proposal. While it would be desirable to identify and eliminate any barriers that may preclude some potential suppliers of operating reserve—such as demand-response resources—from providing operating reserve, these providers may also be chosen not to provide operating reserve for the simple reason that it is expensive for them to do so. Given that, the potential benefits from this analysis are sufficiently limited that it should be deferred to the long term.

Does the stepwise construct of the demand curves create inefficiencies with resource commitments? (page 27)

Consider more sloped/continuous demand curves (page 32)

The recently filed revisions to the 30-minute reserve demand curve for the NYCA should reduce the frequency with which a small difference in the amount by which the ISO is short, relative to its 30-minute reserve requirement can have a large effect on the commitment and dispatch. Since small differences in shortages relative to some or the

[8] 2021 Market Projects (Jan. 21, 2021), at 38, available at: https://www.nyiso.com/documents/20142/18559701/2021%20Market%20Design%20Project%20Outlook.pdf/0094ad10-3eea-bf35-10ce-fb20592a6d33.

ISO's other operating reserve demand requirements can have a similar impact, the TOs believe the former project is reasonable for the medium term.

While the latter project would assess whether "the discontinuous demand curves are having negative operational consequences such as commitments to meet load and reserve needs leading to system minimum generation situations in light load periods," the ISO should study this at the same time as it assesses changes to the operating reserve demand curves for other reasons.

Track real-time interchange transaction offers and projected prices from RTC and neighbors' look-ahead tools and address any consistent biases to improve liquidity (page 27)

The ISO proposed two other medium-term projects, under which the ISO would (1) consider adjusting look-ahead evaluations of RTD and RTC to be more consistent with the timing of external transaction ramp and gas turbine commitment,[9] and (2) consider ways to improve 15-minute and CTS scheduling by reducing forecast latency and/or move the process into RTD.[10] By improving the accuracy of the forecasts used by the ISO to commit and dispatch internal resources in the real-time market, those projects should make that commitment and dispatch more efficient, as well as making interchange more efficient.

Given the existence of those projects, it is unclear to the TOs what this project would add, so the TOs request additional explanation from the ISO explaining why this project should be undertaken in addition to those other projects. If this assessment is undertaken, the TOs believe that it should focus on producing more accurate RTC forecasts, rather than addressing biases in RTC's forecasts. Market participants can adopt bidding strategies that offset the impact of bias, but inaccurate forecasts can cause them to incur losses on interchange transactions that were expected to be profitable when they were scheduled by RTC.

Evaluate more frequent and/or five-minute interchange scheduling protocols with neighbors (page 28)

Last year, the ISO prepared a report on five-minute scheduling with adjoining control areas last year, which would make additional resources available to balance the output of intermittent resources. That would be beneficial in the medium term as the ISO brings more intermittent resources on line, so the TOs concur that this is a reasonable medium-term project. In that study, the ISO indicated its preference for modeling the

[9] December 7 Presentation at 28 and 29.

[10] *Id.* at 29.

external control area that is participating in five-minute interchange scheduling as a generator in RTD, instead of modifying RTD to employ a version of the transaction model that is currently used by SCUC and RTC.[11] That study reached its conclusions without evaluating the benefits and costs of each of those approaches, which was unfortunate because modeling external control areas as generators may limit the efficiency improvements that would result from this project. Accordingly, the ISO should assess the benefits and costs associated with each of those approaches and reach a conclusion based on that assessment.

Consider enhancements to the Real-Time Dispatch Corrective Action Mode (RTD-CAM) that would allow for periodic quick dispatches to address high system volatility (page 28)

While the ability to perform these quick dispatches would be desirable, we do not know how often it would be applied. If the ISO does not expect to use this capability often, then the project should be deferred. Accordingly, the ISO should assess how often it expects to use this capability once it has been developed, and what benefits would result from using that capability. Only then will it be possible to determine whether this is a reasonable medium-term project.

Consider adjusting look-ahead evaluations of RTD and RTC to be more consistent with the timing of external transaction ramp and gas turbine commitment. (SOM-2012-13) (pages 28 and 29)

The TOs have supported this recommendation since the MMU first made it. It includes several different actions that the ISO could undertake to make RTC and RTD more consistent, which (as noted above) should lead to efficiency improvements in the commitment and dispatch of internal resources and the scheduling of interchange in the real-time market. However, the TOs believe that the ISO should consider making this a short-term project, rather than a medium-term project. The benefits from better coordination between RTC and RTD should grow as additional intermittent resources enter the market, as that will make it more important to operate flexible resources using short-term forecasts as efficiently as possible. It would be best to implement these modifications to RTC and/or RTD sooner rather than later so that the ISO will have experience implementing them before large numbers of intermittent resources enter service.

[11] 5-Minute Transaction Scheduling (Oct. 2020) at 13, available at: https://www.nyiso.com/documents/20142/16564733/5-Minute%20Transaction%20Scheduling%20Study.pdf/ffa83a92-b739-16aa-770a-6009192eb0b2.

Consider ways to improve 15-minute and CTS scheduling by reducing forecast latency and/or move the process into RTD (page 29)

In general, the TOs agree that it would be reasonable for the ISO, in the medium term, to investigate whether it can reduce the amount of time needed to determine the net load forecast, which would improve net load forecast latency for both RTC and RTD, making them both more efficient.

Additionally, the TOs agree that it would be reasonable for the ISO, in the medium term, to consider modifying RTD so that it could commit quick-start units and schedule interchange. This would reduce net load forecast latency used to make these determinations by moving commitment and interchange scheduling decisions from RTC to RTD. Eliminating the need for RTC to make these assessments would also improve solution time for RTC, which will become more important if the time horizon for RTC is modified so that it looks over a longer time horizon period, which would improve its ability to determine schedules for ESRs and to make intraday commitments to deal with changes in weather forecasts, as discussed in more detail below.

However, in addition to this project, the ISO also plans to start a project this year which will focus on understanding and considering ways to reduce latency in the forecasts of load and the output of intermittent resources.[12] The ISO has also proposed a long-term project, which would consider if commitment of quick start units should be in RTD and determine whether all real-time interchange scheduling should move to RTD.[13] There is a lot of overlap here, and as a result, it is unclear to the TOs what the ISO proposes to do in the short term, what it proposes to do in the medium term, and what it proposes to do in the long term.

In particular, the ISO's proposed long-term project would consider whether to move commitment of all quick-start units, not just 15-minute units, into RTD, and would consider whether to schedule all real-time interchange, not just CTS interchange, in RTD. In other words, it effectively seems to break the consideration of these issues into two phases, one phase to be addressed in the medium term, and one to be addressed in the long term. If this was the ISO's intent, the TOs would like to understand the basis for that split.

---

[12] James Pigeon, Proposed Approach for Considering Grid in Transition Recommendations in 2021 (Feb. 9, 2021) ("2021 GIT Projects Presentation") at 21, available at: https://www.nyiso.com/documents/20142/19060533/20210209%20NYISO%20-%20Proposed%20Approach%20for%20Considering%20Grid%20in%20Transition%20Recommendations%20in%202021%20(002).pdf/b986ba50-817a-2da2-e373-b977afe603b0.

[13] *Id.*

Are changes in the forecast load and the reliability commitment pass needed? (page 30)

Revisit using the maximum load forecast for the hour to ensure the DAM commits resources to meet the maximum ramping needs across the hours and day, or alternatively consider understating the ramp rates of resources in SCUC (page 30)

The ISO should assess whether the reliability commitment pass of SCUC should commit more capacity than is needed to meet forecasted load at the same time it assesses whether the forecasted load should reflect the average forecasted load for each hour or the maximum forecasted load for each hour, since those are closely related questions which, in the TOs' view, are a reasonable short-term project.

The TOs do not understand why the ISO would consider understating ramp rates in SCUC, so the TOs do not recommend pursuing that project in either the medium term or the long term. This approach would likely cause the most efficient operating reserve providers might be scheduled to provide less operating reserve and more energy while other resources provide more operating reserve and less energy. In addition, this approach would give such resources an incentive to self-schedule, or to overstate their ramp rates to offset the impact of the ISO's understatement. The ISO's proposed long-term project to define ramping requirements and a ramping services product (discussed in Section III of this memo) would better address the need to commit additional capacity in the DAM.

Determine whether constraints for energy/run limited resources can be effectively managed through existing market participation rules (page 31)

Develop new concepts: dispatch price based on energy in storage (page 31)

Are additional market power mitigation measures needed for resources with energy limitations? (page 31)

While the TOs believe that it would be reasonable for the ISO to assess whether the markets can effectively manage constraints for limited duration resources using the current market tools, the TOs believe that the ISO should consider a medium-term project that would address the changes in those rules that would be necessary if the current rules are not sufficient.

One of the ISO's proposed long-term projects would assess whether RTC should look out further to commit slower resources due to changes in weather conditions from those that were anticipated in the DAM. While this project assists with respect to optimizing the commitment to account for changing weather conditions (which is likely to become a growing concern as the ISO increasingly relies on intermittent resources

whose output depends on the weather), extending RTC's horizon will also improve RTC's ability to optimize the operation of limited duration resources when there are significant intertemporal trade-offs resulting from energy storage limitations.

Because RTC only looks over a 2½-hour horizon, it will generally fail to determine optimal schedules for ESRs that are likely to charge earlier in the day and discharge later in the day. As a result, ESRs are likely to self-schedule in the real-time market (either explicitly, or implicitly by submitting very high bids and very low bids). This will be inefficient for several reasons. The operators ESRs do not have the information that the ISO has regarding expected future system conditions, or other resources that are available to the ISO. Market power mitigation measures may also impede the ability of ESRs to self-optimize their within-day schedules. And the time lag between when offers are submitted and when they take effect makes it more difficult for operators to self-optimize, inhibiting their ability to respond quickly to real-time price spikes. A longer horizon in RTC would permit it to do a better job scheduling these resources, thereby reducing incentives for ESRs to self-schedule in the real-time market.

Increased reliance on ESRs to provide operating reserve will also require that both the DAM and RTC ensure that ESRs that are scheduled to provide operating reserves have enough energy stored to meet operating reserves needs and forecasted energy needs over the rest of the day. These changes would also affect interchange schedules and the commitment/decommitment of slower-starting internal generators, both in the DAM and the real-time market.

Given the rapid proliferation of ESRs that is expected over the next few years, the TOs believe the ISO should consider making this a medium-term project rather than a long-term one. In addition, since changes to procedures for calculating prices should accompany changes in scheduling procedures that would account for energy in storage, and since both of these changes are likely to lead to the need to review market power mitigation procedures, the TOs recommend undertaking all of these projects at the same time.

In addition, the market power mitigation procedures for ESRs should be reviewed in the medium term because these reference levels, which are intended to reflect an ESR's opportunity costs, are relatively new and untried. While they appear to be reasonable, it is likely that the ISO will be able to identify improvements once it has more experience in applying mitigation to ESRs.

Expand provider eligibility for operating reserve, and improve modeling of existing resources to ensure operating reserves are deliverable (page 32)

Consider allowing aggregations of DERs and hybrid resources to supply operating reserves (page 32)

In comments on the ISO's proposed short-term projects that the TOs provided on January 19, the TOs proposed a short-term project that would seek to expand eligibility for providers of spinning reserve, as originally proposed in Appendix B of the Grid in Transition report (i.e., the Reliability Gap Analysis).[14] The TOs do not know if the first of these projects would consider any expansions of eligibility for operating reserve providers other than (1) those the TOs have already proposed, or (2) the aggregations of DERs and hybrid resources that would be considered under the latter of the projects above. Therefore, the TOs need additional information before they can assess whether expanding eligibility for operating reserve providers should be a medium-term project.

With respect to improving modeling of existing resources to ensure deliverability of operating reserves, the TOs need additional clarification as to what analysis the ISO intends. Under the Reserve Enhancements for Constrained Areas project, which the ISO will begin this year, operating reserve requirements for an area should be reduced if and only if operating reserves from outside that area are deliverable to that area, so it is not clear what the ISO would need to assess to ensure that operating reserves are deliverable.

Evaluate treatment of response rates in scheduling/deploying reserves (page 32)

Under this project, the ISO would assess whether it should dispatch resources using normal response rates, rather than emergency response rates, during reserve pickups ("RPUs"), suggesting that doing so might permit the ISO "to better manage transmission constraints during stressed conditions" and might "provide more opportunity for scheduling reserves on combined cycle units."

It is not clear to the TOs why the ISO is considering this project. It would remove the ability for resources to specify different response rates to be used during normal grid operations and during RPUs. As a result, it might fail to use available ramping capacity during RPUs, which would be inefficient. Alternatively, it might induce resources to increase the single response rate that would be used during both normal grid operations and RPUs, which would permit them to respond more quickly to RPUs (when prices might be high), but that also lead to inefficiency the rest of the time, as those resources might incur additional costs as a result of ramping quickly during normal grid

[14] Reliability Gap Analysis at 90.

operations. While this proposal might permit combined cycle units to provide additional operating reserve, if that result occurs simply because the amount of operating reserve that their competitors can provide has been limited artificially, the TOs would not consider that to be a benefit. Therefore, the TOs request more explanation as to why this project might be beneficial.

Determine need for longer lead-time replacement reserves (page 32)

In comments on the ISO's proposed short-term projects that the TOs provided on January 19, the TOs proposed a short-term project that would focus on balancing intermittent resources. In the first phase of that project, the ISO would identify the system attributes and flexibility needed to maintain reliability on the grid in the future, while in the second phase, the ISO would determine which products would best provide the needed attributes. One of those products could be longer lead-time replacement reserves. The changing resource mix may create the need for such reserves, as ESRs and other energy limited resources are unlikely to be able to provide energy for as long as fossil generators. As a result, it may be necessary to replace those resources once they run out of energy. Resources that cannot respond quickly enough to provide operating reserves under the current rules could provide longer lead-time replacement reserves, as could resources whose ability to provide operating reserves is limited by the amount that they can ramp within 30 minutes.

Therefore, while the TOs believe this is a reasonable medium-term project, the TOs also believe that it would be subsumed within the project focusing on balancing intermittent resources that was proposed by the TOs.

Investigate the ability to use regulation to meet sustained imbalances up or down without large ACE imbalances (page 33)

Using regulating capacity is an inefficient way of meeting sustained imbalances, both because it is expensive to rely on fossil units to provide regulation if energy prices are low or negative (as they may frequently be in the future once significant amounts of intermittent capacity comes online), and also because increasing regulation requirements decreases the incentive role of real-time energy prices because larger amounts of capacity are responding to AGC signals, which are not bid-based, rather than RTD basepoints, which are bid-based. Therefore, while there might be a need to rely on regulating capacity to meet any sustained imbalances in the short term as a stopgap, the TOs believe that the ISO should focus on other methods for addressing any sustained imbalances in the medium term.

Improve voltage support incentives (page 34)

This project would assess whether voltage support incentives are sufficient to induce asynchronous resources to provide voltage support. This may be a reasonable project, given that the payments made to providers of voltage support have nothing to do with the costs that an asynchronous resource would incur to provide voltage support, but only if the ISO expects that a large portion of the intermittent and storage resources that will interconnect in the future will be asynchronous resources. Therefore, the ISO should assess whether it expects significant quantities of such resources to enter the market before proceeding with this study.

This project would also consider whether "voltage support commitments should be included in the Day-Ahead Market." The TOs do not understand the reason for that aspect of the project. Generators that must forego profitable sales of real energy because they must reduce their output of real power so that they can produce or absorb reactive power are eligible for opportunity cost payments.[15] Our understanding is that those payments are minimal because the need for generators to produce or absorb reactive power almost never affects the amount of real power they can generate. Given that, unless there is some reason to expect that due to the changing resource mix, generators will need to produce or absorb reactive power in a manner that will have a much greater impact the amount of real power they can generate than it has had historically, the TOs do not see why it is necessary to consider voltage support commitments in the DAM. Therefore, the ISO should explain the reason for this aspect of the project.

Review NYCA-wide and local black start requirements and Incentives (page 34)

The TOs believe that a review of black start requirements is a reasonable medium-term project, given the need to reassess the adequacy of black start plans and the types of resources that will be needed to provide black start capability. However, since compensation for black start providers is cost-based, and since black start service cannot realistically be procured in a market, the TOs do not see why the ISO would review incentives, so the ISO should provide additional explanation regarding that part of the project.

Consider resource outage scheduling improvements to accommodate shifts in net load variations due to intermittent resource penetration, which has implications for defining the Peak Load Windows (page 35)

The Reliability Gap Analysis suggested some reasons why the ISO should consider improvements to resource outage scheduling procedures. Changes in seasonal load

[15] Services Tariff, § 15.2.2.2.

patterns resulting from the changing resource mix could affect optimal outage scheduling.[16] Also, changes in the importance of capacity payments relative to energy payments will affect incentives for resources to return quickly from planned outages. Currently, while a planned outage does not reduce the amount of UCAP that a generator qualifies to provide, it may affect the amount of energy revenue that a generator collects, which provides an incentive for generators to minimize the length of planned outages. These incentives are likely to be less effective in the future if the change in the resource mix often causes energy prices to be low or negative.[17]

The ISO's proposed project mentions the first of these reasons for considering resource outage scheduling improvements, but not the second. The TOs believe that this study should incorporate a review of the incentives for minimizing the length of planned outages. That might include the development of procedures for coordinating outage scheduling for economic reasons. In the past, the MMU suggested, "It would be beneficial for the NYISO to consider expanding its authority to reject outage requests that would take economic capacity out-of-service during relatively high load conditions. However, any such process would require significant resources for the NYISO to administer effectively."[18] The ISO should consider whether the changes underway in the market would justify that approach.

Review NYISO's resource adequacy design versus other control areas and build off of the lessons learned/recommendations from that review (page 37)

The TOs' concern with this proposal stems from the fact that other control areas that have more experience with intermittent and storage resources, such as California—do not have ICAP markets like the ISO's. While California may have many lessons for the ISO, it is not clear that there are many lessons that would apply to New York's markets for ensuring resource adequacy. Therefore, the ISO should explain which control areas they would focus upon, and why that review might benefit the New York's resource adequacy market.

Explore capacity requirements based on transmission security considerations (page 38)

The ISO's explanation of this proposal says that it is intended to "explore whether transmission security considerations are sufficiently incorporated in capacity

[16] Reliability Gap Analysis at 111.

[17] *Id.* at 112.

[18] Potomac Economics, Ltd., 2016 State of the Market Report for the New York ISO Markets (May 2017) at A-34, available at: https://www.potomaceconomics.com/wp-content/uploads/2017/05/NYISO_2016_SOM_Report_5-10-2017.pdf.

requirements." However, an initiative has been proposed for this year to incorporate Transmission Security Limits ("TSLs") into the procedure used to determine the Installed Reserve Margin ("IRM"),[19] and it is unclear to the TOs how that project relates to this one.

Currently, TSLs are disregarded when setting the IRM but are considered when setting Locational Capacity Requirements ("LCRs"). This difference can affect both the IRM and the LCRs. It appears that this year's project is intended to eliminate that difference. However, this takes the TSLs as given, and there are reasons to reassess the procedures used to calculate the TSLs. For example, the procedures that the ISO currently uses to calculate TSLs do not reflect any tie benefits, even if the holders of UCAP Deliverability Rights to import capacity into a Locality do not decide to exercise those rights. That is consistent with Con Edison's N – 2 – 0 planning standard for New York City, but it is inconsistent with PSLI's N – 1 – 1 planning standard for Long Island.

While the TOs believe that ISO should attempt to ensure that TSLs are used consistently when setting the IRM and the LCRs, the ISO should also ensure that those TSLs accurately indicate the amount of capacity outside a Locality that is likely to be available to meet load within that Locality, consistent with the relevant planning standards. Similarly, it may be necessary to revise procedures for calculating TSLs to account for intermittent resources, such as offshore wind.

Review the ICAP demand curve shape and zero crossing point (page 38)

According to the final version of the 2020 NYISO Master Plan, the "Capacity Demand Curve Adjustments" project, which would "review the efficacy of the ICAP Demand Curves to better evaluate whether alternative shapes and/or slopes would improve resource adequacy and grid reliability,"[20] is scheduled to reach "Study Complete" in 2023.[21] Given the definition of short-term projects as projects that "should be considered over the next 3+ years," classifying this as a medium-term project suggests that it would be deferred until after the next demand curve reset ("DCR") (which should conclude in early 2025), if it is still relevant at this time. If that is the ISO's intent, the TOs concur, as the TOs believe that it is more important to address other, more fundamental issues related to the ICAP market at this time, but the ISO should clarify whether that is its intent.

---

[19] 2021 GIT Projects Presentation at 22.

[20] 2020 Master Plan: Reliability and Markets for the Grid of the Future (Dec. 2020) at 29, available at: https://www.nyiso.com/documents/20142/17255913/2020%20Master%20Plan%20FINAL.pdf/6b88b220-da25-cad8-d371-bdf91d4059fe.

[21] *Id.* at 24.

Consider modifying the translation of the annual revenue requirement for the ICAP demand curve unit into monthly demand curves that consider reliability value. (SOM-2019-4) (page 38)

Similarly, the TOs' view is that consideration of this proposal should be deferred until after the ISO completes a fundamental reassessment of the capacity market. The proposal to make this a medium-term project seems to be consistent with that view, but the ISO should confirm whether that is its intent.

Consider what would be needed to expand software to support additional Localities (page 38)

In the early stages of each DCR, including the 2021-25 DCR, the ISO assesses whether any additional Localities should be defined for the period to which the next set of ICAP demand curves would apply. This culminates in a report that must be filed with FERC by March 31 of each year in which the ISO must file a new set of ICAP demand curves (as it did in 2020).[22] If the ISO had concluded last spring that there was a need to add Localities, it would have needed to file ICAP demand curves by November 30, 2020 for those new Localities, which would have needed to take effect May 1, 2021. Thus, the TOs do not understand why this project is necessary, given that the ISO could have been called upon to support additional Localities in the 2021-25 DCR. If this project is needed, then it should be a short-term project, so that the necessary capability will be in place for the next DCR.

Evaluate using performance-based measures for resources that currently rely on availability-based metrics like EFORd (page 39)

The ISO suggests that this project would "consider a change in resource rating … [to] focus on performance as the needs of the grid evolve." But there will still be a fundamental difference will remain between resources that are dispatchable, and can be directed to produce energy when it is needed, and resources that are not dispatchable. For the latter set of resources, performance-based measures are appropriate because those resources cannot control whether they are available, so their past availability is the best predictor of whether they will be available in the future. Meanwhile, for resources that are dispatchable, there is no reason to believe that their past output is likely to reflect their availability for the future.

Intermittent resources can improve their ability to provide energy when it is needed by installing storage devices, such as batteries. But if this makes these resources dispatchable, presumably the amount of capacity they can provide would use availability-based metrics, since the point of installing those devices is to ensure that

[22] Services Tariff, § 5.16.4.

they are available when needed. Therefore, the ISO should provide further explanation as to why it proposes to undertake this project.

That does not mean that the ISO shouldn't consider further improvements to either availability-based metrics or performance-based metrics. As an example of the former: the ISO has demonstrated that even after the Tailored Availability Metric ("TAM") goes into effect for the 2021-22 capability year, forced outages at different times within a given capability period that may have very different impacts on reliability will continue to have roughly the same impact on the amount of UCAP that these resources qualify to provide.[23] The TOs proposed a project for prioritization for 2021 that would have focused on identifying and assessing further improvements to the procedures used to calculate the amount of UCAP that can be provided by resources using availability-based metrics, which would have tied that quantity more closely to their availability at times when their availability significantly affects reliability.[24] However, that analysis was not prioritized for 2021 because the ISO said it didn't have the necessary resources.

Similarly, the ISO should consider whether two resources, one providing a certain amount of UCAP using a performance-based measure and one providing the same amount of UCAP using availability-based measures, are really providing the same contributions to reliability. For example, reductions in output by intermittent resources may be more correlated than reductions in output by other types of resources. That would reduce their contribution to reliability in a manner that would not be fully reflected by their average output during peak load periods.

To implement this, it will be necessary for the ISO to track the deviations between forecasted and actual output by intermittent resources in order to assess the extent to which they are correlated. If this correlation has a significant impact, the ISO should consider modifying the procedure used to calculate the amount of UCAP that resources qualify to provide to account for the impact of that correlation. We understand that the ability of the MARS program to consider the impact of these correlations has improved recently, because MARS is now able to calculate the Effective Load Carrying Capability (ELCC) for each resource. The ISO proposed a short-term project that would consider using the ELCC methodology to value all resources' contributions to reliability, and the ISO should consider including, in this medium-term project, modifications to the calculation of the amount of UCAP that each resource

[23] Emily Conway, Tailored Availability Metric (Mar. 20, 2020) at 8-9, available at: https://www.nyiso.com/documents/20142/11452204/6%20Tailored%20Availability%20Metric.pdf/e3d25399-3f10-01de-cff7-94935c3f4426.

[24] 2021 Market Project Candidates (July 8, 2020) at 15-16, available at: https://www.nyiso.com/documents/20142/13602287/03%20Proposed%202021%20Market%20Project%20Descriptions.pdf/e36c1482-91f6-54d2-a8f2-7501a58c2d81.

can provide that would reflect the impact of this correlation, depending on the outcome of the short-term project.

Consider deliverability study assumptions for capacity suppliers to ensure all capacity can be delivered during gross and net load peaks (page 39)

This study would assess the extent to which transmission congestion during peak load periods decreases the amount of transmission available for reliability. It is not clear to the TOs why increased reliance on intermittent and storage resources drives the need to reassess whether there are significant differences between the reliability contribution of different resources that are deemed deliverable by the deliverability study, so the ISO should provide additional information explaining that linkage. Also, the ISO should consider assessing other periods, as the TOs' experience is that deliverability constraints may be most likely during low net load periods.

II. ADDITIONAL RECOMMENDATIONS THAT THE ISO SHOULD IDENTIFY AS MEDIUM-TERM PROJECTS

Additionally, the TOs propose adding four projects, the first three of which were identified in the Reliability Gap Analysis, to the medium-term projects identified in the December 7 Presentation.

Consider whether to modify RTD to reduce solution time and improve net load forecast latency

While one of the short-term projects that the ISO plans to undertake this year will assess ways to reduce latency in the forecasts of load and output from intermittent resources,[25] another way to reduce the latency of the net load forecast used by RTD is to reduce RTD solution time—e.g., by eliminating the look-ahead function in RTD that determines schedules for many intervals, even though only the first set of schedules is binding.[26] This possibility does not seem to be considered in any of the ISO's medium-term projects (while there is a medium-term project that focuses on reducing net load forecast latency, it focuses on the latency of the net load forecast used by RTC, not RTD), and the ISO should consider making it a medium-term project, or including it with another medium-term project.

[25] 2021 GIT Projects Presentation at 21.

[26] ERCOT's real-time dispatch, which only solves for a single interval, solves in less than a minute. Reliability Gap Analysis at 86.

Define separate regulation-up and regulation-down products

The Reliability Gap Analysis recommends that the ISO consider separating regulation-up and regulation-down service, because this would permit fossil resources to provide just regulation-up service, while permitting intermittent resources to provide just regulation-down service.[27] Fossil resources may incur significant costs if energy prices are low or negative and they need to be scheduled above their minimum generation levels, in order to provide regulation as that product is currently defined, but they would not be required to incur those costs if they can provide only regulation-up service. Meanwhile, the reduction in the amount of regulation-down service provided by fossil resources could be offset by intermittent resources, which can regulate down more easily than they can regulate up. While one of the short-term projects proposed by the ISO would investigate the benefits of separate regulation-up and regulation-down service, the December 7 Presentation does not include any medium-term or long-term projects that would actually implement those proposals. Consequently, the TOs believe that the ISO should add a medium-term project to implement these changes, if the anticipated benefits from separating these products are deemed sufficient.

Consider modifying procedures for calculating real-time prices and real-time uplift payments

The Reliability Gap Analysis points out that differences between RTD's pricing and dispatch passes may affect incentives for generators to follow dispatch-determined schedules and could induce them to self-schedule instead.[28] As a result, it suggests that it might be necessary to limit the ability for resources that are online to provide reserves or ramping capability to set LBMPs.[29]

It also points out that BPCG calculation procedures may also affect incentives for participation in dispatch by flexible resources.[30] The ability for the market to provide efficient incentives in real time depends upon resources having an incentive to offer their capacity into the RTM and to follow the basepoints determined therein, instead of simply following DAM schedules. It is also important to induce these resources to offer their full ramping capability. These incentives are less effective or ineffective if a supplier receives BPCG payments due to low or negative LBMPs.[31]

---

[27] *Id.* at 73.

[28] *Id.* at 79-80.

[29] *Id.* at 81.

[30] *Id.* at 79.

[31] *Id.* at 80.

For these reasons, the ISO should consider, in a medium-term project, whether revisions to the procedures used to calculate real-time prices and real-time uplift payments might be necessary to improve incentives for resources to participate in the dispatch, offering their full capacity, and to follow the basepoints determined in the dispatch.

Reconsider procedures for assessing the value of capacity provided by resources with energy limitations

This summer, the ISO will implement procedures for incorporating the impact of energy limitations on the amount of UCAP that can be provided by these resources, which include ELRs, ESRs and SCRs. The Duration Adjustment Factors that will initially be applied to resources that elect Energy Duration Limitations of six hours or less, and that will later be applied resources electing Energy Duration Limitations of eight hours or less, were based upon the results of MARS analysis conducted by General Electric. Section 5.12.14.3 of the Services Tariff will require the ISO, "Starting in 2022 and occurring every four years … to re-evaluate the reliability benefit of Resources with Energy Duration Limitations in meeting Resource Adequacy criteria…." This review will identify the appropriate Energy Duration Limitations, Duration Adjustment Factors for resources with such limitations, and re-evaluate the Peak Load Windows that pertain to those resources.

However, it is not clear that adjustments to the Energy Duration Limitations, Duration Adjustment Factors, and Peak Load Windows will suffice to provide incentives that are likely to lead to the development of the economically efficient set of storage resources. As mentioned in Section I of this memo, MARS is now able to calculate the ELCC for each resource, which it could not do when GE was performing the MARS analysis that formed the basis for the Duration Adjustment Factors that are about to take effect. The ISO should consider a medium-term project that would implement changes to base the amount of UCAP that can be provided by resources with these limitations on ELCC, depending on the outcome of the short-term project the ISO has proposed that would consider using the ELCC methodology.

III. RECOMMENDATIONS THAT THE ISO IDENTIFIED AS LONG-TERM PROJECTS

Revisit broader regional markets (BRM) and regional dispatch to improve regional coordination and enable external resources to support NYCA's flexibility needs (page 28)

The degree to which the ISO could take advantage of regional dispatch to address its needs for flexible resources will depend upon the diversity in demand for those resources: if neighboring control areas need flexible resources to accommodate reductions in output from intermittent generation at the same time that New York needs flexible resources for the same reason, then the benefits from a regional dispatch may

not be significant. Therefore, the ISO should assess the potential benefits from this project.

Consider if commitment of quick start units should be in RTD (less impacted by RTC forecast latency), and determine whether all real-time interchange scheduling should move to RTD (page 28)

See the discussion in Section II of this memo of the ISO's medium-term proposal to consider ways to improve 15-minute and CTS scheduling by reducing forecast latency and/or move the process into RTD (which appeared on page 29 of the December 7 Presentation).

Does RTC need to look out further to commit slower resources due to changes in weather conditions from the Day Ahead (this may require another settlement) (page 29)

See the discussion in Section II of this memo of the ISO's medium-term proposal to determine whether constraints for energy/run limited resources can be effectively managed through existing market participation rules (which appeared on page 31 of the December 7 Presentation).

Consider explicitly modeling ramp in DAM. What are locational ramp requirements? (page 30)

Investigate the need for ramping services and a zonal ramping product (page 34)

These recommendations seem to address the same issue, so they are addressed together here. (If the ISO has different objectives in mind for these projects, it should provide additional information to explain the difference.) The TOs agree that this should be a long-term project. As the Reliability Gap Analysis describes, there are two ways in which it might be implemented, and the project should assess these options.

First, as mentioned in Section II of this memo, the ISO could define ramping requirements and develop a ramping services product. The requirements (both overall and locational) would be used by DAM, RTC and RTD to reflect the amount of ramping capability that is expected to be needed to balance expected variations in output by intermittent resources. They should vary hourly (at least), and should be updated in real time. There are important differences between this ramping product and operating reserves, in that: (1) the demand curve for ramping capacity would be set at a much lower price than the demand curve for operating reserves; (2) energy market offers would need to be considered when determining which offers to accept because resources providing ramping service are likely to be dispatched to produce energy (note that negative energy offers will increase the cost of ramping capability); and (3)

resources that provide this service would provide downward ramping capability, not just upward.[32]

An alternative approach, which was mentioned in Section II of this memo with regard to the proposed medium-term project regarding which load forecast to use in the DAM, is to commit additional capacity to create ramping capability. Increasing the amount of capacity committed in the reliability commitment pass in SCUC may necessitate binding financial settlements in the forecast load pass, as resources committed in this pass would otherwise be likely to receive BPCGs which would not provide strong financial incentives for performance. Committing additional capability in the real-time market could induce additional differences between RTC and RTD, which could affect incentives to participate in the real-time dispatch.

Evaluate whether sub-hourly commitments might be needs in critical parts of the day. Are mid-hour schedules needed to balance predictable solar ramp? (page 30)

Increasing the granularity of DAM schedules so that they only apply to a portion of an hour, instead of schedules that are constant throughout the hour, could avoid inefficient DAM schedules at the beginning or the end of the hour. However, while providing the option for sub-hourly commitments and schedules could lead to more efficient day-ahead scheduling and commitment, RTC already looks at 15-minute intervals, so the ISO should evaluate the extent to which adding this functionality would actually facilitate real-time management of factors like solar ramp. This evaluation should be conducted in the medium term, not the long term, because if these changes are needed, they will need to be developed and implemented as large amounts of solar generation (including behind-the-meter solar generation) begin to come online.

Depending on findings of long-term studies, consider whether market or cost-based mechanisms are necessary to compensate for inertial response (page 34)

The ISO is proposing a medium-term project to "leverage Reliability Needs Assessments and other planning studies to consider need for inertia response and evaluate voltage support and system strength needs." The ISO should confirm whether this project is undertaken will depend upon the findings of that medium-term project.

[32] Reliability Gap Analysis at 74-79.

Consider valuing system strength and/or short circuit capabilities. Do we need to pay for grid forming capabilities? (page 34)

The TOs suggest that assessing whether there is a need to compensate providers of these services should be a medium-term project, rather than a long-term project. If that study indicates a need to compensate providers of these services, that would leave an opportunity to develop and implement procedures for doing so in a long-term project.

IV. ADDITIONAL RECOMMENDATION THAT THE ISO SHOULD IDENTIFY AS A LONG-TERM PROJECT

The TOs also propose adding one project, which was identified in the Reliability Gap Analysis, to the long-term projects identified in the December 7 Presentation.

Consider enhancements to operating reserve pricing

The Reliability Gap Analysis pointed out that if thermal units are committed to provide operating reserve, the marginal cost of operating reserve may be low but the full cost, including those units' commitment costs, may be high. It might be necessary to revise procedures for calculating operating reserve prices to account for this.[33] While a number of projects proposed by the ISO would evaluate various aspects of the operating reserves, none of them seems to address this issue. The revisions to procedures for calculating these prices that might be necessary to address these issues seem to be broader than those contemplated in the medium-term project that the TOs propose in Section III of this memo, which would consider modifying procedures for calculating real-time prices and real-time uplift payments, which is why the TOs propose this as a long-term project.

[33] *Id.* at 91-92.