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NEW YORK BATTERY
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TECHNOLOGY CONSORTIUM

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April 1, 2016

Michael DeSocio & James Pigeon
Market Issues Working Group
New York Independent System Operator
10 Krey Boulevard
Rensselaer, NY 12144

Dear Mr. DeSocio and Mr. Pigeon—

On behalf of the Energy Storage Association (ESA) and the New York Battery and Energy Storage Technology Consortium (NY-BEST), please accept these comments in response to NYISO Market Issues Working Group's request for comments regarding its March 1, 2016, solicitation for comment on issues pertaining to energy storage market participation. ESA & NY-BEST acknowledge NYISO staff for taking the initiative to reach out to stakeholders and better incorporate considerations of storage in market designs, rules, and procedures.

ABOUT THE ENERGY STORAGE ASSOCIATION

Since its inception 26 years ago, ESA has promoted the development and commercialization of competitive and reliable energy storage delivery systems for use by electricity suppliers and their customers. ESA's membership of over 200 companies comprises a diverse group of electric sector stakeholders, including utilities, energy service companies, independent power producers, technology developers—of advanced batteries, flywheels, thermal energy storage, compressed air energy storage, supercapacitors, and other technologies—component suppliers, and system integrators. A number of ESA member companies have assets or operations in NYISO.

ABOUT THE NEW YORK BATTERY AND ENERGY STORAGE TECHNOLOGY CONSORTIUM

NY-BEST was created in 2010 to position New York State as a global leader in energy storage technology, including applications in transportation, grid storage, and power electronics. NY-BEST currently has more than 150 members. The Consortium's membership is diverse and includes manufacturers, academic institutions, utilities, technology and materials developers, start-ups, government entities, engineering firms, systems integrators, and end-users. The majority of its members are New York State based entities. NY-BEST serves as an expert resource to energy storage-related companies and organizations seeking assistance to grow their businesses in New York State. This includes access to financing, research capabilities, potential partners, technology developers, manufacturers, and other

private sector and government resources. NY-BEST serves as an important connector in establishing a strong energy storage “ecosystem” encompassing all stages of energy storage product development and use.

RESPONSE TO NYISO SOLICITATION ON ENERGY STORAGE ISSUES

ESA & NY-BEST strongly support NYISO’s efforts to further integrate advanced energy storage into its wholesale markets. ESA & NY-BEST are also hopeful that the current Energy Storage Market Integration and Optimization discussion at NYISO will lead to substantive action toward lowering barriers to entry and providing market mechanisms that fully capture the multiple values that storage resources can provide.

Energy storage will play a central role in supporting the modernization of New York’s electric grid and enabling the efficient use of clean energy at both centralized and distributed locations. Energy storage may offer energy to the grid during discharge, provide resource adequacy, serve as a source of fast-responding ancillary services, offer behind-the-meter load reduction and generation, provide an alternative to transmission infrastructure upgrades, act as a backup and resiliency resource, firm and time-shift renewable energy, or provide a mix of these and other services. The unique combination of benefits that energy storage offers also puts it in a strong position to support New York’s grid as the state moves toward the ambitious target of obtaining half of its electricity from renewable sources by 2030—the “50 by 30” target outlined in the NY Clean Energy Standard—and simultaneously works to promote a resilient electric grid composed increasing of distributed energy resources—in concert with the objectives of the NY Reforming the Energy Vision.

NYISO has an opportunity to facilitate the deployment of energy storage by ensuring that storage resources (1) have greater access to the wholesale market and (2) are allowed to provide multiple services in order to fully realize the value of resources’ capabilities. A number of potential actions that could improve market access and provide value to the system are available to NYISO. These actions range from relatively straightforward measures, such as clarifying existing rules for storage, to more significant changes, such as expanding or adding new asset classes to give storage resources more options for providing wholesale products.

ESA & NY-BEST support NYISO addressing, or at least answering, all of the energy storage feedback and questions to date shared at the MIWG on March 1, 2016. We have outlined and prioritized a number of possible NYISO actions, including both ideas that NYISO has presented or noted that it has received from storage stakeholders and new suggestions from the storage industry. ESA & NY-BEST considered possible impacts and timeframes in prioritizing these actions, which we believe to be a selection of more impactful measures NYISO could practically take—but by no means the only such actions. Furthermore, we have identified several paths for addressing many of these suggestions and estimated the timeframe for each potential path; actions that appear possible to complete within a year are considered *short-term*, actions that could take 1 to 2 years are considered *mid-term*, and further out possibilities are considered *long-term*.

Possible NYISO actions to facilitate storage market integration, *ordered by priority*:

1. **Clarify rules for storage resources in existing programs.** *Short-term.* One of the most beneficial and immediate actions NYISO can take to facilitate the integration of energy storage resources into its markets would be to provide detailed, written clarification on exactly how storage resources can participate in its markets. NYISO has already identified four specific programs that accommodate some energy storage configurations: LESR, ELR, DSASP, and SCR. However, except in the case of the relatively well-defined LESR category, some ambiguity remains about how storage can participate as each of these particular asset types. Clear, written explanations about existing rules for storage—something NYISO has already mentioned it plans to produce—will significantly aid developers in assessing potential projects and help reduce the volume of similar inquiries to NYISO. These explanations should address any rules and restrictions, as well as specific considerations and operational practices, necessary to ensure comparable treatment for energy storage resources. They should also clarify, among other topics, the following three major areas of ambiguity.
 - a. Clarification around the operation of ELRs would be particularly helpful as this is the only resource type that permits front-of-the-meter storage technologies to earn Capacity. Details about ELR bidding, scheduling, and operation outside of scheduled hours would significantly help resources beyond pumped-storage hydro plants to participate as ELRs.
 - b. Further clarification about the ability for storage to participate in NYISO DR programs is also necessary for better integration of distributed storage resources into the wholesale market. Recently, NYISO has stated that both the DSASP and SCR programs are open to storage despite prior statements by ISO staff that implied that storage might not be an option, at least for SCRs. A written position confirming that both programs—as well as mentioning any other behind-the-meter options—are open to storage resources would help rectify this contradiction. Additionally, clarity around specific program mechanisms and details would be beneficial. For example:
 - i. Could NYISO change the classification of storage to something other than a local generator in order to allow it to provide Regulation and Synchronous Reserves in the DSASP? Do other factors, such as the uncertainty around NPCC’s classification of storage as a non-synchronized resource, affect storage’s ability to provide these products?
 - ii. Can behind-the-meter storage utilize the sub-metering options available for small customer DR aggregations, at least in the SCR program? If not, are other options available to prevent excessive metering and telemetry burdens on small behind-the-meter storage resources?
 - c. A discussion of any other rules that could prevent storage from participating as an Energy-only resource outside of any particular asset class would help inform

stakeholders about limitations on adding storage projects for economic participation in non-Capacity NYISO markets.

2. **Clarify rules for storage in new BTM:NG program.** *Short-term.* Excess capacity from behind-the-meter energy storage resources could provide multiple NYISO services if the BTM:NG rules permit storage to participate in this new program. NYISO should clarify whether any explicit restrictions on storage exist in the first iteration of the BTM:NG program due to be implemented later in 2016. If specific restrictions block the use of storage as a BTM:NG resource, NYISO should provide a clear written explanation of these barriers and work to remove them as soon as possible. NYISO has indicated that it intends to consider ways to better integrate storage in future BTM:NG revisions—this effort should be a priority because behind-the-meter storage resources are likely to become much more prevalent in New York in coming years, and many units will have excess capacity that could provide service to the wholesale market.

3. **Fill the gap between 1- and 4-hour asset types for energy storage resources.** *Mid-term to long-term.* The two non-DR registration options for storage in NYISO, LESRs and ELRs, exclude storage resources with durations of between 1 and 4 hours, which may represent a majority of storage projects going forward. LESRs are restricted to resources that can sustain output for less than 1 hour, whereas ELRs must be able to sustain discharge for at least 4 hours. The lack of any storage-enabling asset types for resources with durations between 1 and 4 hours discourages market participation of mid-duration technologies by not allowing developers to utilize the mechanisms that facilitate storage in the LESR and ELR categories. NYISO could fill this gap in several ways, including the two possibilities below.
 - a. *Mid-term.* Extend the maximum duration to qualify as LESR beyond 1 hour. Opening the LESR category to resources capable of more than an hour of maximum injection or withdrawal would offer storage developers more options, as LESR's are currently the only asset type that receives NYISO state-of-charge (SoC) management. This option could be relatively straightforward to implement—although tariff revisions would likely be necessary—but still restricts resources to only offering Regulation.

 - b. *Long-term.* Add a new asset class for mid-duration storage resources. An entirely new asset class specifically designed to allow energy storage resource to provide Energy and Ancillary Services would be an ideal option for mid-duration storage. Provisions that specifically support storage, such as SoC management—either by the ISO or, preferably, by individual resources—and the ability to switch between injection and withdrawal instantaneously, should be considered for such as asset class. These provisions would permit the optimization of charge and discharge based on both economic and resource-specific factors. Despite the greater difficulty and longer timeframe involved in adding a new asset type than other enhancements, its addition into NYISO's 2017 Project Prioritization Process would be a positive step toward promoting an impactful change.

4. **Clarify NPCC rules for provision of synchronized reserves.** *Short-term.* NYISO has mentioned that NPCC rules for synchronized resources do not provide enough specificity to determine if storage interconnected through an inverter may provide Synchronous Reserves. Additionally, NYISO stated that it is reaching out to NPCC for clarification. We strongly encourage NYISO to continue seeking clarity from NPCC in order to resolve this issue, and make any subsequent changes to rules for storage in NYISO, as soon as possible.

5. **Add SoC management to more resource types.** *Short-term to long-term.* The addition of SoC management to existing or new asset types would facilitate market access for new energy storage projects. As a secondary advantage of ISO-controlled SoC, NYISO would have visibility into the charge state of more storage resources in the state, improving resource optimization and planning. We have identified several resource types to which NYISO should add SoC management in varying timeframes below.
 - a. *Short-term.* The ELR asset class is a good candidate for more immediate addition of SoC management because NYISO is already discussing updating the ELR modeling and dispatching in its Energy Storage Optimization project. Because NYISO's planned updates to the modeling for long-duration storage resources could include better visibility into the available energy of a given resource, adding a provision for active management of that energy level appears possible, potentially within a year if NYISO commits to completing the modeling update in 2016.
 - b. *Mid-term.* Adding SoC management to the DSASP would facilitate the use of more behind-the-meter storage, particularly if active SoC management can facilitate storage providing Regulation from behind-the-meter (although any path towards storage as a source of Regulation in DSASP appears to also depend on NYISO changing its classification of storage as a local generator or changing DSASP rules for local generators). Because these changes would require new control algorithms and possible rule changes, they would likely take several years to implement.
 - c. *Long-term.* SoC management for the BTM:NG program could be a significant benefit for storage, as the new asset class is the only opportunity for net injection into the wholesale market from behind-the-meter but does not currently provide provisions specifically enabling storage to participate.

6. **Define Capacity Value for storage with renewables.** *Short-term.* NYISO should set a near-term goal to define Capacity Values for storage paired with renewable energy sources. As New York adds more renewable energy to its grid, it needs to recognize the changing nature of both renewable energy and advanced energy storage technologies, and the benefits associated with pairing these resources. Specifically, storage has often been paired—initially in concept and more recently in practical application—with renewable resources as a way of firming renewables and shifting the output of those resources to times when demand is greatest. And

yet, at present, the NYISO Tariff and Market Rules do not recognize the enhanced system benefits that can be provided by these combined resources, which can include enhanced reliability, increased output (of Energy, Ancillary Services and Capacity) and avoided costs associated with new major infrastructure builds. For example, a 20 MW solar resource that has an average capacity factor of 38 percent could increase that value significantly by pairing it with a 10 MW energy storage facility, yet the NYISO tariff has no specific language that would capture or enable calculation of this enhanced value.

7. **Address 1 MW minimum LESR size.** *Long-term.* Reducing the LESR asset size to below 1 MW, or allowing aggregation to 1 MW, would provide an opportunity for smaller storage resources—which are expected to be a significant portion of storage resource deployment in New York—to participate in the Regulation market.
 - a. Aggregation to 1 MW would allow smaller, geographically-distributed resources to participate, and would enable more resources to access the market. Other asset types allow aggregation and no fundamental barrier to LESR aggregation appears to exist. Due to the likely need for tariff revisions, we acknowledge this implementation timeline could be longer than other enhancements. However, NYISO should consider this option as one step to further align wholesale rules with the objectives of the REV initiative, which is encouraging more distributed energy resource deployment across New York.
 - b. Lowering the size threshold for LESRs to be less than 1 MW is a straightforward way to improve market access. While NYISO has previously indicated that it is unwilling to make this change, other ISOs have lower thresholds (minimum regulation resources sizes are as low as 0.1 MW in ERCOT, PJM, and SPP) and we encourage consideration of this enhancement for LESRs in NYISO.

8. **Expand scope and complete Energy Storage Optimization Project.** *Short-term.* NYISO has planned to optimize the modeling for long-duration resources for several years (per the Energy Storage Optimization project). We encourage NYISO to initiate and complete this effort quickly and include provisions that enable market participation by advanced storage technologies. For example, the addition of SoC management mentioned in item 4 should be part of the optimization strategy. NYISO should ensure that the scope of this project is defined as soon as possible so stakeholders can evaluate details and provide feedback in a timely manner. Because this effort is already planned, completion of the stakeholder process by the end of 2016 appears possible if NYISO commits to working on it throughout the year.

This list represents ESA & NY-BEST's initial recommendations to NYISO to remove some barriers to participation for advanced energy storage resources and to enhance the value of storage resources to NYISO. Other possible areas for future discussion exist around subjects like storage as a transmission asset—for example, CAISO gives consideration to storage in its transmission planning process—as well as measures that NYISO should take to better integrate the small storage resources that will become

more numerous as the REV initiative progresses. We encourage NYISO to share its own view of what enhancements are possible in the near-, medium- and long-term. Additionally, we encourage NYISO to share any additional energy storage-related suggestions it has received or discussed internally as there may be synergies across enhancements or other potential options for further opening the wholesale market to storage.

CONCLUSION

ESA & NY-BEST commend NYISO for seeking stakeholder input on how to consider energy storage resource participation in wholesale market operations. In doing so, NYISO staff acknowledges both the potential value of energy storage and the kind of work needed to incorporate storage into tariff language. ESA & NY-BEST appreciate the opportunity to provide these comments and look forward to working with NYISO and other interested stakeholders to assist with a work plan that will enable the fullest realization of the system cost and reliability benefits offered by energy storage.

We encourage you to contact us if you wish to discuss these matters further.

Respectfully submitted,



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