Federal Energy Regulatory Commission

Review of Generator Interconnection Agreements and Procedures	**Docket No. RM16-12-000**
American Wind Energy Association	**Docket No. RM15-21-000**

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Panel 5: Interconnection of Electric Storage Resources

On behalf of NextEra Energy Resources, LLC ("NextEra"), I thank staff for the opportunity to address you today with respect to interconnection rules and policies as applied to electric storage resources. In the agenda for today's conference, the Commission has asked panelists to address whether changes to the interconnection process or related studies could be better accommodate the interconnection of electric storage resources, including those co-located with generation facilities. To date, most of NextEra's experience in developing battery storage projects has involved the addition of batteries to sites at which NextEra already is operating generation facilities, primarily wind and solar. I therefore focus these initial remarks on a suggestion NextEra has for improving the interconnection process as it relates to the co-location of battery and generation facilities.

Like other companies developing battery projects, NextEra is co-locating batteries with existing generation in an attempt to optimize the use of existing injection rights and minimize the interconnection-related costs and delays discussed by earlier panelists. When co-locating batteries with existing generation, a threshold question arises as to whether the injection rights held by the generator are sufficient to accommodate the addition of the batteries. In NextEra's case, several of our battery projects have used excess injection rights from existing wind generation sites,[1] resulting in no net increase in injection rights at the point of interconnection ("POI"). Even though these projects have not involved any increase to NextEra's injection rights, the interconnection requests generally have been subject to the same thermal and stability studies that would apply as if injections from the battery were in addition to those of the generation.

In our view, interconnection studies for new battery projects should be tailored to the actual service being requested. Specifically, there should be no thermal study of injections if the interconnection customer agrees not to deliver more than the existing injection rights that already have been studied and granted in the generator's interconnection agreement. Because withdrawals likely would not have been studied when the existing generator interconnected, it may be necessary for the transmission

[1] Differences between an interconnection customer's installed capacity and the injection rights provided by its interconnection agreement are not uncommon, particularly for wind and solar generation. Interconnection agreements are executed as projects are being developed, often a year or more before wind turbines and solar inverters are delivered and installed. A customer has excess injection rights when the number of turbines or inverters estimated in its interconnection request and reflected in the interconnection agreement ends up being larger than the final number of turbines or inverters installed.

provider to perform thermal studies of battery withdrawals, such as when the battery is interconnecting to a weak area of the system.[2] Finally, stability studies would be performed as with any other interconnection. Tailoring interconnection studies in this way would allow transmission providers to process more quickly requests to co-locate batteries with existing generation, outside of the queue clusters used by most RTOs, and would encourage interconnection customers to maximize the use of existing injection rights.

This distinction between thermal and stability studies arises from the technical differences in each analysis. Thermal studies analyze whether any transmission elements would be overloaded if the requested level of injection rights were granted. These studies require power flow modeling of injections from existing and proposed generation, effectively linking interconnection requests in the review process and causing delay when earlier-queued customers fall out of the queue. Stability studies, however, are driven by the technical aspects of a new resource, such as technology and configuration. Stability studies simulate faults on the system to analyze whether the transmission system is able to recover and remain stable notwithstanding the addition of the new resource. Because they are focused on the specific resource to be interconnected at a POI, stability studies can be performed independent of thermal studies and are not similarly impacted by other generators falling out of the queue except in unusual circumstances (such as multiple, new interconnection requests at the same POI).

To streamline the interconnection process for battery storage facilities, NextEra recommends that transmission providers tailor the thermal studies being performed to the actual service requested by the interconnection customer. When no additional injection rights are requested, no additional thermal study of injections should be performed. Yet in NextEra's experience, RTOs and ISOs typically focus less on the actual injection rights requested by the customer, and more on the aggregate installed capacity at the POI – or to be more precise, require the injection rights requested to be equal to the aggregate installed capacity.[3] As a result, RTOs/ISOs typically analyze the addition of a battery to an existing generator by adding the newly proposed capacity to the existing capacity and studying whether the aggregate amount causes overloads in thermal studies, and whether the changes in technology and configuration result in unrecoverable faults in stability studies. This means that RTOs/ISOs generally perform thermal studies on a battery's total injection capability (MVA) to check for overloads on the system – even if the customer is committing not to operate the battery in a way that exceeds the injection rights already held by the existing generator.

For example, assume an interconnection customer seeks to develop a 10 MVA battery project co-located with an existing generator that has 100 MW of injection rights but only 90 MW of installed

[2] For example, NextEra believes it would be reasonable to perform a thermal study of a battery's interconnection to a lower-voltage radial line, where the introduction of significant charging load could result in overloading.

[3] NextEra is aware of several instances in which RTOs have entered into interconnection agreements providing injection rights that are below the capacity to be installed by the customer. *See PJM Interconnection, L.L.C.*, 137 FERC ¶ 61,084 at P 4, n.3 (2011) (accepting non-standard terms and conditions for an interconnection agreement for installed capacity of 214 MW and injection rights of 200 MW); *Southern California Edison Company*, Docket No. ER16-1459-000, April 19, 2016 (filing of an interconnection agreement for installed capacity of 256 MW and injection rights of 128 MW). NextEra has been unable to confirm the scope of thermal studies performed with respect to these interconnections, although the willingness of the RTOs to enter into such agreements indicates an acceptance of the fact that injection rights do not have to be set equal to the customer's aggregate installed capacity.

capacity. Under NextEra's proposal, no thermal studies of the injection would be performed, since the generator's 10 MW of currently unused injection rights is simply being transferred from one entity to another. If the interconnection customer were developing a 20 MVA battery, it would have a choice: limit its injection rights to 10 MW and avoid a thermal study of the injection; or, request injection rights of 20 MW, triggering a thermal study of the 10 MW incremental increase in injection rights under the *pro forma* Small Generator Interconnection Procedures. For withdrawals, a thermal study would be performed only if the proposed interconnection is in a weak area of the system, with the level of withdrawals to be studied defined by the size of the battery (*i.e.*, 10 MVA or 20 MVA). Finally, stability studies also would be performed based on the size of the battery (again, 10 MVA or 20 MVA) in order to take account of the changed electrical configuration of the system.

There already is a model for this study approach in the Net Zero Interconnection Service offered by the Midcontinent Independent System Operator ("MISO"). Net Zero service is defined as an increase in gross generating capability at the same POI of an existing generating facility without increasing the existing generating facility's capacity at the POI.[4] For Net Zero interconnection requests, the MISO tariff provides that stability studies will be performed for every request, but thermal studies are performed only when necessary to ensure reliable operations.[5] A similar approach could be implemented by other RTOs, ISOs, and transmission providers under the existing the *pro forma* Large Generator Interconnection Procedures ("LGIP") or Small Generation Interconnection Procedures ("SGIP"), which is silent as to how the transmission provider should conduct thermal studies of interconnection requests that do not increase total injection rights at the POI. The Commission therefore has flexibility to implement this recommendation either through a statement of policy interpreting the *pro forma* LGIP/SGIP or through a rulemaking amending the *pro forma* LGIP/SGIP accordingly.[6]

I look forward to discussing this recommendation and the other topics raised by the Commission in its agenda, and to working with the Commission and its staff on these issues as we move forward in considering potential improvements to the interconnection process as it relates to energy storage facilities.

[4] MISO Open Access Transmission Tariff, Attachment X, Section 3.2.3.1.

[5] *Id*. at Section 3.2.3.2 ("The Interconnection Study for Net Zero Interconnection Service consists of reactive power, short circuit/fault duty, and stability analyses. Steady-state (thermal/voltage) analyses may be performed as necessary to ensure that all required reliability conditions are studied.").

[6] While the focus of the current discussion is on battery storage facilities, it would be logical to apply the same thermal study rules to existing generation seeking to reconfigure facilities without changing injection rights, similar to MISO's Net Zero process. For example, an existing wind generation facility could seek to add solar generation at the same site to maximize its use of injection rights already held, but not entirely used by, the wind generation.