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Comments to PJM Regarding the Use of the Light Load Reliability Analysis within the Generation and Merchant Transmission Interconnection Queue Study Process

The American Wind Energy Association (AWEA) and the Mid-Atlantic Renewable Energy Coalition (MAREC) urge PJM to remove the Light Load Reliability Analysis from the generator interconnection process, and instead continue to conduct the light load analysis in the Regional Transmission Expansion Plan (RTEP) process, where it belongs. Because light load deliverability is an economic and not a reliability issue, the PJM RTEP is the right place to perform this type of analysis, as a key goal of RTEP is to identify economic transmission that can reduce inefficient market dispatch due to transmission constraints on generation. In contrast, generator interconnection studies should be focused on avoiding reliability concerns from the interconnection of generation, and not on economic issues.

It is difficult, if not impossible, to imagine a scenario in which a generator's inability to deliver its full output under light load conditions could harm power system reliability. In fact, transmission congestion limiting the ability to deliver generation during light load conditions would typically only help reliability, as the power system often faces the risk of over-generation during light load conditions.

Removing the light load analysis from the interconnection study process would allow interconnecting generators to weigh the costs and risks in the tradeoff between potential generation curtailment versus transmission upgrade costs. Generators are much better suited to assess and mitigate that risk than PJM, and allowing generators to make that decision will place the appropriate incentives on them and result in a more economically efficient outcome for all parties.

Numerous, serious flaws in the assumptions used in PJM's current and proposed light load analysis methods illustrate the problems that inherently arise when the analysis is conducted as part of the generator interconnection process. These flaws illustrate why an interconnecting generator is much better equipped to assess future market trends and weigh the complex tradeoffs that go into decisions about generation deliverability. Even if the flawed assumptions discussed below are changed, the light load analysis will always inherently be vulnerable to imposing incorrect assumptions on interconnecting generators due to intractable uncertainty about future market conditions. The only solution to addressing the fundamental problem is to not conduct the light load analysis in the generator interconnection process.

PJM's current and proposed light load analysis methods impose a number of flawed assumptions on interconnecting generators. We list these flaws to illustrate the inherent inefficiencies that result when PJM attempts to make economic decisions that generators are better equipped and incentivized to make. Fixing these assumptions alone would not address that fundamental problem, though we hope

that PJM would fix obviously flawed assumptions once the light load analysis has been appropriately restricted to the RTEP process.

One example is that PJM assumes a very high level of output from wind generation during light load conditions. As part of its analysis, PJM currently assumes wind generators are producing at 80% of nameplate capacity during light load conditions, and is proposing to increase that assumption to 100% of nameplate. PJM data indicate that the PJM wind fleet only exceeded an 80% capacity factor during 31 hours in all of 2014, or 0.35% of the hourly intervals in the year, with the highest capacity factor in any hour registered as 86%. Moreover, none of those 31 hours coincided with periods of extremely low demand, with the lowest demand in one of those 31 hours being around 69,000 MW, and most of those hours had relatively high electricity demand.

AWEA also examined the 41 hours in 2014 in which PJM load dropped below 60,000 MW, and found that the average wind capacity factor in those hours was 26.8%, below the annual average wind capacity factor of 29.9%. The highest wind capacity factor seen in any of the extremely low demand hours was 70%, and in the three lowest demand hours the wind capacity factor was below 10%. Another concern is that PJM proposes to model electricity demand in its light load analysis as being 35% of peak demand, but in 2014 the lowest hourly demand was 41% of peak demand.

It is clear that modeling wind plant output at either 80% or 100% capacity factor is not a realistic representation of wind output during light load hours. Light load output assumptions for other generators also appear to be high, which further causes PJM's analysis to overestimate congestion. However, the more important point is that any set of assumptions is going to be a poor representation of future grid conditions, let alone the complex interactions of market forces that determine the economic impact of transmission congestion today.

The economic impact of transmission congestion today cannot be accurately represented in a study that takes a single snapshot in time. Even a detailed hourly analysis would fail to capture the complex impact factors like fuel prices, generator commitment and dispatch decisions, ambient weather conditions, and localized load patterns have on transmission congestion today. Moreover, the economic impact of congestion on a generator is likely to vary considerably from generator to generator depending on the ownership and off-take structure, any tax credit or REC revenue, and other unique financial attributes. Trying to look into the future adds additional uncertainty regarding these market forces as well as load growth, load shape, wind plant output curves, development of other generation, and generator retirements, none of which can be predicted with any accuracy.

While this uncertainty may be intractable for anyone, these risks are best assessed and managed by a private generation developer, not PJM, and certainly not PJM using a single-hour deterministic analysis that is based on rough rules of thumb. In PJM's defense, we understand that predictions about the future will almost always be wrong. That is precisely our point. Because the light load modeling results will always be very sensitive to highly uncertain inputs, generators are best equipped to assess and manage that uncertainty.

The extreme outlier assumptions PJM is using for light load analysis are similar to the types of assumptions PJM makes for the peak generation and load delivery system conditions, which is a test used to ensure resource adequacy and continued reliable service to load. Light load conditions by definition are not periods where load is at risk of losing service. Rather, zero-fuel-cost wind resources

are displacing generation resources that are not as competitive during these low load periods, and therefore existing plants that cannot respond to dispatch instructions (either due to technical or economic reasons) are experiencing generation delivery constraints. This is not a reliability issue but an economic issue.

In addition to the obvious harm of forcing interconnecting generators to pay for transmission upgrades that may not make economic sense, PJM's current and proposed process for conducting the light load analysis subjects generators to additional and unnecessary uncertainty.

For one, PJM's light load study assumptions are a moving target, creating uncertainty for generators. As mentioned above, PJM is currently seeking to change the study assumptions used in the light load analysis as historical data has indicated that the current assumptions for load and generation are no longer reflective of actual system operations. This process of using static assumptions and then changing them, after a few years of operating history reflecting that the assumptions are no longer valid, creates a moving target that generation interconnection customers cannot predict and respond to. This creates uncertainty in the interconnection process and is burdensome for interconnection customers to manage.

In addition, the retroactive application of new study assumptions introduces additional uncertainty. In 2011, when the Light Load Reliability Analysis was implemented, PJM retroactively applied the criteria to all interconnection projects in the PJM interconnection queues that had not yet executed Interconnection Service Agreements. This forced several interconnection projects to withdraw from the interconnection queue because their study reports that had originally included limited system upgrade requirements were updated to oftentimes reflect significant upgrade costs multiple years into the interconnection study process.¹

We believe that PJM's use of the light load analysis has run afoul of FERC requirements. Per FERC Order 2003, a Transmission Provider can only re-study an interconnection project if certain events occur that necessitate the re-study including:

- 1) A higher queued position drops out
- 2) A higher queued position is modified (as allowed)
- 3) The Point-Of-Interconnection of a prior-queued request is modified (as allowed)

Note that none of these reasons includes "change of planning assumptions" as a valid reason. Thus PJM, in their retroactive application of this study process, in general, and in the re-application with modified assumptions, is non-compliant with FERC requirements.

In addition, some changes have not been fully transparent, such as by adding study procedures and making assumption changes external to the PJM tariff. Interconnection customers were not broadly made aware of the introduction of this new study process unless they were intimately involved in the PJM stakeholder process during the period of the development of Manual 14B language in 2011 and its approval at the MRC. Since PJM does not include the study procedures in their tariff but rather in their business practice manuals (specifically PJM Manual 14B) they did not have to file Tariff changes at FERC.

¹ As an example, this report was released in 2010 and then was updated two years later with \$60 million in light load system upgrades: http://www.pjm.com/pub/planning/project-queues/impact_studies/s62_imp.pdf

Note that at the time that this was developed, MISO's Multi-Value Project cost allocation process was being developed which likely distracted many interested stakeholders.

Finally, we believe PJM's use of the light load analysis is discriminatory against wind generation. PJM only performs the Light Load Reliability Analysis for wind, coal, nuclear, and pumped storage projects. PJM has, therefore, been discriminating against wind since 2011 by not applying this criteria to natural gas generators in the interconnection process.²

Recommendation

It is recommended that PJM perform the Light Load Reliability Analysis in the RTEP study work to help identify economically efficient transmission, demand response, and other system solutions to address inefficient market dispatch due to transmission-constrained generation under light load conditions. The generation interconnection process should not be used as a tool to overbuild the transmission system to accommodate potential market dispatch inefficiencies. As light load deliverability is an economic and not a reliability issue, the RTEP is the right place to perform this type of analysis. PJM should apply light load modeling in its RTEP process (which is correctly focused on reducing total system costs by planning the optimal level of transmission), not generator interconnection studies (where interconnecting generators should have an economic choice on the tradeoff between curtailment and upgrade costs).

² See example on page 10: http://www.pjm.com/pub/planning/project-queues/impact_studies/x2012_imp.pdf