



Testimony of
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**UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION**

Grid-Enhancing Technologies

Docket No. AD19-19-000
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For Public Use

PJM is pleased to provide these Comments to address the issues on Panel Five concerning challenges regional transmission organizations (RTOs) face in utilizing grid enhancing technologies in the planning process. Per the Commission's Notice, this panel has also been asked to address ways to ensure that the regulatory issues addressed in Panel 4 can be crafted so as to work in tandem with RTO deployment of grid enhancing technologies.

RTO processes and FERC regulatory policies work in a symbiotic relationship. When the two are harmonized the public is well served through planning and operations that support an efficient, reliable and secure grid. However, when they do not, *i.e.* when the particulars of the regulatory program are at odds with the fundamentals of how RTO planning or operations is done, we invite sub-optimal results and, as is the American way, litigation over outcomes that can choke both RTO and FERC processes.

With grid enhancing technology deployment, we are at such a crossroads. I would posit that both the Commission's incentive rate policy and its Order 1000 policies need to be examined to consider how they can best be harmonized with the goal of deploying innovative grid technologies which can serve to increase the throughput and efficiency of the existing grid. This is not to say that either of these FERC policies need to be abandoned. We have seen tangible benefits to customers as a result of *both* the Commission's incentive rate policies and its Order 1000 policy. But neither was necessarily crafted with the thought of how best to accommodate the deployment of new technologies that can extend the life of existing assets or turn what would have been competitively-bid greenfield projects into far more modest transmission owner upgrades. As a result, the barriers to deployment of grid technology are not as much in the technical integration of these technologies (although valid issues remain as to what extent the RTO or transmission owner should depend on a relatively new and yet-to-be proven in the field technology as well as liability issues) as they are in harmonization of existing regulatory policy with the role emerging technologies can play in grid enhancement.¹

The array of grid enhancing technologies is vast and growing. We would recommend that the Commission not simply lump all of these efforts to enhance the operation and throughput of the existing grid into one and create a single regulatory response for every such initiative. Rather, the Commission's action should be tied to the particular state of the technology, the risks of deploying a particular new technology and the alternatives available.

As a result, PJM would posit that the Commission could put grid enhancing technologies into one of three 'buckets' and develop different regulatory approaches for each:

Proposed Bucket No. 1: Technologies that Have Been Proven but Whose Use and Deployment is Disparate around the Nation

There are a certain class of practices and technologies that have been fully developed and proven in the field. Nevertheless, use of these practices and technologies has varied across the nation. This disparity occurs for a

¹ Because the issues surrounding when technologies have been sufficiently proven so as to trigger deployment as well as the liability issues are important ones, I address these separately in this statement.

variety of reasons ranging from adherence to existing local practices to the existence of more open-ended NERC standards on the matter.

A good example of this disparity concerns the use of temperature-adjusted line ratings as discussed in Docket No. AD19-15-000. The Technical Conference record in that proceeding demonstrates that adjusting transmission line ratings for ambient temperature conditions is a practice (along with enabling technology deployment) that has been employed, at least in the PJM region, for many years. Although legitimate differences exist (and should continue to exist) as to *how* a given transmission owner develops and applies its ambient temperature line ratings, debates as to *whether* ambient temperature line ratings should even be utilized are a thing of the past in the PJM region. Moreover, planning and operation at the seams becomes much more complex (and the resulting system-wide dispatch clearly sub-optimal) if the RTO has to administer a patchwork where some transmission owners (either in the same or different RTOs) have provided temperature adjusted line ratings for RTOs to use while other transmission owners have not.²

Moreover, given the proven nature of this technology as well as the need for a degree of uniformity on the issue of whether to utilize some form of temperature-adjusted line ratings, special rate incentives need not necessarily be provided for deployment of this grid enhancing practice and technology. Just as all car manufacturers must provide speedometers and gas gauges as a baseline product on the vehicles they sell regardless of price, so too should this practice (and the resulting metering technology to deploy it) be deemed an accepted practice. The Commission could address the regional disparity issue associated with use of temperature-adjusted line ratings either by directing NERC to re-examine its FAC-008 standard or by directing the implementation of such a practice (while still allowing for flexibility in implementation) under its authority to set reasonable terms and conditions of transmission service.³ But this kind of ‘baseline’ practice and deployment of implementing technology is a good example of one that would fit into ‘Bucket No. 1’ and ensure the deployment of grid enhancing technologies and practices.

Proposed Bucket No. 2: Technologies for Which Incentives Should Be Considered

The second ‘bucket’ is populated with those technologies which have been tested and proven in the field but which, because of their characteristics, are ones which should be eligible for incentives for deployment. Eligible technologies in this category could include technologies which work to enhance the efficiency and throughput of existing lines and thus forestall or even obviate the need for a new greenfield project or more expensive upgrade. As noted below, absent some incentive structure, the regulatory system does not particularly encourage these more modest efficiency projects as compared to new builds. Moreover, although the RTO arguably could choose one of these solutions in an Order 1000 competitive bidding process, the actual deployment of these facilities by a transmission developer triggers all of the issues that gave rise to the Commission’s Order 1000 exception for upgrades. I address this issue further below.

² I raise the adoption of a minimum standard and deployment of technology to address variable ambient temperature conditions not to litigate issues being addressed in Docket No. AD19-15-000, but rather as an example of the kind of widely-accepted technologies and practices that arguably belong in bucket number one.

³ In either case, the Commission should provide flexibility in how a transmission owner develops and applies temperature-adjusted line ratings so as to reflect the unique topology and equipment on its system.

The RTO planning process can and should play an important role in considering deployment of these technologies. The RTOs could develop a 'catalog' of those technologies which it would consider as sufficiently proven in the field to be considered as a viable grid enhancement technology. The catalog need not be exclusive. Other technologies could be considered and potentially added to the list and even those not on the list would be able to establish their merit to the RTO and stakeholders through the planning process. But the 'catalog' would help to provide additional transparency and notice to all stakeholders as to what technologies the RTO expects, at a minimum, the transmission owner should *consider* as it addresses end of life issues for particular transmission lines. Also, the catalog would provide transparency outlining those technologies which the RTO would definitely consider in reviewing reliability and market efficiency projects pursuant to Order 1000 processes. And as part of its existing tariff requirements to review certain proposed upgrades within the regional transmission expansion planning (RTEP) process, the RTO would address why particular grid enhancing technologies were either accepted or rejected prior to the ordering of new greenfield projects. Such transparency would assist developers in knowing what should be considered and also provide a record for use by states in the siting process where inevitably intervenors raise the question as to whether viable alternatives were considered over a new greenfield project.

Proposed Bucket No. 3: New Emerging Technologies

For technologies still in the developmental stage, the transmission grid can, in certain instances where the deployment of a new technology would not threaten reliability, serve as a test bed for field testing of these new technologies. PJM and AEP recently partnered on the testing of certain dynamic line rating sensors. By the same token, PJM partnered with the Department of Energy (DOE) back in 2010 to field test the deployment of phasor measurement units (PMUs). That 2010 PMU 'proof of concept' deployment has blossomed and PJM now requires PMUs for all new generators larger than 100 MVA. PJM also plans to integrate PMU placement in all future transmission planning projects beginning with the 2020 RTEP cycle.

These are examples of areas where the DOE could be helpful in helping to support the testing of new technologies which may not be ready for widespread commercial deployment. Given their limited nature, these deployments should be considered exceptions to the Order 1000 competitive bidding process and, by the same token, need not receive special incentives so as to avoid the technological risk of unproven technology simply being shifted from developers to customers. But RTO regions can lead by example to provide a neutral, independent review and transparent proof of concept as to the viability of new technologies.

PJM believes that if the Commission approached grid enhancement technologies in categories, such as the three categories described above, the Commission's regulatory incentive and Order 1000 policies could better complement deployment of these technologies. This approach would also provide a useful framework in deciding the appropriate RTO and FERC response to a given incentive proposal or Order 1000 competitive bid.

Interaction of RTO Practices Regarding Grid Enhancing Technologies with Today's Regulatory Policies

Harmonizing the Commission's Incentive Rate Policy with Grid Enhancing Technologies

There have been few applications seeking an ROE adder related to advanced technology.⁴ Thus, the Commission's efforts to incentivize the application of these technologies does not really get at the fundamental financial realities that transmission developers and owners (whether incumbent transmission owners or new entrants) earn a return on the size of their rate base investment. The larger that investment, the greater the potential return.

Interestingly, this fundamental financial reality does not change with the entrance of new competitive transmission developers under Order 1000. Although it is true that competition forces all parties to 'sharpen their pencils' and potentially lower costs of projects, the overall return to the investor still depends on both the size and cost of the project and the ROE return set by this Commission. In this sense, both transmission owners and new developers have a built-in incentive to develop larger scale projects rather than simply extending the life of existing assets.⁵

This is not to say we should simply scrap the cost of service/return on rate base investment that has been the hallmark of regulation from its inception. Many have tried various forms of 'value of service' ratemaking, particularly in areas outside of the electricity arena, with mixed results. But it does underscore that unless the incentive policy also embraces technologies that enhance the efficiency of the existing grid, the Commission's incentive policies could continue to work against deployment of those technologies that maintain and improve existing assets versus new greenfield projects.

Incentives in this area certainly should not be a 'blank check'. To date, the Commission has focused on the innovative nature of the technology itself although one could argue that such an adder, if anything, incents deployment of unproven new technology due to its focus on innovation and riskiness. As an alternative, the Commission potentially could address this conundrum by focusing its award for innovative new technologies more on a cost/benefit analysis of the deployment of a specific grid enhancing technology versus alternatives when assessing the ROE. The RTOs could assist in providing that analysis to the Commission. However, under today's incentive rate policy the timing of the incentive awards provided by the Commission creates the odd situation where the Commission determines the ROE incentive award for a particular project proposal *before* any of the alternatives have been considered by the RTO. This frustrates the kind of thoughtful cost/benefit analysis to ensure that the size of the ROE incentive award actually is determined in light of fully viable alternatives analyzed by the RTO and reflects the increased value to customers from that choice.

⁴ *Inquiry Regarding the Commission's Electric Transmission Incentives Policy*, 166 FERC ¶ 61208 at ¶ 39 (Mar. 21, 2019).

⁵ Of course, siting challenges associated with greenfield facilities certainly work to temper the desire to build greenfield projects. Both transmission owners and competitive developers need to consider siting and land owner challenges as they address 'end of asset life' issues, particularly for projects which are key to meeting the transmission owner's core reliability responsibility to its customers.

Harmonizing Deployment of Grid Enhancing Technologies with the Requirements of Order 1000

Another area where additional harmonization is needed relates to the application of Order 1000 to replacement projects when existing assets are approaching the end of their useful lives. When looking at end of life alternatives, the RTO will inevitably receive a wide variety of proposals. In addition to greenfield alternatives, both transmission owners and new developers could propose various grid enhancing technologies including reconductoring using state of the art conductors. Under PJM's sponsorship model, PJM will first publish the reliability violations and market efficiency issues to be addressed and ask stakeholders to propose solutions which could include life extension solutions. However, an asset life extension or enhancement upgrade solution proposed by a non-incumbent could well involve the developer placing facilities and potentially being responsible for the maintenance and operation of one or more devices on an existing transmission line owned by an incumbent Transmission Owner. This then raises all of the challenges that gave rise to the Commission carving out an Order 1000 exception for upgrades to existing transmission owner facilities. As the Commission recognized in crafting that exception, the Commission's "reforms do not affect the right of an incumbent transmission provider to build, own and recover costs for upgrades to its own transmission facilities, such as in the case of tower change outs or reconductoring, regardless of whether or not an upgrade has been selected in the regional transmission plan for purposes of cost allocation. In other words, an incumbent transmission provider would be permitted to maintain a federal right of first refusal for upgrades to its own transmission facilities."⁶

On the flip side, transmission developers will inevitably challenge designation of these projects to the incumbent arguing that, in this context, that award constituted a 'band-aid' solution that made it impossible for larger more holistic solutions to be considered. Absent guidance in this area from the Commission, the RTO will find Order 1000 processes becoming a battleground that could hinder the rapid deployment of grid enhancing technologies. And as the transmission infrastructure ages, this question of upgrades to existing facilities through grid enhancing technologies versus competitive 'new build' solutions will only become more contentious. Although each situation obviously turns on its facts and the particular cost/benefit analysis of one solution versus another, Order 1000 and the litigation it will engender in this area could become itself a barrier to rapid deployment of life extension technologies that would otherwise bring significant benefit to customers.

PJM recommends that in addressing this issue, the Commission clarify its intent as to the RTOs' role in addressing end of life asset replacements and make clear the extent to which its existing upgrade exception applies to the deployment of these grid enhancing technologies.

Additional Issues for Consideration

Beyond the regulatory issues outlined above, RTOs will need to wrestle with additional issues before directing the deployment of grid enhancing technologies. One such issue is liability. In this area, questions to be addressed include:

⁶ *Transmission Planning & Cost Allocation by Transmission Owning & Operating Pub. Utilities*, 136 FERC ¶ 61051 at ¶ 319 (July 21, 2011) (footnote omitted).

- Is it prudent to enhance the life of a transmission asset whose location (such as in the case of proximity to forests giving rise to wildfire risk) or topology (such as in the case of CIP14 facilities) already carries a certain degree of risk?
- What factors should the RTO consider in analyzing this question for any particular project and how best to balance cost versus the potential consequences of a high impact but low probability of risk of occurrence?
- What are the liabilities to the transmission owner should such a course be directed by the RTO?
- By the same token, who bears the risk if the technology being deployed, although tested in the field, proves deficient and faulty over time?
- What are the standards on which the RTO should determine that the technology is sufficiently proven so as to order deployment?
- And should that decision vary by RTO or transmission owner with each RTO or transmission owner adopting its own particular risk tolerance level?

These are issues which will need further exploration as the Commission and the RTOs seek to address the growing need for addressing transmission facilities that are approaching the end of their useful lives. The Order 1000 competitive process is both a blessing and a complication in this area. On one hand, Order 1000's competitive processes overall can work to spur more creative and holistic solutions. Conversely, the reality remains that grid enhancing technologies are, in almost all cases, upgrades that today are (and probably should remain) within the province of the transmission owner.

PJM welcomes further dialogue on these issues at this Technical Conference and on into the future.