



Statement of Michael Bryson, Senior Vice President – Operations, on behalf of PJM Interconnection, L.L.C.

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Panel 4: Recovery and Restoration

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On behalf of PJM Interconnection, L.L.C. (PJM), it is a pleasure to participate on this panel and share PJM's perspective on issues relating to the recovery period following an extreme weather event. My name is Michael Bryson. I currently serve as the senior vice president of operations for PJM. As part of my work for PJM, I am responsible for PJM's Operations Division, overseeing the 24 hours per day, seven days per week transmission system operations. These operations include scheduling, transmission dispatch, generation dispatch, reliability coordination, training and all engineering analyses required to run the system and support the critical energy management systems.

We at PJM believe that it is necessary not only to maintain a reliable and resilient infrastructure, but also to have in place robust plans to recover and restore a functioning grid as soon as possible. Restoration of service in response to natural disasters, as well as potential physical attacks or cyberattacks, is not a new task for PJM or any other system operator. As I will discuss, PJM has established processes and procedures in place, and, working with the individual utilities in our region as well as with our neighboring regional transmission organizations (RTOs), we drill for these events continuously. Restoration is a key part of PJM's reliability responsibilities and is something PJM takes seriously.

PJM's Role in Restoring the Bulk Electric System

Restoration of service is a shared responsibility among local utilities and RTOs such as PJM, with assistance from end-use customers as well as the federal government and state and local authorities. PJM's policy is to maintain, at all times, the integrity of the PJM transmission system and the Eastern Interconnection, and to prevent any unplanned separation of the PJM transmission owners' systems.

PJM's role in restoring the Bulk Electric System (BES) differs greatly depending on whether the system response is precipitated by a storm or other extreme weather event (referred to herein as PJM's "storm response approach") or by a blackout or other system disturbance (referred to herein as PJM's "black start" or "system restoration" approach). More specifically, under the storm response approach, PJM's role is focused on supporting its transmission owners, who are largely responsible for restoring the BES following a storm or other extreme weather event. For example, PJM helps the transmission owners to prioritize which facilities to restore first while the transmission owners are the entities responsible for assessing any damage to physical infrastructure resulting from the storm or extreme weather event.

On the other hand, PJM plays a much more active role when a blackout or other system disturbance requires PJM to implement its black start / system restoration approach. Based on North American Electric Reliability Corporation (NERC) reliability standards EOP-005 and EOP-006, PJM and its members are expected to respond to system disturbance conditions or a system blackout. In that vein, PJM maintains in its manuals a detailed recovery plan for responding to loss of all or portions of the grid ("System Restoration Plan") in the event of a blackout or other system disturbance.

As part of the System Restoration Plan, PJM has identified key strategically located generators known as black start resources that can start without needing to draw power from the grid. Having identified such black start resources, PJM's plan seeks to ensure service to these quick-start resources, so they can be used to energize transmission lines and restart other generators, which in turn are needed to restart more generators needed to restore the grid and ultimately get customers back online. The black start resources also provide safe shutdown power for nuclear units

and ensure service to critical natural gas facilities needed to fuel larger generators during the restoration process. PJM refers to this as restoration of critical loads.¹

As a supplement to the System Restoration Plan, each PJM transmission owner is required to develop a restoration plan that supports restoring the system following a disturbance in which one or more areas of the member transmission owner's BES shuts down. Among other things, the transmission owner restoration plans must identify available cranking and transmission paths as well as the procedures for restoring loads, including the identification of critical load requirements. PJM reviews and approves each transmission owner's restoration plan.

Dual Fuel for Black Start Units

I wanted briefly to touch on fuel requirements for black start resources, which is an issue on which we at PJM have focused for some time. Presently, PJM procures black start resources through a PJM RTO-wide request for proposal (RFP) process that we administer every five years. We have been fortunate that this RFP process has worked well so far. The process has allowed PJM to obtain a more efficient fleet of black start units as compared to some years ago when black start – in some cases – was provided by large coal units, at costs that were not necessarily competitive when compared to utilizing a more updated technology, such as a gas combustion turbine unit. Through the RFP process, we have established a point system to rate the many bids we receive and provide additional points toward an award for units that have dual fuel capability and/or firm fuel contracts. Clearly, of the two, dual fuel capability is a superior alternative given the benefits of diversity of fuel resources.

PJM's RFP process has provided a mechanism to bring new resources into the black start program and allow those units to recover capital and operating costs. PJM still has a significant number of legacy units that operate under the PJM Tariff formula rate. These legacy rates have been criticized as insufficient to cover the actual operating costs and higher standards for black start units. This is an area that PJM and FERC will need to analyze and address.

Questions have arisen as to whether PJM should require the conversion of all existing black start units to dual fuel and mandate that, in the future, all units must have dual fuel. In some cases, these conversions, particularly for older units nearing the end of their useful lives, could be quite costly and lead to expensive retrofits for a unit with a limited useful life. In other cases, the ability to burn oil may be restricted by local environmental laws and regulations.

Given these competing concerns, PJM initiated a stakeholder process to focus on these issues. PJM also sought input from the Organization of PJM States, Inc. (OPSI) regarding these issues. Although PJM undertook to model the costs and benefits in response to OPSI's legitimate requests, OPSI ultimately informed PJM that the OPSI states were unable to reach consensus on whether such an across-the-board Tariff mandate to upgrade all units (new and existing) for dual fuel capability was cost-justified. While PJM will continue to work with OPSI and stakeholders on this matter, to date, we have chosen the route of providing added points to our RFP process scoring system in reviewing competitive bids to units that are offering to be dual fuel capable. The RFP process has been successful to date. Nevertheless, the Commission's question is appropriate. PJM would benefit from further guidance from the Commission as to whether a reliability-based directive is warranted, given the split within our stakeholders and states on the issue, the relative success of our RFP-based approach to date, and other factors. PJM welcomes further dialogue on this issue. PJM

¹ PJM only considers critical loads as part of BES restoration. Priority loads, which focus on health and safety (hospitals, National Guard facilities, critical communication equipment, police, fire and other locations critical to public health and safety), are not included in PJM's definition of critical load. Instead, priority loads are included in a transmission owner's respective restoration plan, and local utilities and states play key roles in prioritizing restorations to priority loads. The specific priorities and plan for each utility are often described in tariffs and regulations adopted and overseen by state public utility commissions.

continues to view this as a critical issue and will continue to make modifications through some of the current stakeholder processes involving black start and capacity requirements.

Innovative Approaches to Restoration

The Commission has inquired as to potential new innovative technologies to support restoration. We agree that this is an appropriate question. We have seen the development of certain sizable microgrids, such as the one developed at Princeton University. Our experience has been that microgrids can both assist in restoration of their own load but also assist in restoration generally. Moreover, with appropriate protective controls and visibility to electric distribution companies, distributed resources can provide another source to call upon for restoration. The growth of batteries in PJM's footprint, and even a future of more electric vehicles, can also prove to be promising resources that need to be considered in any restoration plans. Finally, PJM has also received several viable storage solutions during past black-start RFP solicitations.

Restoration planning in this area requires close coordination between distribution companies, transmission owners and PJM. The grid of the future can provide new opportunities to enhance restoration efforts. But, to work effectively, incorporating distributed resources into restoration plans requires a degree of visibility, dispatchability and safety controls that ensure they can be safely and effectively deployed. We look forward to continuing work in this area.