FirstEnergy Solutions Response to PJM Request for Stakeholder Input

FirstEnergy Solutions Corp. ("FES") submits these comments to encourage timely and meaningful efforts by PJM Interconnection to properly value fuel security. FES appreciates this opportunity to provide input to PJM on this critical issue. Within these comments, FES identifies critical assumptions and modeling parameters that PJM needs to consider in performing its analysis, as well as suggestions regarding the principles that should be applied as PJM moves forward with a solution to identified fuel security issues.

Specifically, FES identifies the following critical assumptions and modeling parameters that PJM must consider as it performs the proposed fuel security analysis:

- **PJM's modeling must define firm gas pipeline capacity in a manner that represents the reality that only a small portion of gas-fired resources have firm gas supply and associated firm delivery.** In the past, PJM has assumed that all gas-fired generators have firm fuel supply, when in reality, few have this type of arrangement (*see, e.g.*, PJM's Evolving Resource Mix and System Reliability white paper).[1] In fact, many gas contracts are wholly or partially interruptible, and can be curtailed during emergency situations even if the supply is considered "firm." PJM's model should identify and incorporate gas-fired generation with firm transmission delivery and storage rights, and firm commodity supply (those firm rights which are committed and include no contingencies), and recognize that all others supply and delivery arrangements lack such firm supply. To this effect, generators lacking firm supply and delivery arrangements must be modeled appropriately to reflect the risks of non-performance that result from the lack of such firm supply.
- **PJM needs a complete and accurate understanding of the gas infrastructure and contingencies and supply resiliency.** PJM's model should include detailed and accurate information on where pipelines are located, the reliability and capacity of the supply source, which generation resources are connected to which pipelines and the firmness of each supply contract, what pipeline capacity is reserved for local gas distribution company or "human needs" services (*i.e.,* residential heating). This analysis should determine what pipeline capacity is available for each plant and how much pipeline capacity is available for firm contracts, and how flow restrictions during cold weather events impact maximum actual flow capabilities (based on actual experience). Absent such detailed information, PJM's assessment of fuel security will be inherently inaccurate and unreliable.
- **PJM should analyze multiple scenarios around the ability of plants to receive primary and replacement fuel**. PJM should consider scenarios that assume no further buildout of fuel delivery systems (*i.e.,* existing levels of pipelines, rail delivery, and barges), normal conditions and extreme weather, Bomb Cyclone conditions during a non-holiday week, failure of primary mode of delivery (e.g., pipeline failure impact on a large number of plants), failure of primary and secondary modes of delivery (e.g., several pipelines fail simultaneously), and short-term (3-day), mid-term (30-day) and long-term (60-day)

[1] PJM's recent education on fuel assurance for black start units showed only 38% of gas black start units as having firm supply contracts.

interruptions in fuel transportation and supply. PJM should also analyze combinations of the above identified scenarios. Only with such a broad-based analysis that looks at multiple scenarios will PJM be able to gain a meaningful understanding of the true state of fuel delivery and security and associated risks.

- **PJM should not assume that firm gas pipeline contracts are devoid of any risk**. Firm natural gas delivery contracts can still be interrupted due to pipeline issues (Operational Flow Orders for example) or service priorities (similar to firm electric transmission capacity reservations). Ratable service can be enforced during times of supply constraints, meaning that generators can have the hourly delivery capped. These risks will also need to be considered in PJM's model and, thus, PJM should not assume that "firm" gas supply can be delivered 100% of the time. Each natural gas pipeline must maintain on its Electronic Bulletin Board a list of historical restrictions and Operational Flow Orders. PJM must access this data and incorporate it into its analysis.
- **Fuel supply and transportation limits should be considered**. PJM should consider if it is even possible for every gas-fired plant to acquire firm capacity. PJM should also consider the ability of future natural gas plants in the queue to acquire firm supply.
- **PJM's "High-Stressed Portfolio" scenario should be realistic**. The Independent Market Monitor's 2017 State of the Market Report notes that 30 GW of primarily coal and nuclear capacity are at risk of closure. PJM should conduct additional analyses (an "Alternative Base Portfolio") that assumes this amount will in fact retire. In addition, PJM should conduct analyses that assume more than 30 GW closes, because the 30 GW figure may be understated.[2]

In addition, after PJM completes its modeling, the following principles should be applied and analyzed as PJM develops its solution to identified fuel security issues:

- PJM should pursue a holistic approach that takes into account all resilience risks, not just fuel security;
- PJM should ensure that the proposed fuel security solution does not allow one fuel type to dominate the solution, as doing so inherently will increase the risk of common mode of failure and economic risk due to commodity price fluctuations;
- PJM should take a broad view of whether there will be timely new entry of new pipeline capacity in light of state opposition to halt or delay construction of new natural gas pipeline capacity or expansions;
- PJM should factor in historical issues, such as extreme weather events or gas pipeline outages;

[2] For example, the State of the Market Report does not list Beaver Valley as being unprofitable, despite the fact that FES has announced plans for deactivation in 2021, citing market challenges as the main factor. Additionally, the 3/27/18 DOE NETL report titled *Reliability, Resilience and the Oncoming Wave of Retiring Baseload Units Volume I: The Critical Role of Thermal Units During Extreme Weather Events* found that retirement of aging coal and nuclear generation infrastructure may be underestimated which could give rise to reliability concerns and an inability to meet projected electricity demand; however, more study is required to evaluate the impact.

- PJM's analysis of fuel supply security should also take into account multiple contingencies or "unknown unknowns"; and
- PJM should avoid blanket assumptions about fuel availability or fuel security of specific plants should be avoided (*e.g.*, it should not assume that units near or adjacent to fuel sources cannot suffer supply disruptions).

Absent adoption of FES' suggested recommendations, PJM's proposed approach to evaluating fuel security may lead to solutions that result in nothing more than a more expensive version of today's flawed capacity market. Any criteria to assess fuel security that are broad enough such that resources of all technologies and fuels can qualify as being "fuel secure" will likely result in a system less secure than the *status quo* with natural gas as an even more dominant fuel source. If PJM's only goal here is to slightly firm up gas supply, it would be achieved. The approach, however, is lacking if PJM truly wants to ensure system resilience and protect customers against equipment design issues or common modes of failure in similar resource types, fuel price volatility, fuel supply disruptions, and other unforeseen system shocks. To this effect, absent a realistic assessment of fuel security, PJM's efforts will result in customers paying more without receiving any additional benefits, while losing the existing benefits provided by fuel-secure, resilient coal and nuclear resources.

FES has long advocated that fuel-secure, resilient generating facilities receive compensation for the fuel-security and resiliency qualities they bring to the electric grid; attributes for which they receive no compensation for from the PJM markets. When PJM first began to discuss resilience publicly, PJM stated market compensation and regulatory structures may need to shift to ensure that adequate levels of generator reliability attributes are maintained in future resource mixes.[3] PJM has acknowledged that all resource types are needed for the system to be resilient.

PJM's latest proposal takes a market-based approach, in which PJM will define (if analysis indicates they are necessary) specific fuel-security criteria that could be implemented as constraints in the capacity market for application in the next possible Base Residual Auction. PJM proposes to define the constraints "in a fuel-neutral manner, such that all resources are able to compete to meet them." FES has serious concerns with this approach, as it is based on the flawed premise that all generation technologies, fuels and supply chains *should* be able to compete to meet the same fuel security criteria when in-fact the fuels resources utilize are fundamentally different, and may not be capable of providing adequate security.

As PJM has properly identified, the continued availability of fuel supply is a critical component of resilience. A generator without a secure and stable source of fuel cannot respond to, recover from, or otherwise provide value to the electric system during potentially disruptive events. Nuclear and coal-fired generators – each of which has on-site fuel storage as a natural characteristic of its design – are the types of generation resources that can most clearly contribute to fuel-security and grid resiliency.

The most fuel secure generation resources are those resources with on-site fuel storage. The more on-site fuel storage capability, the longer a plant can run during a supply disruption. For example, in the event of an interruption to the coal fuel supply (river freezing, train issues, miner strike), coal plants typically have 30 days or more to create alternative supply routes before service is interrupted. Nuclear

[3] http://www.pjm.com/~/media/library/reports-notices/special-reports/20170330-pjms-evolving-resource-mix-and-system-reliability.ashx

power plants also offer significant fuel security benefits, as they have approximately 18 or more months of on-site fuel storage. On the other hand, dual-fueled gas power plants may only have 1-2 days of on-site fuel storage before fuel supply is depleted, and plants without backup capability will be offline immediately.

An overly broad, watered-down definition of fuel-security with a short-term horizon will not accomplish the intended goal of ensuring resilience in the long term, or alleviate concerns over-reliance on a single fuel source or slow the accelerating pace of coal and nuclear retirements (and their inevitable replacement with natural gas). Moreover, a broad, unfocused definition will not result in a grid that is able to withstand a long-term disruption, will do nothing to address major issues with potential long-term pipeline failures, will not protect customers if gas economics change, and would exacerbate shorter-term issues like gas pipeline capacity during a cold spell. For this reason, absent adoption of the recommendations included herein, PJM's proposed approach will result in a resource mix that is even less fuel-secure than it is today.