PENNSYLVANIA PUBLIC UTILITIES COMMISSION

Resource Adequacy	)	
Technical Conference	)	Docket No. M-2024-3051988
	)	

POST-TECHNICAL CONFERENCE COMMENTS OF MAINSPRING ENERGY, INC.

I. Introduction

Mainspring Energy, Inc. ("Mainspring") appreciates the opportunity to submit comments to the Pennsylvania Public Utility Commission ("PUC") on issues critical to ensuring resource adequacy and grid reliability in Pennsylvania.

Mainspring participated as a panelist in the November 25, 2024 Technical Conference ("T.C.") on "Panel 3: What can the PUC do to ensure resource adequacy for electric distribution customers?". Mainspring offers these written comments to supplement verbal comments made at the T.C. As stated during the T.C., our company supports adding more flexible generation to meet Pennsylvania's reliability needs of the moment, regardless of ownership and market structures. We applaud the efforts of the Commission and staff in proactively addressing the challenges facing the state's energy landscape.

II. Executive Summary

Mainspring recommends that the Commission take the following actions to address emerging challenges:

1. Investigate reforms to retail service such as interruptible tariffs to enhance demand-side flexibility.

2. Research and develop recommendations to the Legislature and Governor's office for reforms that bolster Pennsylvania reliability, around accelerating development of flexible behind-the-meter and front-of-the-meter generation.
3. Advocate for reforms at PJM Interconnection, LLC ("PJM") to accelerate the deployment of high-reliability, flexible, clean generation resources.
4. Working with PJM, utilities and large load customers, create awareness for new large load customers to develop 24/7 on-site generation and "bring their own power" to get online faster.

III. About Mainspring

Mainspring is a U.S.-headquartered manufacturer of dispatchable, fuel-flexible, and scalable linear generators. Mainspring was founded in 2010 and its first commercial units were deployed in 2020. The company has customers across the country that span numerous industries, including commercial and industrial facilities, data centers, utilities, and independent power producers.

Mainspring is a leader in converting fuel to electricity through its linear generator technology that is highly efficient and low emissions. The linear generator delivers unmatched flexibility for the grid transition, including the ability to switch between various fuels, such as natural gas, hydrogen, propane, and biogas. The linear generator uses a low-temperature reaction without a spark or flame, which results in near-zero emissions of nitrogen oxides. The linear generator can also quickly track and firm renewables with its full dispatchability, and is modular allowing for scalability similar to battery energy storage, but does not face the same energy duration limitations.

Mainspring Linear Generators have been deployed on the distribution and sub-transmission systems across the country. Mainspring Linear Generators are fully dispatchable and scalable from 250 kW to 100+MW power blocks. Mainspring customers include Fortune 500 companies such as Lineage Logistics, Prologis, and Kroger, as well as utilities such as AEP, Florida Power and Light, and others. Mainspring Linear Generators, in configuration with 100% green fuels stored on-site, can provide cost-effective, long duration energy storage for seasonal reliability needs.

Finally, Mainspring is proud to announce a $174 million investment to establish a manufacturing facility in Western Pennsylvania, enabled in part by $9 million in incentives provided by the Commonwealth. This facility will produce approximately 1,000 linear generators annually and create 600 good-paying jobs. In addition to manufacturing our units in Pennsylvania, we aim to deploy our technology within Pennsylvania and the PJM region to enhance grid reliability and support economic

development across various sectors, including those seeing growing load in data centers and manufacturing.

IV. Detailed Recommendations

A. Implement Retail Service Reforms to Support Demand Growth and Reliability

Pennsylvania, as well as the wider region, is witnessing significant load growth from data centers, reshoring manufacturing facilities and electrification. To accommodate this growth:

- **Evaluate New Interruptible Tariffs:** Design voluntary tariffs to incentivize large energy users to curtail consumption during peak hours (e.g., the top 1,000 hours annually) and deploy on-site generation. Such rate designs can attract businesses to Pennsylvania while maintaining grid reliability.
- **Encourage On-Site Generation:** Adopt other rate structures that incentivize on-site generation, enabling economic development and resilience.

B. Initiate Broader Legislative and Regulatory Initiatives

Broader reforms are necessary to ensure adequate generation on the bulk power system and behind critical loads to ensure reliability even when the grid may fail:

- **Research Reliability Threats in Pennsylvania:** Model grid scenarios that may occur in Pennsylvania creating energy shortages and the resulting financial and health impacts.
- **Public Funding for Generation:** Learn from other states, such as Texas, which established a $10 billion fund for loans and grants to incentivize new generation investments. Pennsylvania should design policies to support diverse and flexible technologies in case markets do not drive sufficient new dispatchable generation in the Commonwealth.[1]
- **Utility Ownership:** Create awareness of policies under which utilities can currently own and operate customer-sited generation assets, such as through the

[1] Texas Energy Fund and Texas Backup Power Package. Details available: https://www.txenergyfund.texas.gov/ and https://www.txenergyfund.texas.gov/TBPP

unique existing policy highlighted by the Pennsylvania Consumer Advocate at the T.C.[2]

C. Influence Reforms to PJM Processes to Get More Flexible Generation Online

The PUC can influence PJM to fast-track deployment of clean, high-reliability generation for bulk power:

- **Support Expedited Processes:** Advocate for new permanent, long-term reforms that prioritize projects addressing critical reliability needs.
- **Encourage Dual-Fuel and Fuel Flexibility:** Given Pennsylvania's experience of outages with single fuel generation in Winter Storm Elliott, prioritize technologies that can operate with on-site dual-fuel and on various fuels, including natural gas, hydrogen, propane, and biogas, to enhance reliability and avoid supply disruptions.

D. Influence the Regional Discussion for Approaches to Meet Demand Growth, such as by Leveraging On-Site Bring Your Own Power Solutions

The PUC can influence other states, utilities, customers and PJM to study and create awareness for approaches for large loads to bring their own power. As was discussed by many expert panelists at the T.C., Pennsylvania is a net electricity exporter, but the Commonwealth still faces potential electricity shortages as its electricity is part of an energy pool. As a result, increasing electricity demand across PJM impacts Pennsylvania also. Mainspring offers detailed recommendations under Section V. below to manage demand growth in the region.

V. Response to Technical Conference Comments

A. On-Site Bring Your Own Power

[2] Pennsylvania Consumer Advocate highlighted in verbal comments that existing Pennsylvania Utilities Code Section 2807(e)(5) (i) and (ii) does allow for EDCs to contract with large loads and own/operate on-site generation under specific conditions. Available: https://www.legis.state.pa.us/cfdocs/legis/LI/consCheck.cfm?txtType=HTM&ttl=66&div=0&chpt=28&sctn=7&subsctn=0

During Panel 3, Commissioners raised questions to Mainspring and other panelists regarding approaches to serve large loads. Mainspring spoke of the need to advance business models that enable customers to bring solutions on-site. Further, during Panel 1, there was widespread support among panelists for Pennsylvania to support "bring your own power" solutions to expedite new generation and offset the rapid growth anticipated across many states in PJM. This support included PJM Interconnection, the Independent Market Monitor for PJM, Natural Resources Defense Council, Constellation and LS Power. "Bring your own power" (BYOP) is often discussed in the context of new grid-connected power, however Mainspring emphasizes that the 'on-site" flavor of BYOP solves more problems and can be built much faster in Pennsylvania.

To address this topic further, we offer more details here regarding the demand for on-site power to serve large loads and scenarios that the PUC can help to unlock for customers to bring their own power.

First, why is on-site power needed? The alternative of bringing new generation into the PJM queue to address new large loads is important, but faces major obstacles that do not solve customer reliability concerns. These obstacles include (1) the 4+ year timeline associated with the PJM queue today and uncertainty on the benefits of recent enhancements, (2) challenges of rapidly building out new distribution infrastructure to interconnect loads, such as frequent multi-year delays given the need to upgrade substations and other equipment, and finally (3) the fact that electrical distance between bulk power generation and large loads raises reliability risks.

Instead, a better option for many of these customers will be to bring their own power solutions behind the large load's utility meter to serve its own load via a microgrid. Mainspring recently filed similar comments to the Federal Energy Regulatory Commission (FERC) regarding large loads and on-site power.[3]

In addition to supporting these large loads' goals, these on-site arrangements are all additive to resource adequacy, as they do not involve removing capacity from the grid. The Commission should research and raise awareness across the region of such solutions.

Mainspring has delivered "bring your own generation" and "speed to power" solutions for customers and utilities. Mainspring leverages its expertise and organizes the flavors of these solutions into a taxonomy below around (1) pre-grid interconnection and (2) post-grid interconnection scenarios.

1) Pre-grid interconnection. As numerous regions deal with serious ramps in demand and multi-year delays to allow new loads to interconnect, large

[3] Post-Technical Conference Comments of Mainspring Energy under AD24-11, December 9, 2024. Available: https://elibrary.ferc.gov/eLibrary/filedownload?fileid=AB9D8BB7-268E-CC2A-991D-93AC32200000

customers seek alternatives to come online faster. These loads are not grid loads, at least initially. For example, in 2024, Mainspring commenced operation at a Prologis site in Southern California with 2.75 MW of fuel-flexible, hydrogen ready linear generators paired with 18 MWh batteries to provide up to 9 MW of instantaneous power to charge 96 EV trucks simultaneously.[4]

In this case, the project is entirely powered via microgrid off the grid until the grid arrives. States (and FERC) should continue to recognize that pre-grid interconnection projects such as this do not use the grid and therefore are not subject to wholesale charges. From a planning perspective, for the time periods that these loads are pre-grid interconnection, it is important that these loads are accurately recognized as non-grid load, such that customer classes are not improperly charged for services such as transmission and capacity. This scenario supports grid reliability by reducing the slope of grid demand growth, while simultaneously supporting economic development and national security.

2) Next, post-grid interconnection. Below are several sub-examples:

    A) Once the grid arrives, on-site generation can continue to play a key role.
        a) For the first sub-example, the on-site generation can be transitioned to low-emission backup as a diesel alternative. In this case, the load will normally be entirely served by the grid.
        b) As a second sub-example, Mainspring is working with customers that will relocate on-site linear generation once the grid arrives. Once the grid arrives, all load will be met by the grid. The on-site linear generators will be moved to new sites by the owner (whether the owner is a utility or large load customer, for instance). The generators can then solve for speed to power challenges and serve prime power in these new locations until the load there becomes grid connected.

[4] Details available: https://www.microgridknowledge.com/energy-storage-microgrid/article/55042968/prologis-and-performance-team-launch-new-ev-charging-depot-powered-by-ev-truck-microgrid-near-ports-of-los-angeles-and-long-beach

B) Next, in other cases, the on-site generation will remain on-site to serve the load.

a) In the first sub-example here, the grid and on-site generation can each serve a portion of the prime power throughout the annual 8760. For example, a large load that starts with 5 MW of prime power needs served by on-site power (linear generators), can ramp its load by adding another 5 MW when the grid arrives and serve the second 5 MW tranche entirely from the grid.

The first 5 MW tranche would continue to be non-grid energy, whereas the second tranche will be grid energy. From a planning perspective, it will be important to consistently identify these loads correctly as only 5 MW of grid power. If on the other hand, the full load of 10 MW was formally planned for, improper cost-shifting could occur to the disadvantage of all load in the region. For instance, transmission could be overbuilt and capacity could be overprocured to meet the extra 5 MW plus reserves.

b) As the second sub-example, a large load can shift between meeting its full load from the grid during certain hours and continue to use on-site generation to meet a portion or all of its load for other hours. This model, which is analogous to operating under an “interruptible tariff”, can maximize the utilization of grid assets and requires the proper price signals to avoid using grid power during the top 1,000 hour peak periods of the year, for example.

Mainspring’s main point is that Pennsylvania can address growing large load additions in the region by encouraging “on-site” power generation. This should involve significant collaboration with the Organization of PJM States (OPSI), PJM, utilities and large loads to create awareness for new large load customers to “bring their own power” to get online faster. Utilities need not own generation to help large customers get connected - Mainspring has helped customers and utilities with the speed to power challenge. In particular, we can bridge the gap until local distribution line and other grid upgrades are made. We can also help get large customers connected by making them a controllable load that can be turned off from the grid perspective when the local utility or PJM system gets tight, all without interrupting customer service.

VI. Conclusion: Mainspring's Linear Generator, A Key Reliability Solution

Given the challenges the grid faces in Pennsylvania, Mainspring's Linear Generator provides unprecedented operational and fuel flexibility, making it an essential tool for grid reliability:

- **Rapid scalability:** While many other technologies face multi-year procurement delays, Mainspring's technology is available now. In addition, given its modular nature, projects can be deployed to minimize risks of over-building and keep pace with load ramps.
- **Operational Flexibility:** Load following, unlimited starts and stops and unlimited runtimes enable the linear generator to deliver best-in-class, on-site power generation. The technology serves customers 24/7. On grid-scale, the linear generator can work around the clock or serve as a clean peaking replacement and fill gaps in traditional thermal, battery, renewable, and nuclear generation.
- **Fuel Flexibility:** The ability to switch between natural gas, hydrogen, propane, biogas, and ammonia ensures reliability during fuel supply interruptions.
- **Environmental Benefits:** Compared to many traditional thermal units in operation today, Mainspring's technology cuts carbon dioxide and criteria pollutants by more than half.
- **Reliability During Extreme Events:** Modular and redundant designs ensure 100% availability, with projects including five days of on-site fuel storage to manage through natural gas pipeline emergencies.

Mainspring Energy urges the PUC to take proactive steps to enhance resource adequacy and grid reliability in Pennsylvania and across the region. The growth rate of electricity demand in the region creates short-term and long-term reliability challenges. By adopting forward-looking PUC, legislative, and PJM reforms, Pennsylvania can position itself as a leader in energy innovation and economic growth. Mainspring stands ready to collaborate with the PUC, PJM, and other stakeholders to achieve these goals.

For further information, please contact Brian Kauffman, Director of Wholesale Market Development, at brian.kauffman@mainspringenergy.com.

Sincerely,

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