August 24, 2015

VIA EMAIL TO: LPT.RFI.2015@hq.doe.gov

Ms. Alice Lippert
Office of Electricity Delivery and Energy Reliability
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

RE: Comments of Grid Assurance LLC on Request for Information on National Power Transformer Reserve, 80 Fed. Reg. 39,422 (July 9, 2015)

Dear Ms. Lippert:

Grid Assurance LLC (Grid Assurance) appreciates the opportunity to submit these comments on the Department of Energy's (DOE) Request for Information on a National Power Transformer Reserve, 80 Fed. Reg. 39,422 (July 9, 2015) (RFI).

I. Background on Grid Assurance

Grid Assurance is a new company that has recently been organized by several electric utilities and energy companies to provide improved responses to major events affecting the electric transmission grid by giving transmission-owning entities access to domestically warehoused long lead-time critical equipment.[1] Grid Assurance will provide emergency equipment supply services for transmission owners in the United States and Canada to support the rapid restoration of electric service in the event of certain types of catastrophes, for the purpose of enhancing grid resiliency. Grid Assurance is thus an industry response to the critical national security concerns about grid resiliency that DOE raises in the RFI.

Grid Assurance will provide access to an inventory of long-lead time critical equipment stored at secured warehouses and readily deployable after a major system failure. It will provide this service to transmission owners on a subscription basis. For its subscribers, Grid Assurance will maintain an optimized inventory of critical spare transformers, circuit breakers and related transmission equipment, provide secure domestic warehousing of the inventory of spares in strategic locations, and release spare equipment to utility subscribers as needed to respond to emergencies. By providing this "sparing service" to many subscribers, Grid Assurance will provide the following distinct benefits to subscribers:

[1] American Electric Power Company, Inc., BHE U.S. Transmission, LLC, Duke Energy, Edison Transmission, LLC, Eversource Energy, Exelon Corporation, KLT, Inc., and Southern Company Services, Inc., are involved in the development of the Grid Assurance business model.

1. Reduced Cost via Inventory Pooling: By optimizing inventory to the resiliency needs of a large group of subscribers, each subscriber's share of the cost of access to inventory will be minimized. Thus, this approach is expected to be more cost-effective than utility-by-utility sparing strategies.
2. Economies of Scale: Grid Assurance will seek to take advantage of volume purchases to obtain favorable pricing on equipment supply and maintenance agreements.
3. Secure Storage and Management of Inventory: Grid Assurance will store the equipment at secure, strategically-located warehouses and contract with equipment manufacturers to periodically test, service, and maintain equipment in inventory. Grid Assurance will manage its inventory so that manufacturer warranties are preserved.
4. Improved Logistics: Grid Assurance will establish warehouses strategically located to maximize efficiency of delivery. Grid Assurance will perform ongoing logistics planning and maintain expertise in large asset transportation, including intermodal transportation for inbound and outbound inventory. Where appropriate, it will also procure access to specialized transportation equipment (e.g., Goldhoffers, Schnabel Cars, deck barges, dedicated boats, low boys, and cranes).

To facilitate the use of its sparing service by subscribers, Grid Assurance recently sought and received certain declarations from the Federal Energy Regulatory Commission (FERC) concerning the regulatory treatment of its sparing service. Specifically, FERC issued declarations that (1) contracting with Grid Assurance for access to spare critical transmission equipment is a permissible resiliency element of a physical security plan under Requirement 5 of Reliability Standard CIP-014-1, and (2) prior authorization under Section 203 of the Federal Power Act is not required for sales by or purchases from Grid Assurance of spare transmission equipment that is not in service at the time of the transfer.[2]

Contingent on the receipt of certain additional declarations from FERC, Grid Assurance expects to begin accepting subscribers and identifying inventory in 2016.

II. Comments on RFI

Grid Assurance acknowledges and supports the comments of the Edison Electric Institute (EEI), the National Rural Electric Cooperative Association, and the American Public Power Association (Joint Trades) submitted in response to the RFI.[3] Grid Assurance's comments below provide detail about Grid Assurance's approach to addressing grid resiliency issues through its subscriber service.

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2 *Grid Assurance LLC*, 152 FERC ¶ 61,116 (2015).

3 *See* Comments of Edison Electric Institute, the National Rural Electric Cooperative Association, and the American Public Power Association on DOE RFI on National Power Transformer Reserve Program (Aug. 24, 2015).

1. Program Need

Is there a need for a National Power Transformer Reserve? How would such a reserve affect the reliability and resiliency of the North American bulk power system? Are there alternatives to a power transformer reserve program that can help ensure the reliability, resiliency, and recovery of the bulk power system? Is there a need for a nationally-maintained inventory of large power transformers?

There is a need for a systematic approach to address threats to grid resiliency posed by large-scale disruptions such as cyberattacks, solar storms, and severe weather events. The maintenance of adequate reserves of critical transmission equipment, including but not limited to large power transformers (LPT), as a means to recover from large grid disruptions as quickly as possible is unquestionably a part of this paradigm.

As the comments of the Joint Trades lay out in detail, the electric utility industry has already undertaken a series of initiatives including the EEI Spare Transformer Equipment Program (STEP) and SpareConnect Programs to support the availability of critical transformers in response to large-scale grid disruptions. The most recent of these industry initiatives is the formation of the Grid Assurance subscriber service, which has been developed as a complement to the STEP and SpareConnect programs.

Grid Assurance's sparing service augments the industry's capability to respond to outages by maintaining additional spare equipment reserves above and beyond what is already kept on hand by individual utilities. Grid Assurance will stockpile reserves of a wide range of critical transmission equipment, including but not limited to LPTs that could impact grid resiliency. Grid Assurance will, in conjunction with the STEP and SpareConnect programs and other industry initiatives, effectively constitute an industry-led transformer reserve program.

Any additional program that DOE considers to increase national reserves of LPTs and associated critical transmission equipment should complement and support existing industry programs to protect the bulk power system, and should not duplicate or compete with current or planned investments in reserves, including the Grid Assurance subscriber service. In evaluating the need for a National Power Transformer Reserve, DOE should take into account the bulk power system (BPS) resiliency, reliability, and recovery benefits already provided by industry-led initiatives.

2. Power Transformer Criteria

What types and sizes of power transformers should be considered for inclusion in a transformer reserve program versus operational spare capacity? What are the design considerations for replacement transformers to support the bulk power system?

The focus of Grid Assurance will be on maintaining an inventory of transformers and other long-lead-time equipment such as circuit breakers, as a means of ensuring that equipment that might otherwise take many months to replace can be deployed much more quickly. In

deciding what types of equipment to hold in inventory, Grid Assurance will consider the collective needs of its subscribers, with input from each.

Grid Assurances considers the following design elements relevant to the procurement of replacement transformers: MVA rating (size/capacity), impedance, tertiary winding kV, basic insulation level, high/low side transformer taps, and LTC versus non-LTC functionality. A transformer's physical dimensions should also be considered in light of possible transportation and installation constraints.

Although it has been previously considered with little success, a generic transformer designed to fit multiple applications would be extremely useful in a low-probability, high consequence event. Satisfying the many variable design criteria listed in the above paragraph are at the center of the challenge to design such a unit.

3. Ownership and Economics

What would be an appropriate structure for procuring and inventorying power transformers? How, and by whom, should a program of this type be administered? How would a transformer reserve be funded?

Grid Assurance believes that this grid resiliency service is best provided by the electricity industry itself. Grid Assurance has been established as a separate company that will be owned by a number of affiliates of transmission-owning utilities across the United States to offer a spare equipment inventory service for disasters and emergencies. Electricity industry ownership brings expertise to the enterprise, and Grid Assurance's organizational structure and voluntary subscriber model will allow it to draw upon the collective experience and knowledge of a broad cross-section of the electric industry in a collaborative and ongoing fashion.

Because Grid Assurance is electric industry-owned and led, Grid Assurance proposes to use a cost-based pricing model. Each subscriber will pay a periodic subscription fee which will be equal to its allocated share of Grid Assurance's cost of operation. The Grid Assurance Subscription Agreement will also establish the pricing at which inventory will be sold to subscribers in times of need, which will be based on Grid Assurance's cost for purchasing such equipment.

Each utility's decision to subscribe to the Grid Assurance sparing service will be voluntary. The costs of the service will be borne by the utilities that choose to use the service, and their ratepayers.

The notion of a Federal government transformer reserve, even if authorized, raises difficult questions about funding. Funding a Federal transformer reserve through annual appropriations could impact procurement activities and creates the prospect of funding interruptions. Therefore, Grid Assurance believes that an industry-funded model is preferable.

4. Technical Considerations

Is it technically feasible to develop a reserve of large power transformers when most are custom engineered? Is additional research and development (R&D) necessary to develop suitable replacement transformers that can be rapidly deployed from inventory in the event of an emergency?

Many transformers have been engineered to fit specific utility needs and provide optimum performance in particular applications. However, it is technically feasible to develop a reserve of LPTs with properties that could accommodate a wider range of configurations. There are multiple voltage classes and configurations currently deployed in the BPS, but research studies, interactions with the R&D community, and discussions with suppliers indicate that there is a potential to reduce the levels of customization needed in replacement equipment. For instance, the low-side winding of a transformer could be configured to provide a wider range of coverage (e.g., a 230 kV/138kV transformer could become a 230kV/115kV-138kV-161kV transformer). This option would allow for more spare pooling opportunities.

5. Procurement and Management

How should procurement, maintenance and management of the reserve power transformers be conducted? For example, should manufacturers be pre-qualified, and if so, according to what criteria?

The Grid Assurance model will provide for efficient and cost-effective procurement, management, and maintenance of spare LPTs and other critical transmission equipment. Grid Assurance expects that its procurement activities will take advantage of volume purchasing to obtain favorable pricing on equipment supply and maintenance agreements. Manufacturers of critical transmission equipment will be pre-qualified, using criteria similar to those currently used by utility companies. Grid Assurance expects to pre-qualify many manufacturers to maintain diverse sources of supply, and has already held preliminary discussions with several top manufacturers. Maintenance, including on-site testing, validation of operational readiness, and routine maintenance, will be performed by pre-approved suppliers on an as-needed basis.

6. Supply Chain

What are the critical supply chain components for the manufacture and delivery of large power transformers (e.g., electrical steel, copper, silicone, high voltage bushings, etc.)? Are there shortages or other considerations that could necessitate using the Defense Production Act Priority Ratings to ensure sufficient parts are available in a time of need? Are there related skilled workforce issues?

Critical supply chain components for the manufacture of LPTs include high-voltage bushings, copper, core steel, and insulating oil. Transportation is also a critical supply chain component. Transport via rail car, truck, or barge is often required, and therefore proximity to critical transportation arteries is critical to rapid deployment of spare equipment. Grid Assurance

will work with manufacturers to ensure a reliable supply chain and that transportation logistics are pre-arranged.

7. Manufacturing

Is there adequate manufacturing capacity to support a transformer reserve program? What is the lead time for engineering, manufacture, and delivery of large power transformers? Are there approaches that could help to speed manufacture and delivery of large power transformers?

Yes, there is adequate worldwide manufacturing capacity to support a transformer reserve program. The lead time for EHV equipment is typically 12-18 months. The Grid Assurance model is designed to cost effectively provide utilities access to spare equipment that has such extended lead times when procured from the manufacturer, by purchasing and maintaining an inventory of equipment with long manufacturing lead times in secure domestic warehouses where they can be deployed promptly in the event of an emergency.

8. Transport and Deployment

What specialized transport infrastructure would be necessary to ship large power transformers from manufacturing site to storage locations, and from storage locations to field site in the event of an emergency? What should be the number and location of transformer storage sites? What are feasible delivery times for LPTs that reside in a reserve to an affected site?

Transporting LPTs to storage facilities and installation sites may require the use of railcars specifically designed to transport transformers, rail sidings, flatbed trucks designed for transformers, rigging equipment, and barges. Grid Assurance anticipates setting up multiple storage warehouse locations near major transportation arteries in different parts of the country to minimize transportation time for emergency deployment of spares for its subscribers around the country. However, the ultimate number and location of storage facilities that Grid Assurance opens will depend on the specific needs of its subscribers, including the geographic diversity and footprints of Grid Assurance subscribers and the type and quantity of inventory that Grid Assurance, in consultation with its subscribers, determines is appropriately held in inventory.

9. Field Engineering and Installation

Are there adequate domestic engineering and installation resources available throughout the United States to install multiple bulk power transformers simultaneously? What additional resources would be necessary?

Domestically, engineering and installation resources are adequate to handle the installation of multiple bulk power transformers simultaneously in all regions of the country, so no additional resources are necessary to address installation issues.

10. Criteria for Deploying Transformers

What criteria should be used for activating and deploying transformers from the reserve? How would deployment be funded?

Grid Assurance's subscriber service will deploy spare equipment from Grid Assurance reserves in response to certain "qualifying events," including but not limited to physical and cyber-attacks, electromagnetic pulses, solar storms, earthquakes, floods, fires and severe weather events.

Deployment will be funded by subscribers receiving spare equipment. The Grid Assurance Subscription Agreement will establish the pricing at which inventory will be sold to subscribers following a qualifying event, which is expected to be based on Grid Assurance's cost for such equipment. Grid Assurance expects to establish a deployment protocol in consultation with subscribers to enable the rapid and effective deployment of spare equipment. Grid Assurance will also support and facilitate delivery of spare equipment.

III. Conclusion

DOE's RFI raises important issues about readiness to respond to low-probability, high consequence risks to the electric grid. Grid Assurance is working to offer a sparing service based on maintaining an optimized inventory of long-lead-time grid equipment in secure domestic warehouses, with the goal of cost-effectively enhancing the resiliency of the grid. Grid Assurance appreciates DOE's consideration of these comments, and looks forward to playing an important role in addressing the resiliency needs of the BPS and utility subscribers and their customers.

Respectfully Submitted,

/s/ Douglas W. Smith

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