



National Association of
State Energy Officials

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Office of Electricity Delivery and Energy Reliability
U.S. Department of Energy
Forrestal Building
Room 1E-078
1000 Independence Avenue SW
Washington, DC 20585

Subject: Response to Request for Information: National Power Transformer Reserve

Dear Ms. Lippert:

The National Association of State Energy Officials (NASEO) is pleased to provide our response to the U.S. Department of Energy (DOE) Office of Electricity Delivery and Energy Reliability (OE) Request for Information (RFI) on the establishment of a national reserve of power transformers that support the bulk power grid. NASEO represents the 56 State and Territory Energy Offices across the nation. The State Energy Office Directors typically serve as advisors to the governors and state legislators on energy policy issues. In this role, the state directors are concerned with a range of energy reliability and affordability issues, including the vulnerabilities that the loss of large power transformers (LPT) would pose to public health and safety, and the negative impact it would have on state economies.

NASEO greatly appreciates DOE's actions to bring attention to this important issue through the RFI, and by including it as one of the recommendations in the first installment of the federal Quadrennial Energy Review (QER) released on April 21, 2015. As noted in the QER:

Analyze the policies, technical specifications, and logistical and program structures needed to mitigate the risks associated with loss of transformers: As part of the Administration's ongoing efforts to develop a formal national strategy for strengthening the security and resilience of the entire electric grid for threats and hazards (planned for release in 2015), DOE should lead—in coordination with DHS and other Federal agencies, states, and industry—an initiative to mitigate the risks associated with the loss of transformers. Approaches for mitigating this risk should include the development of one or more transformer reserves through a staged process.

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- *The staged process should begin with an assessment of technical specifications for reserve transformers, where transformers would be located and how many would be needed, how transformers would be secured and maintained, how transformers might be transported, and whether new Federal regulatory authorities or cost share are necessary and appropriate. These reserves may include smaller, deployable transformers.*
- *The analysis under this process should both recognize significant efforts already underway by industry to share transformers and parts, including planning for surge manufacturing and long-term standardization of transformer designs, and build on policy work already underway by Federal regulators.*

NASEO's comments below address the need for a National Power Transformer Reserve program and include a series of questions on program costs under additional comments for consideration by DOE.

1. Program Need

a) Is there a need for a National Power Transformer Reserve?

The U.S. electric transmission grid consists of more than 200,000 miles of high-voltage lines, which connect power plants across the country. LPTs are essential components of the grid as they control the high-voltage flow of electricity. The nation's energy security, in large part, depends upon the reliability of LPTs as the failure of one can cause a disturbance in the grid. Conversely, the failure of multiple LPTs can magnify the impact and lead to widespread outages, which are felt across many states. For example, widespread interdependencies were seen during hurricanes Sandy, Gustav, Ike and Katrina when extensive power outages caused cascading effects that impacted petroleum supplies both in the areas that had lost power as well as larger areas outside the areas experiencing black outs. The Southeast region experienced serious fuel shortages that lasted nearly a month after Hurricanes Gustav and Ike when refinery production was impacted along the Gulf Coast. In addition, Katrina caused the temporary shutdown of a major crude oil pipeline serving the Midwest region due to power outages in the South. This, in turn, caused retail gasoline prices to spike in the upper Midwest to the highest levels in the nation. A National Power Transformer Reserve could strengthen the bulk power system and increase its reliability and resilience during an event whether manmade or weather-related.

b) How would such a reserve affect the reliability and resiliency of the North American bulk power system?

A National Power Transformer Reserve would reduce the risk (consequences, vulnerabilities, and threats) of major and long-lasting power outages that could be caused by severe weather events, multiple physical and cyber-attacks on LPTs, geomagnetic storms, and electromagnetic pulse events. Long-term and widespread power outages would have very large human and economic consequences. *As reported in the QER, “A 2013 Lloyds of London report indicated that geomagnetic disturbances could cost the economy as much as \$2.6 trillion and take 1 to 2 years for a full recovery (to put this in perspective, the Northeast blackout in 2003 was estimated to have cost between \$4 billion and \$10 billion).¹”*

¹ ¹ U.S. Department of Energy. *Quadrennial Energy Review*. April 21, 2015. Page 2-12.

c) Are there alternatives to a power transformer reserve program that can help ensure the reliability, resiliency, and recovery of the bulk power system?

There are limited efforts in place, and/or under development, that contribute to the reliability, resiliency, and recovery of the bulk power system. These efforts should be seen as part of a “portfolio of actions” to help reduce risks to the power grid. These options include:

- i. Drawing from the U.S. Department of Homeland Security’s Recovery Transformer (RecX) program and final report² that contains lessons learned, evaluations, and considerations for a spare transformer strategy to support the nation’s electric grid.
- ii. Initiate a short-term (6 months) federal-state task force to examine incentives for promoting the manufacture of transformers domestically taking into account national and economic security and cost, while avoiding anti-trust issues. NASEO would, of course, participate in such activity. There is the capacity to produce transformers in the United States; however it only meets “approximately 15 percent of the U.S. demand for power transformers of a capacity rating greater than or equal to 60 megavolts-amperes. The nation’s reliance on foreign manufacturers was even greater for extra-high voltage power transformers with a maximum voltage rating greater than or equal to 345 kilovolts.”

d) Is there a nationally-maintained inventory of large power transformers?

The electricity industry has developed several programs over the years to deal with threats to the electric system. For example, the Edison Electric Institute (EEI) maintains a Spare Transformer Equipment Program (STEP) to address certain physical threats. Under STEP, a pool of LPTs in various voltage classes and sizes are maintained by participating utilities throughout North America. STEP members agree to a set of predefined obligations as a requirement of participation and activation of the program is defined under specific criterion. In addition, the electricity industry has developed the SpareConnect program which provides an additional mechanism for bulk power system asset owners and operators to share transmission and generation step-up transformers and related equipment, including bushings, fans and auxiliary components. Finally, the recently announced Grid Assurance Program, which was initiated by a consortium of eight electric utilities and energy companies, should provide additional resilience capacity during a major event. While none of these programs meets the criteria of a National Power Transformer Reserve it is NASEO’s belief that there is an opportunity for DOE, working in coordination with the states, EEI, the American Public Power Association, National Rural Electric Cooperative Association, and other electricity sector industry organizations to develop a national reserve using components of these and other existing programs.

11. Additional Comments

e) Are there additional concerns regarding a National Power Transformer Reserve Program that need to be considered?

The Federal Register notice does not include a question on the cost of a National Power Transformer Reserve. Cost issues raise several questions. Does the Federal Government anticipate paying for some portion – or all – of the program? To the extent the utility industry covers a portion of the cost, what state regulatory and policy issues need to be addressed to protect ratepayer (e.g., cost recovery) and

² U.S. Department of Homeland Security. *Considerations for a Power Transformer Emergency Spare Strategy for the Electric Utility Industry*. September 30, 2014.

taxpayer interests? The QER provides some information on the potential costs and benefits of such a program where it describes the, “Western Area Power Administration proposed a strategic transformer reserve pilot program and included a calculation of costs. Under this program, the Federal Government would purchase 110 large transformers at a cost of \$324 million to provide backup units for the roughly 20,000 LPTs nationwide in emergency events. The Federal Government could mitigate the cost of the program by sharing the burden with industry. The benefits would accrue to the entire national grid (valued at more than \$1 trillion) and directly to the U.S. economy by avoiding outages.” To the extent the electric industry is relied upon to share a portion of the costs, NASEO recommends direct engagement with state energy officials and state utility commissions to ensure the cost-benefit structure of this important program is fully understood.

NASEO greatly appreciates the opportunity to provide comments for DOE’s consideration on the establishment of a National Power Transformer Reserve. We support the concept of a reserve, and believe action should be taken as soon as practicable. We look forward to continuing our dialogue with DOE, the states, and the utility industry on this and other recommendations set forth in the QER.

Best regards,



David Terry
NASEO Executive Director