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SPURRING INNOVATIVE IDEAS IN WIDE OPEN SPACES

Welcome

Fort Worth, Texas | October 7-10, 2017



# Thank You to our 2017 Sponsors



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Grid Assurance LLC - Tuesday Breakout Session  
Jeff Fleeman – COO Grid Assurance, LLC

10:15 – 11:30

# Agenda

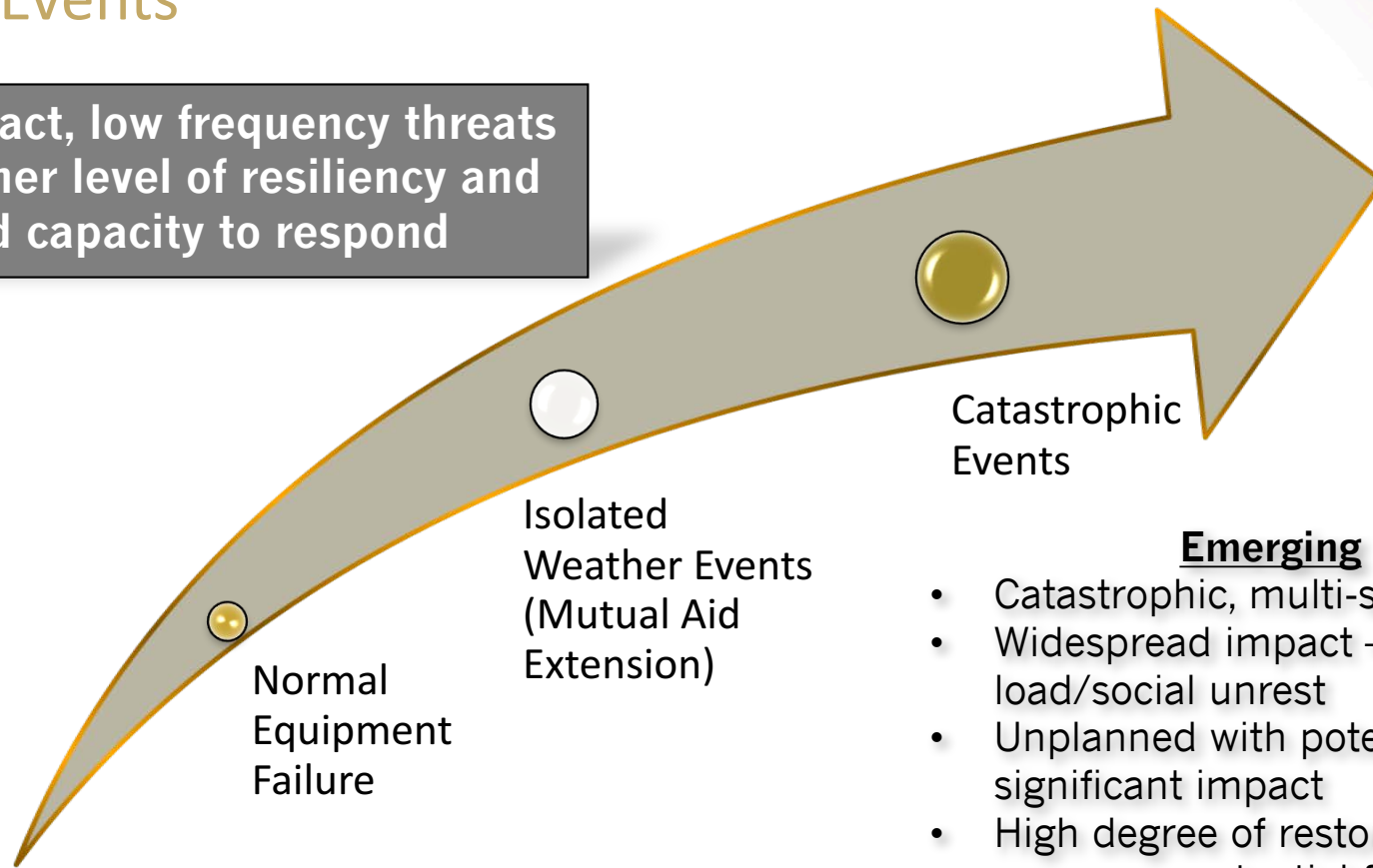
- Introductions
- Emerging Threats to the Grid
- Company Overview and Structure
- Equipment Sparing and Requirements
- Subscriber Benefits
- Regulatory Considerations
- Cost to Subscribe & How It Works
- Questions





# Emerging Events

New high impact, low frequency threats require a higher level of resiliency and increased capacity to respond



## Traditional

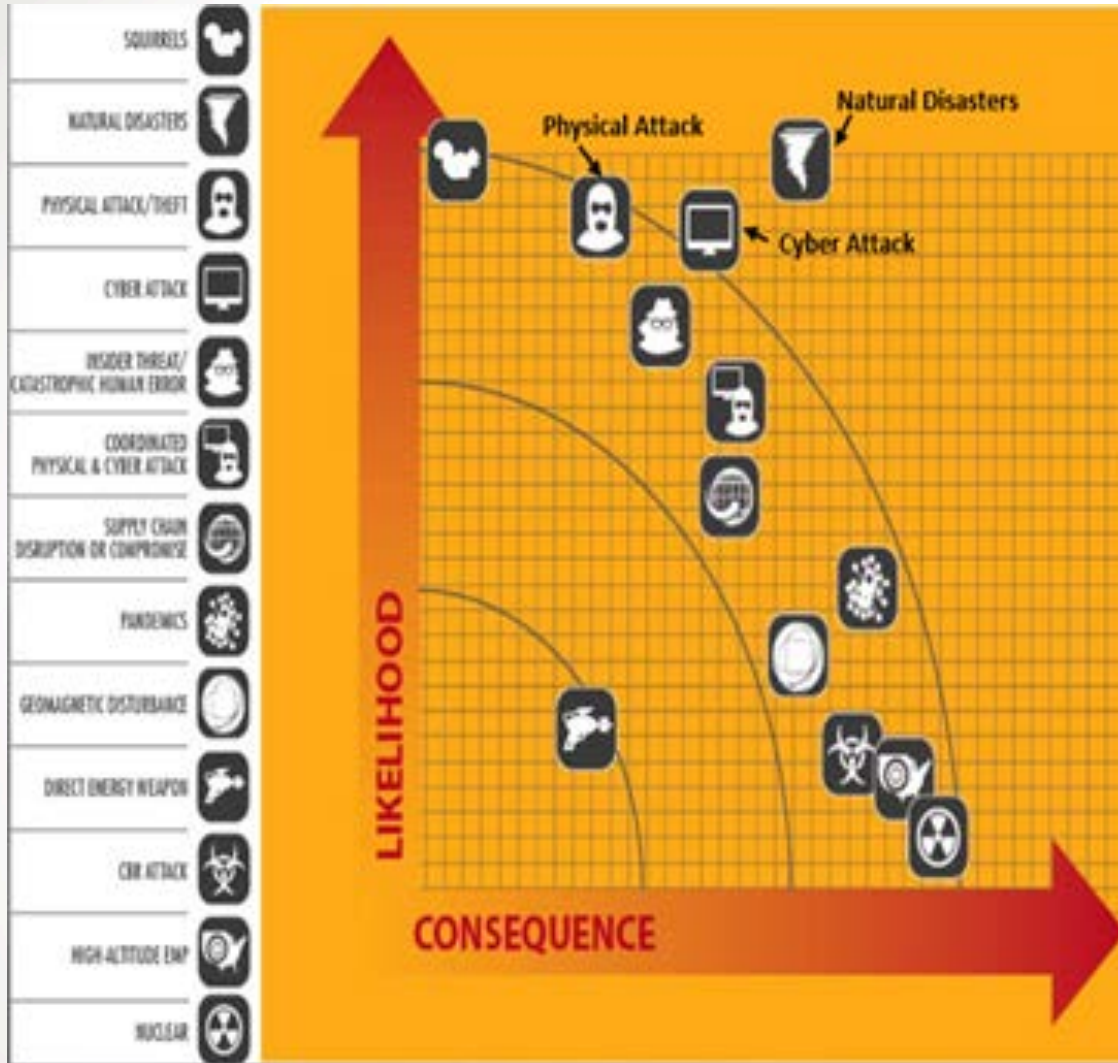
- Individual equipment failures
- Isolated events impacting a single location
- System planned and designed to withstand impact
- Planned, orderly restoration
- Companies self-perform

## Emerging

- Catastrophic, multi-site events
- Widespread impact – loss of load/social unrest
- Unplanned with potentially significant impact
- High degree of restoration urgency – potential for extreme social & political intervention



# Threats to the Grid



Source: NERC

The threat landscape is evolving in our industry and the industry must keep pace. Business as usual will not do. There is an urgent need to make proactive steps to strengthen grid

## EEI Industry Threat Model

1. Coordinated Cyber Attack
2. Advanced Persistent Threat
3. Disruption of Voice & Data Services
4. Coordinated Physical & Cyber Attack
5. Insider Sabotage
6. Pandemic
7. Supply Chain Disruption or Compromise
8. Catastrophic Human Error
9. Intentional Electromagnetic Interference
10. Distributed Denial of Service (DDoS)

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# Collaborative Industry Solution

**Six electric utility companies with wide geographic and technical diversity formally launched Grid Assurance May 6, 2016 to provide a cost-effective industry solution via pooling to expedite restoration following high impact low frequency events.**



## Optimized Inventory

- Subscribers will participate in pools of inventory applicable to their systems
- Level of inventory will be optimized to lower Subscriber costs
- Inventory will be actively managed to mitigate risk of obsolescence
- Warranties that are transferable to Subscribers with the appropriate length and terms

## Secure Warehousing

- Secure, cost-effective storage that is away from Protected Equipment
- Strategic, geographically diverse locations

## Delivery Logistics

- Create and maintain pre-determined logistics plans to reduce deployment time
- Coordinate/facilitate transportation capabilities
- Access to equipment and vehicles that could transport inventory
- Optional delivery services may be provided on a fee basis

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# Benefits to Subscribers

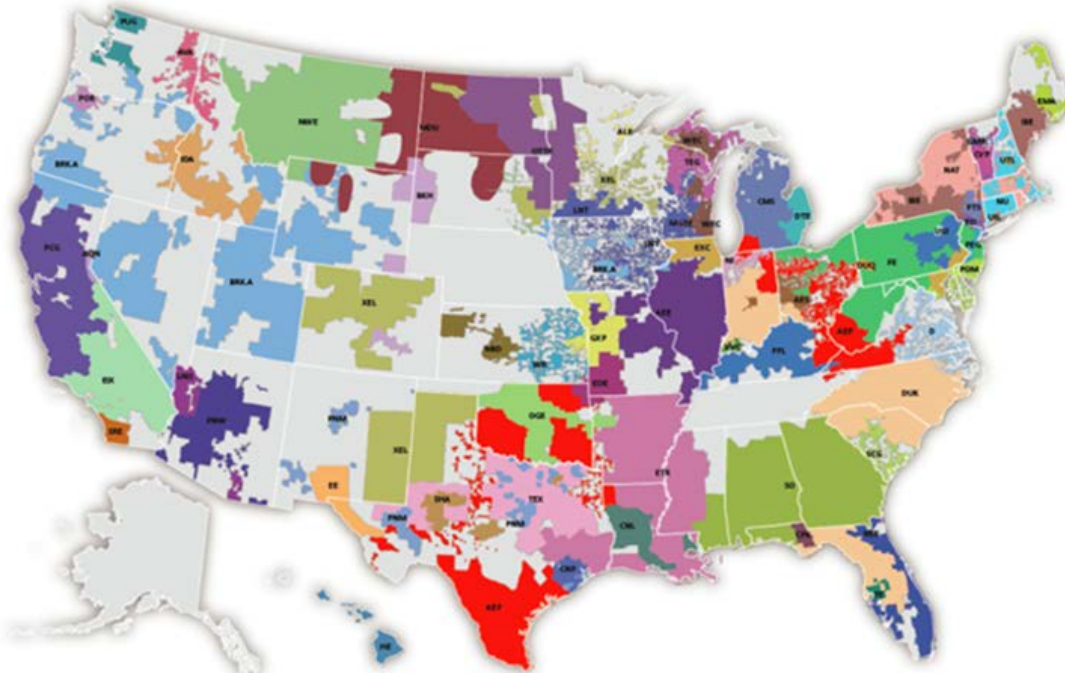
- **Diversification & Pooling Leads to Cost Savings:** By optimizing inventory to the resiliency needs of a large diverse group of subscribers, each subscriber's share of the cost of access to inventory will be minimized. Thus, this approach is expected to be more cost-effective than utility-by-utility sparing strategies.
- **Economies of Scale:** Grid Assurance will seek to take advantage of volume purchases to obtain favorable pricing on equipment supply and maintenance agreements.
- **Secure Storage and Management of Inventory:** Grid Assurance will store the equipment at secure, strategically-located (sites near key modes of transportation and sites with low natural risks profile) warehouses and contract with equipment manufacturers to periodically test, service and maintain equipment in inventory. The equipment will include a transferrable 5-year warranty at the time of deployment.
- **Improved Logistics to Expedite Delivery:** 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.





# Subscription Status Update

Currently working with 55 utilities (IOUs, Public Power, G&Ts) for subscription and ownership



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# DOE's Strategic Reserve of Large Power Transformer Report



## Strategic Transformer Reserve

Report to Congress  
March 2017

United States Department of Energy  
Washington, DC 20585

- ❑ FASTAct Legislation in 2015 prompted DOE to engage a study on LPTs
- ❑ DOE submitted the Strategic Reserve of Large Power Transformer Report to Congress 4/15/17. In summary:
  - Report recognized industry efforts including Grid Assurance.
  - DOE concludes the most efficient and effective approach is to build on industry-based approaches like Grid Assurance.
  - DOE evaluated options for establishing a strategic transformer reserve and recommends encouraging and supporting industry-based options and NERC CIP-014-2 requirements, approved by FERC.
  - **DOE emphasized prompt industry action; re-assessment in one year to check whether progress warrants alternative actions by Government.**
- ❑ Grid Assurance agrees with the proposed next steps for DOE and looks forward to working closely with DOE and other Federal Government agencies to ensure and enhance the resilience of the Nation's electric grid.

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# Pooling Benefits and Inventory Update

Pooling benefits to date have been achieved across multiple equipment classes.

Description	Transformers			Circuit Breakers			
kV Rating	500	345	230	500	345	230/161	138/115
Ratings Classes	3	5	3	1	1	1	1

- 26 companies nominated 11 transformer and 4 breaker classes resulting in inventory of 68 and 184 spares, respectively.
- Service level for transformers & breakers are virtually 99.84% and 99.70%; this provides 500 years between stock-outs
- Overall pooling benefit for transformers and breakers, respectively is 49% and 49%; with some ratings classes achieving nearly 80%





# Operations Update

## EQUIPMENT

- **Developed general specification** (i.e. oil, valves, lugs, gaskets)
- **Developed order specifications for both transformers and circuit breakers** (i.e. ratings, MVA, %Z, kV)
  - Specifications currently being reviewed by owners
- **Developing OEM suppliers**
  - Reviewing OEM capabilities
  - Inquiry on rapid replenishment
  - Researching warranty options
  - Exploring quick recovery
- **Evaluated accessory (i.e. bushings, pumps, fans) suppliers**
  - Manufacturing capabilities
  - Quick replenishment capacity

## WAREHOUSE

- **Determined Target Cities**
- **Defined Site Selection Criteria**
- **Confirmed warehouse design basis \$/SF estimates**
  - Evaluating design features for additional cost saving options
  - Leveraging vendors insights
- **Completed initial property search**
  - Mainly focused on greenfield
  - Found sites with lower cost for land and site development
  - Now researching suitability of existing structures

## LOGISTICS

- **Completed first round of interviews with logistics and heavy hauling vendors**
- **Presented at EEI's Transformer Transportation workgroup in Phoenix**
- **Developing RFI/RFP specifications for logistics providers**
- **Researching rail car advance reservations**
- **Engaged railroads and government agencies on advance arrangements for clearances and permits**



# Regulatory Update

## ❑ Foster Regulatory Support at FERC and the State Commission Level

- FERC – emphasize the two orders (*August 7, 2015 and March 25, 2016 in FERC Docket Nos. EL15-76-000 and EL16-20-000, respectively*) that provide subscribers with clarity on issues related to prudence, compliance, ratemaking issues, and affiliate pricing rules.
- NARUC - Collaborate with NARUC, specifically the Critical Infrastructure Committee
- State Utility Commissions - brief commissions and coordinate joint-utility commission meetings in states with multiple subscribers
- National Governor's Association - Assist NGA on efforts related to "Preparing States for Extreme Power Grid Outages"
- DOE - Work closely with DOE and communicate the messages and timeline from March DOE Strategic Transformer Report to other key stakeholders
- Monitor state legislation and participate when applicable
- Assist Subscribers in state regulatory process (i.e. affiliate approval or cost recovery)

## ❑ Active Participant in GridEx IV

- Grid Assurance will be an active participant in the November 2017 event, beginning with representation at the upcoming May Final Planning Meeting



# Critical Dates, Stages, and Deliverables

Critical dates to sign Subscription Agreement, satisfy Conditions Precedent and order equipment

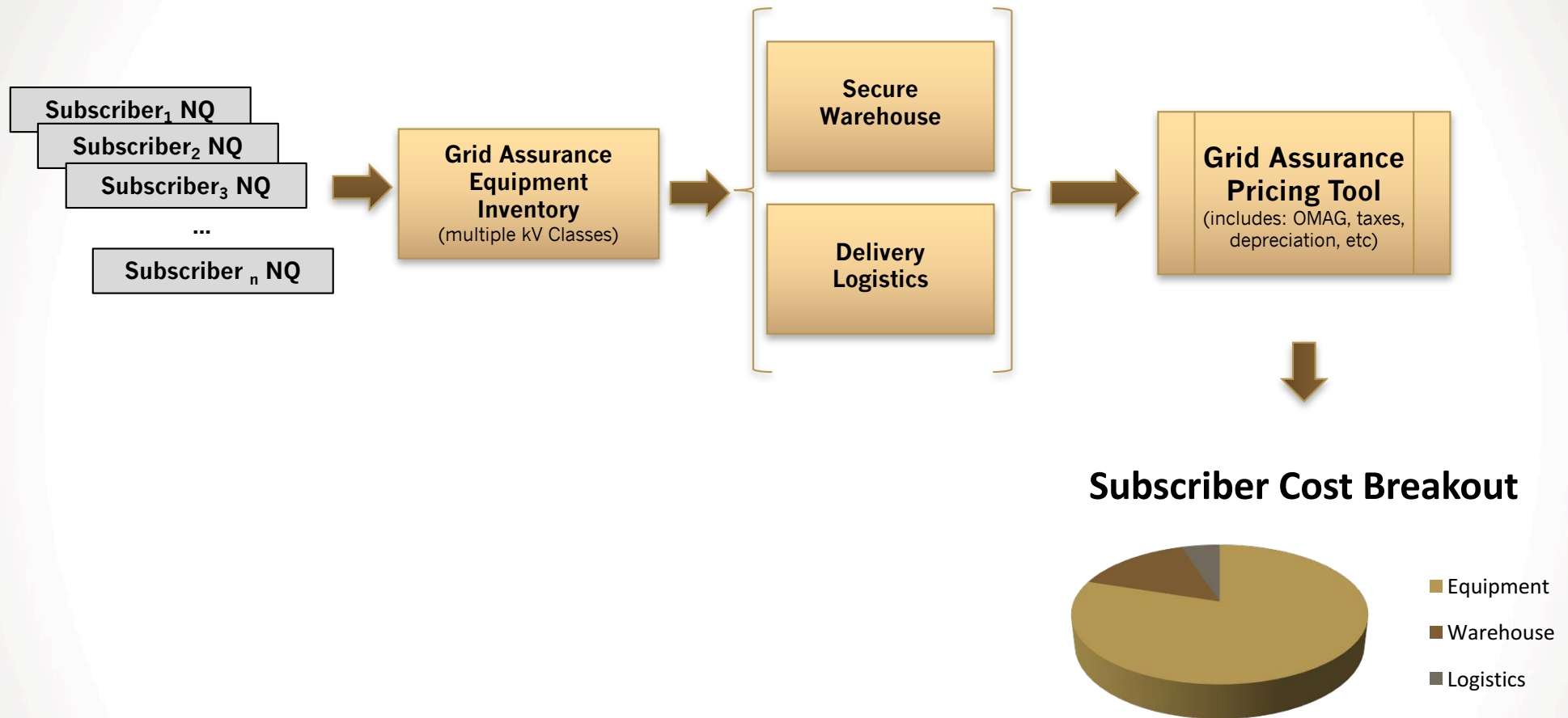


Date	6/1/2017	8/1/2017	10/1/2017	12/1/2017	12/15/17 - 3/31/18
Stage	Revised Fee Estimate	Near Final Fee Estimate	Final Fee Estimate	Satisfy Conditions Precedent	Equity Offering and Inventory Ordered
Status of Nominated Quantities, Subscribers & Costs	<ul style="list-style-type: none"> <li>• NQs Revised</li> <li>• Subscribers Revised</li> <li>• Cost Revised</li> </ul>	<ul style="list-style-type: none"> <li>• NQs Firm</li> <li>• Subscribers Revised</li> <li>• Cost Revised</li> </ul>	<ul style="list-style-type: none"> <li>• NQs Firm</li> <li>• Subscribers Firm</li> <li>• Cost Firm</li> </ul>	<ul style="list-style-type: none"> <li>• NQs Firm</li> <li>• Subscribers Firm</li> <li>• Cost Firm</li> </ul>	
Planning Confidence Level	~80%	~90%	~95%	100%	
Subscriber Deliverable	Send GA Signed Subscription Agreements			Send GA Regulatory Confirmation & Fee Confirmation	





# Cost to Subscribe – How it Works



# Contact Information

Website: [www.gridassurance.com](http://www.gridassurance.com)

If you have any questions or need additional information, please contact:

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Questions?

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## APPENDIX: DOE Report and Grid Assurance's Related Actions

The DOE report confirms the need and approach of the industry-led Grid Assurance.

***DOE Strategic Reserve Report: “ensuring a ready and sufficient supply of spare LTPs”***

- Grid Assurance engaged ICF International and developed a modeling framework to assist subscriber utilities in determining required inventory levels in a pooling scenario.

***DOE Strategic Reserve Report: “move towards greater standardization of LPT designs ... to make spare LTPs more interchangeable”***

- Grid Assurance has developed standard equipment and accessory specifications. This subscriber-wide standardization effort will produce more cost effective procurement, inventory and maintenance of the large power transformer reserve.

***DOE Strategic Reserve Report: “adequate storage and installation of replacement LTPs are extremely crucial to establishing a functional strategic transformer reserve”***

- Grid Assurance has defined the warehousing strategy and is in the process of analyzing potential warehouse sites.

***DOE Strategic Reserve Report: “The success ... depends on the industry’s capability to move spare transformers quickly in the event of an emergency”***

- A Grid Assurance subscription includes a subscriber-specific logistics playbook for asset delivery. Additionally, Grid Assurance is working with federal, state and local entities to streamline permitting and obtain ready-access to specialized transportation equipment and vehicles.

***DOE Strategic Reserve Report: “FERC has permitted cost recovery on certain utility investment for infrastructure security and resiliency”***

- Grid Assurance submitted two petitions for declaratory order to FERC requesting a total of five regulatory declarations for the benefit of prospective subscribers. FERC issued two orders on the Grid Assurance petitions granting the requested declarations on August 7, 2015 and March 25, 2016 in FERC Docket Nos. EL15-76-000 and EL16-20-000, respectively. These orders provide subscribers with clarity on issues related to prudence, compliance, ratemaking issues, and affiliate pricing.

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