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NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

NERC: Potential Bulk Power System Impacts due to Severe Disruptions of the Natural Gas System

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RELIABILITY | ACCOUNTABILITY



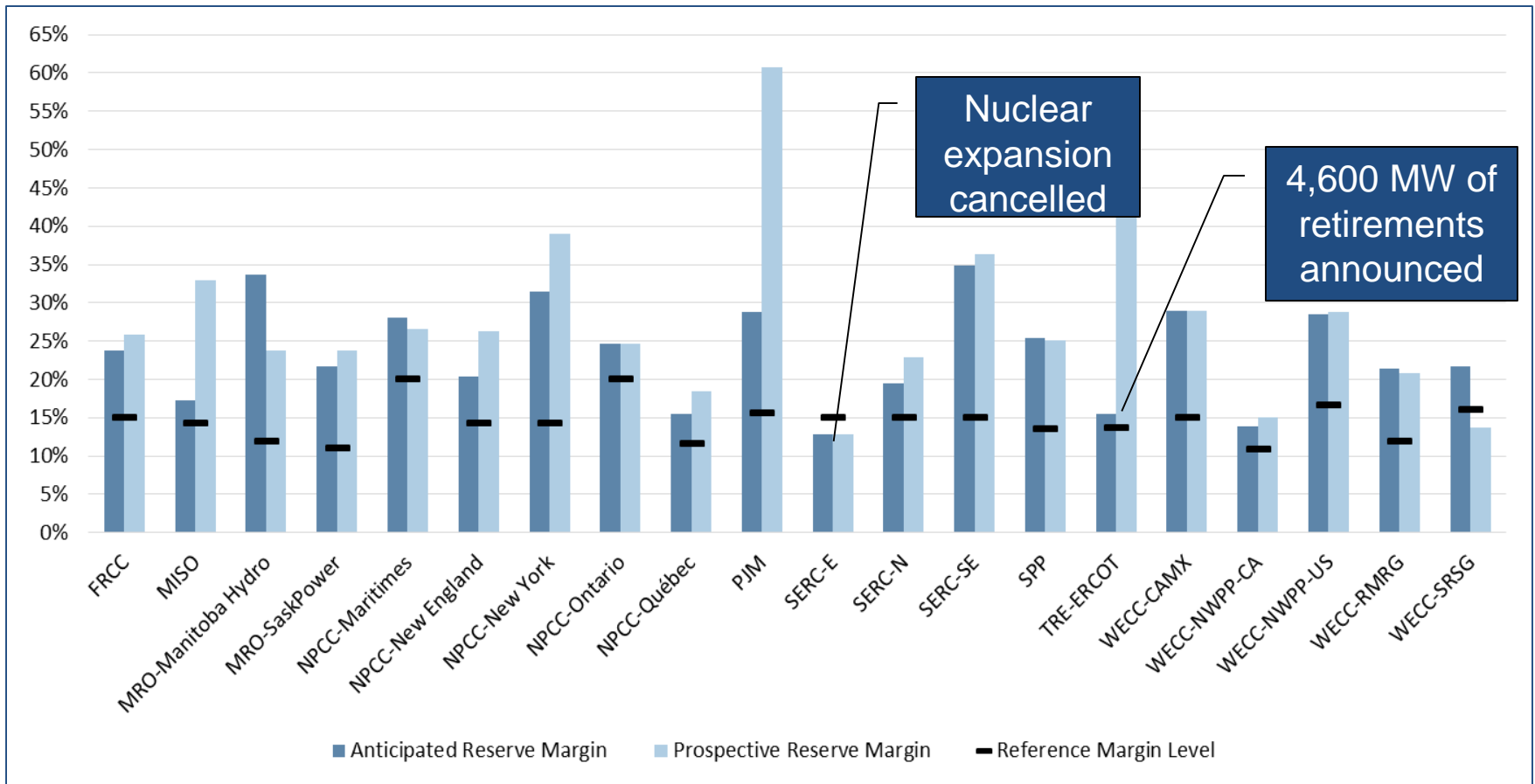
To assure North American bulk power system reliability

Accountable as ERO to regulators in the United States (FERC)
And Canada (CA NEB and provincial authorities) to:

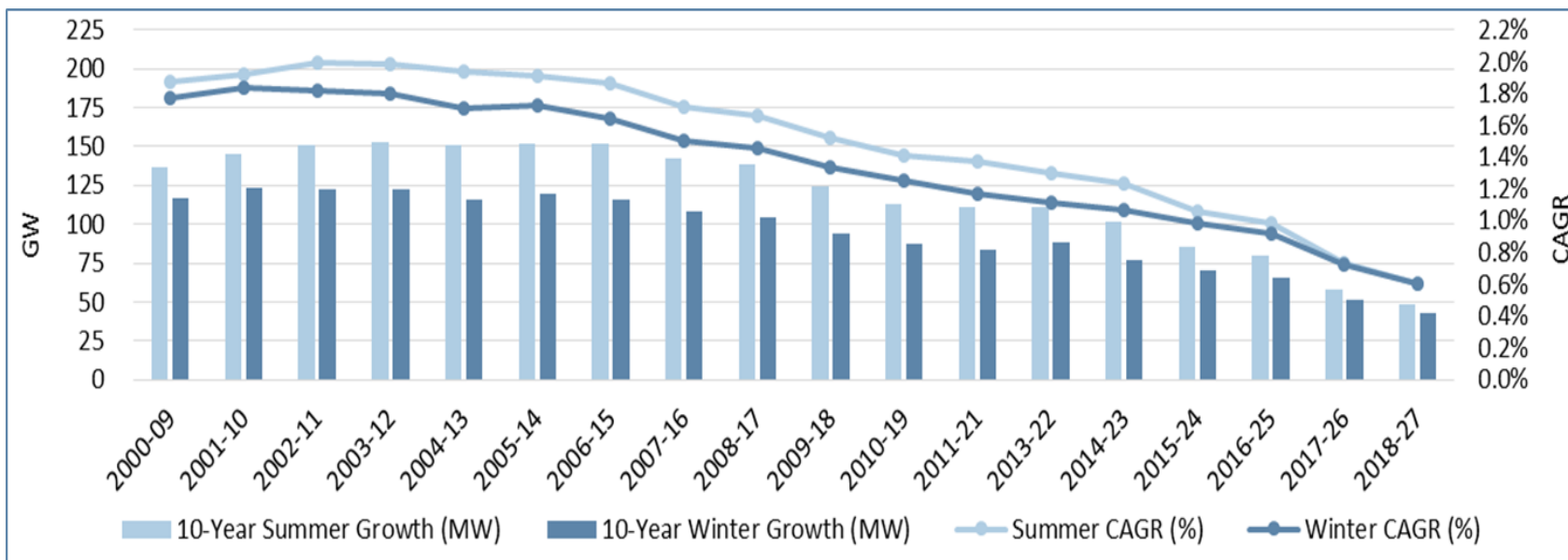


- **Develop and enforce NERC Reliability Standards**
 - Over 100 mandatory standards (1,500 requirements) in place
 - Developed and voted on by technical experts
 - Approved and Enforced by NERC and FERC
- **Assess current and future reliability**
 - Develop reports to assess resource adequacy and identify reliability issues
 - Analyze system events and recommend improved practices
 - Manage technical committees and stakeholder groups

Sufficient resources projected for 2022, but some risk remains

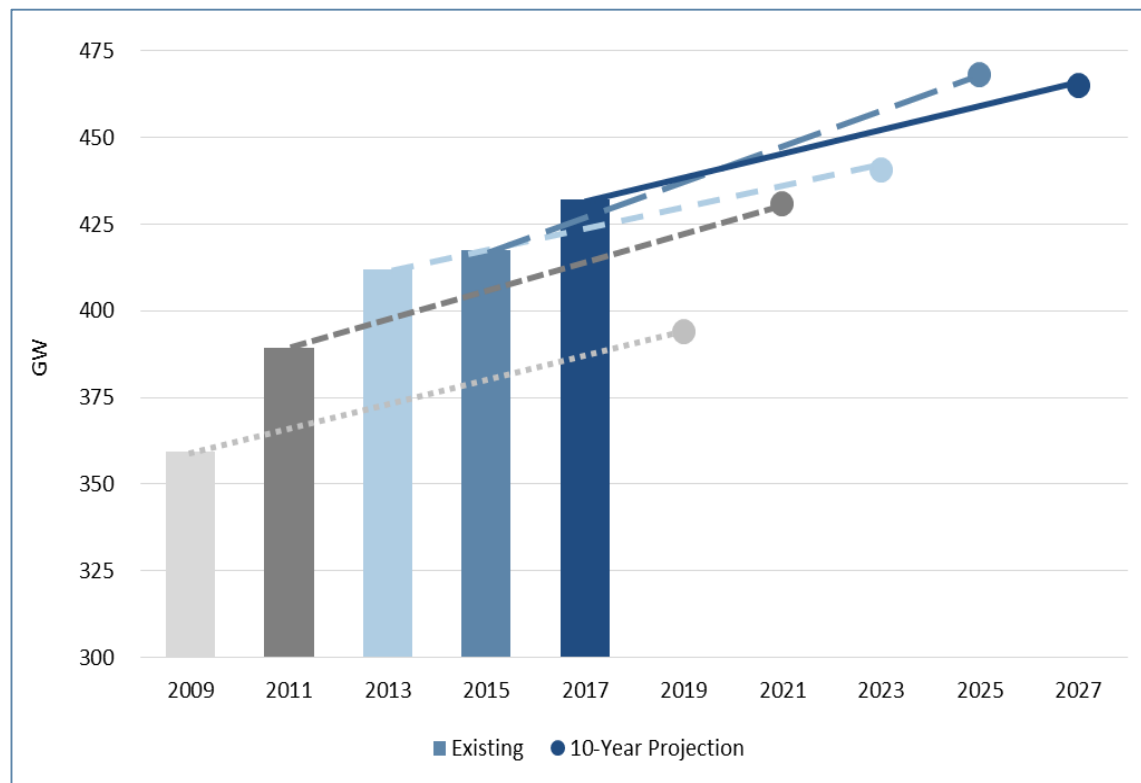


- 10-year annual demand growth rate for North America is the lowest on record, at 0.61% (summer) and 0.60% (winter)

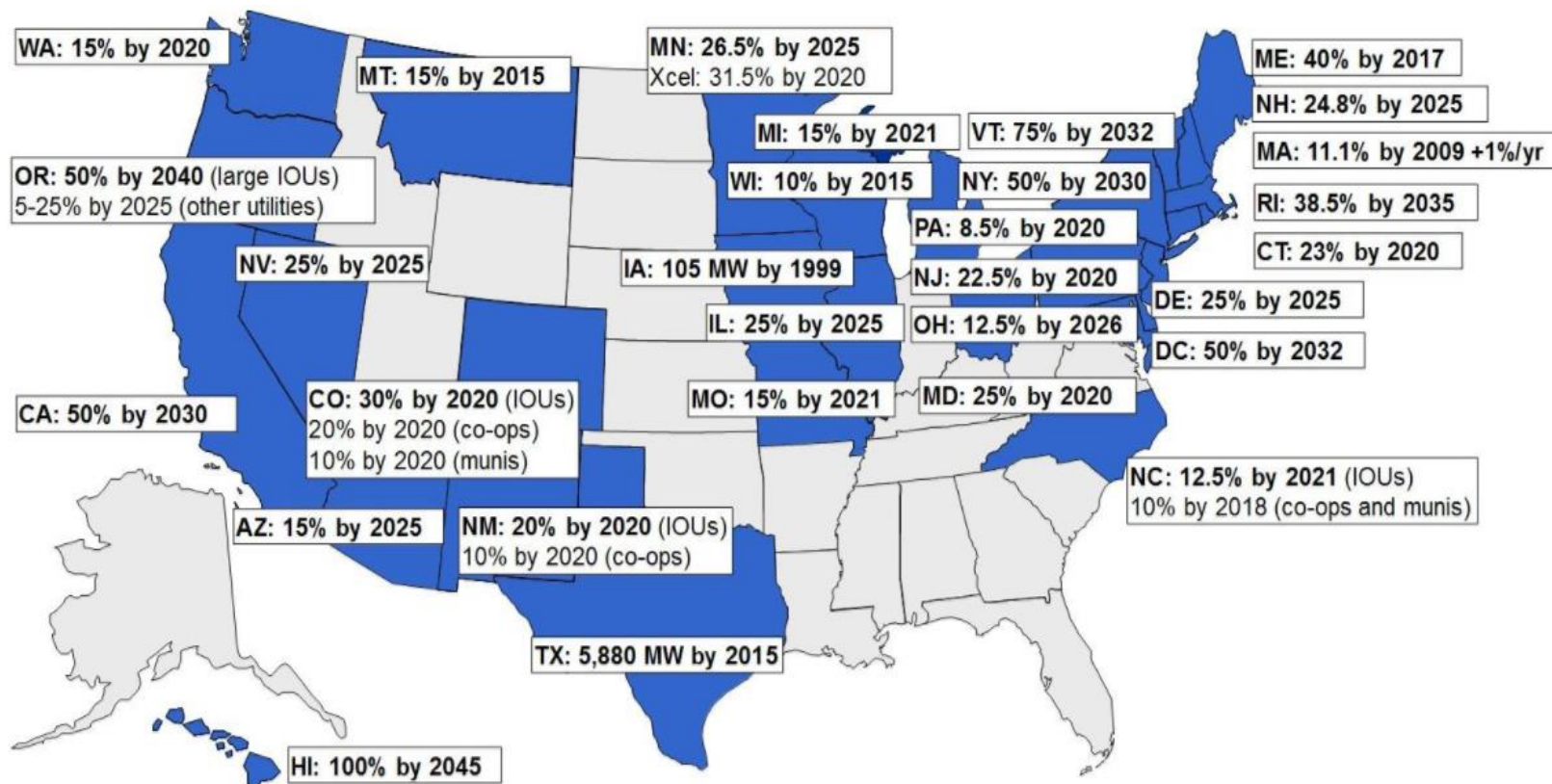


- On-peak natural gas-fired capacity has increased to 442 GW, up from 280 GW in 2009
- 32 GW of Tier 1 gas-fired capacity is planned during the next decade

Assessment Area	2022 (%)
FRCC	78.1%
WECC-CAMX	68.2%
Texas RE-ERCOT	63.3%
NPCC-New England	52.3%
WECC-SRSG	51.8%
WECC-AB	51.8%



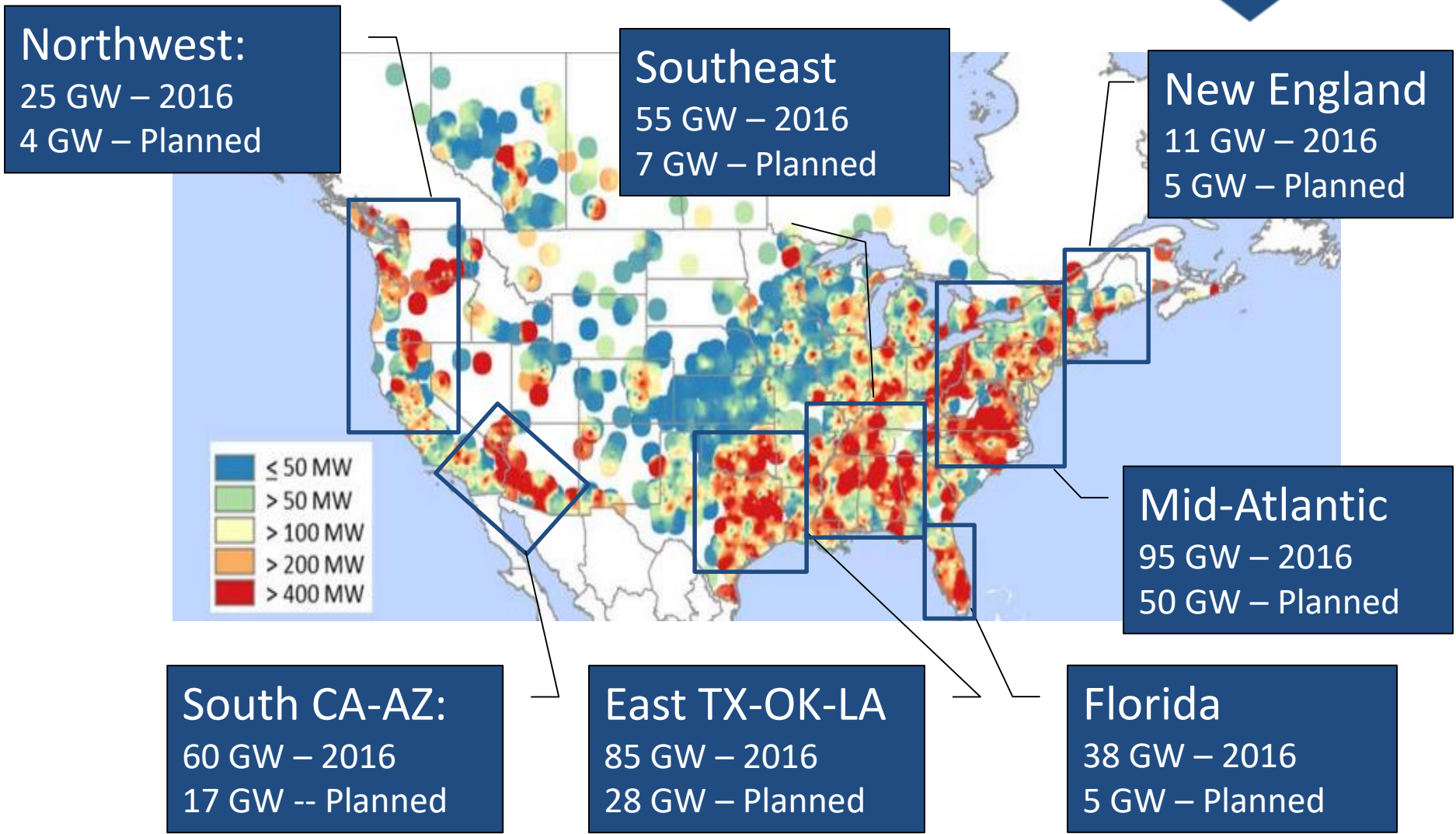
6,200 miles of transmission additions are needed to maintain reliability and meet policy objectives

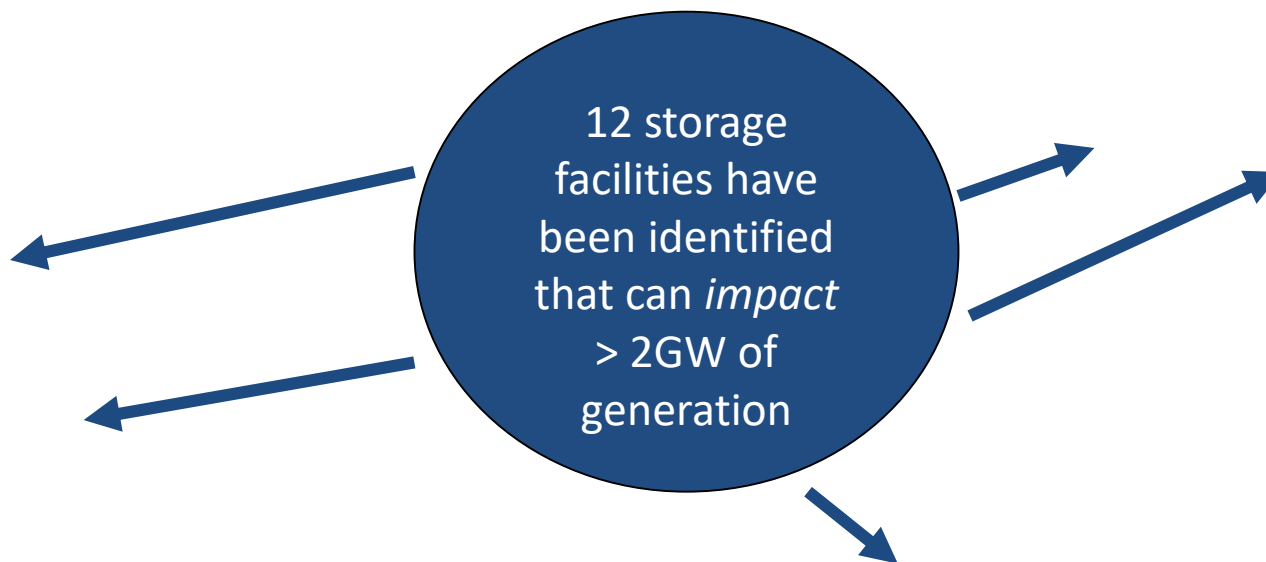


- Aliso Canyon storage facility outage underscored risks to electric generation and potential reliability issues
- Evaluate impacts to BPS reliability as a result of potential disruptions and the loss of major natural gas infrastructure facilities:
 - Key pipeline segment outages
 - Disruption of LNG transport operations
 - Natural gas storage disruptions
- Collaborative effort with Argonne National Laboratory analysis on critical facilities
- Advisory group established with electric and gas research organizations

- Variety of concerns and region-specific challenges
- Wide-area transmission impacts (voltage and thermal constraints) due to loss of natural gas infrastructure are typically not studied; focus is generally on resource adequacy and resource availability
- Many respondents indicated that there were no natural gas storage facilities within their systems to evaluate
- Opportunity to learn from those with comprehensive resilience plans

Identifying Generation Risk Clusters





- Aliso Canyon has different characteristics than other natural gas storage facilities
- Natural gas facility disruptions have varying impacts dependent on location and infrastructure density
- NERC's transmission simulations demonstrates operational challenges in the event of natural gas disruptions
- Demand for natural gas has altered storage dynamics
- Mitigation strategies (e.g., dual fuel) can reduce potential impacts
- Natural gas supply sources have become more diversified
- Recent FERC Orders continue to promote coordination
- Comprehensive planning by Planning Coordinators can significantly increase resilience

- Regulators should consider fuel assurance mechanisms as they establish energy policy objectives
- In the event of an emergency, planning processes should include provisions for, and be prepared to, secure necessary air permit waivers
- Cyber and physical security needs should be diligently considered by regulators
- DOE should consider collecting data that quantifies dual fuel storage and seasonal on-site inventory

- NERC registered entities should consider the loss of key natural gas infrastructure in their planning studies
- Owners and operators of dual fuel generators must ensure operability
- Natural gas and electric industries should continue to advance operational coordination

- NERC should consider enhancing its Reliability Guidelines and/or Reliability Standards related to transmission planning and extreme event assessments
- NERC should enhance its Generator Availability Data System (GADS) database for better granularity in generator outage causes

- Accelerated retirements of conventional base load generation and potential implications from a BPS stand point
- http://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_SPOD_11142017_Final.pdf



Questions and Answers