

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Accommodating a Changing Resource Mix and Ensuring a Resilient BPS:

A North American Bulk Power System Reliability Perspective

RELIABILITY | ACCOUNTABILITY



- Conventional generation retirements create BPS reliability concerns when **Essential Reliability Services** and **fuel assurance** mechanisms are not replaced
- Declining reserve margins projected to tighten **operational reliability**, particularly under extreme conditions
- Variable resources can be reliably integrated, but need to be carefully planned and operated
- Fuel diversity is a means to fuel assurance, but solutions need to consider **regional differences**
- Finding solutions to the limited pipeline capacity problem should encompass **wholesale electric market** action as well as **natural gas regulatory frameworks**

What is BPS Reliability?

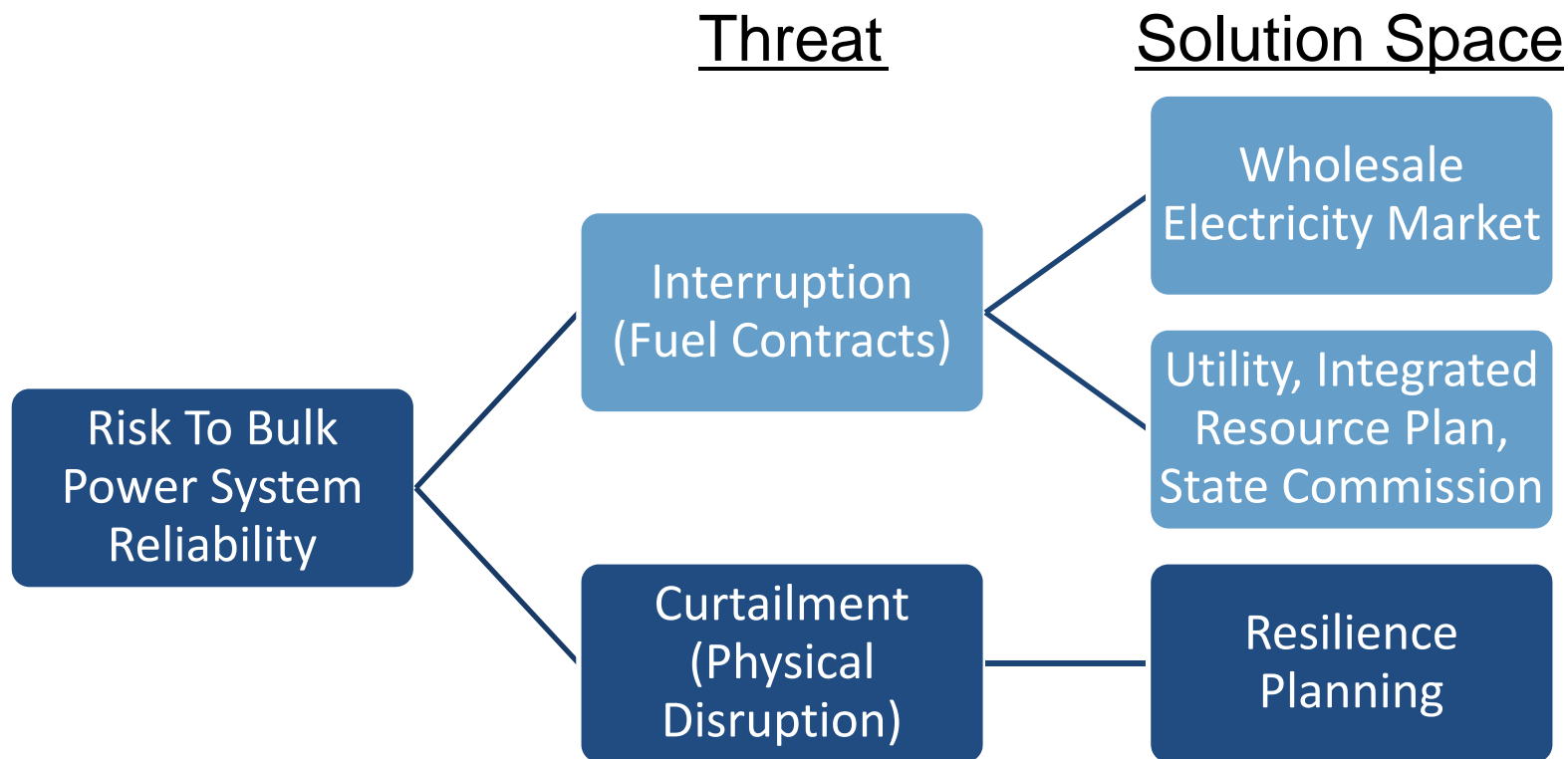
- The ability of the BPS to meet the electricity needs of end-use customers at all times.
- **Adequacy** — The ability of the bulk power system to supply the aggregate electrical demand and energy requirements of the customers at all times.
- **Operating Reliability** — The ability of the bulk power system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system elements.

Is there enough supply of electricity?

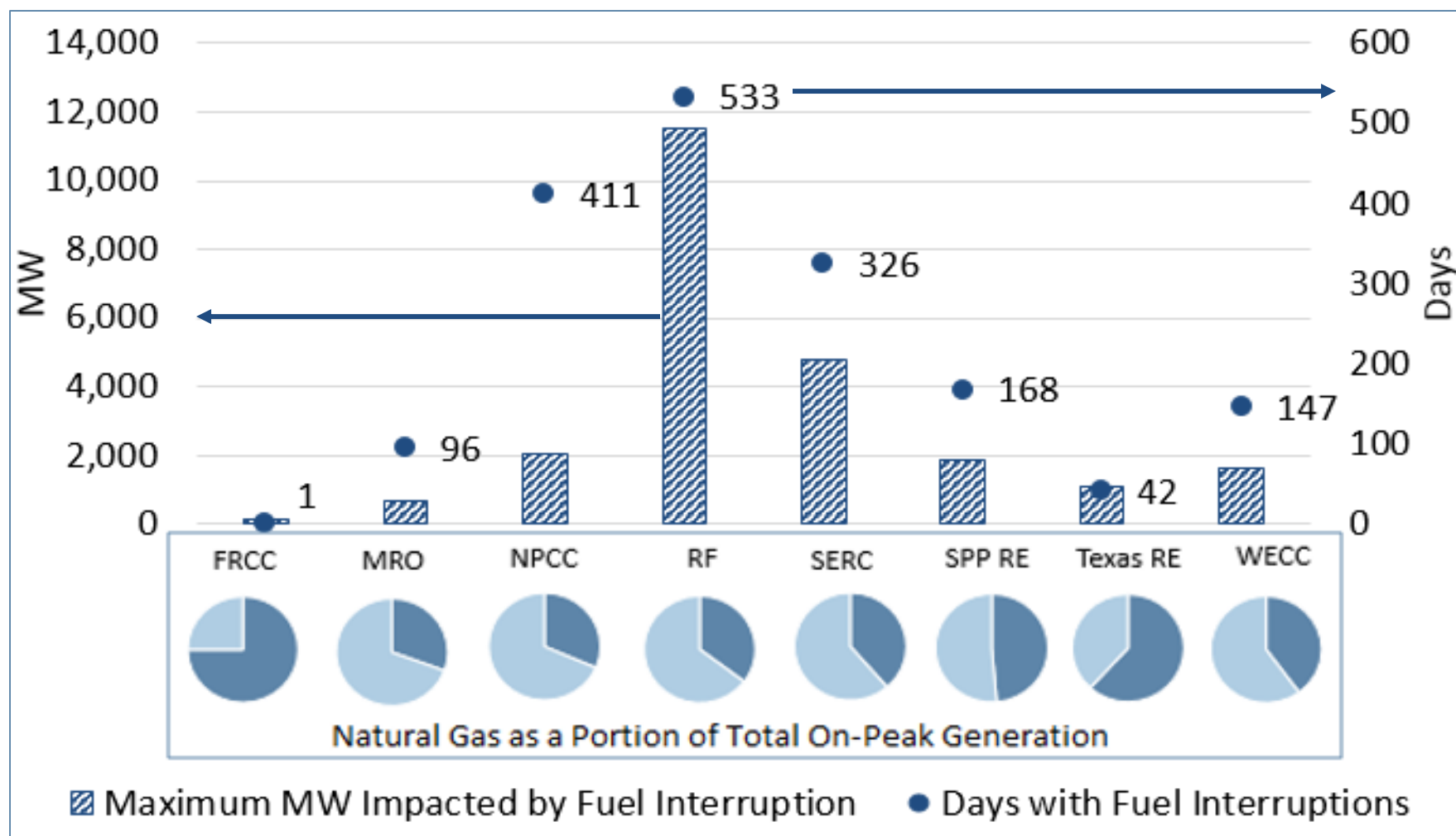
Is there enough supply of fuel, operational reliability, and control?

Can the system operate under a variety of conditions?

- Increased dependence on natural gas for generating capacity can amplify the bulk power system's vulnerability to disruptions in fuel supply, transportation, and delivery.

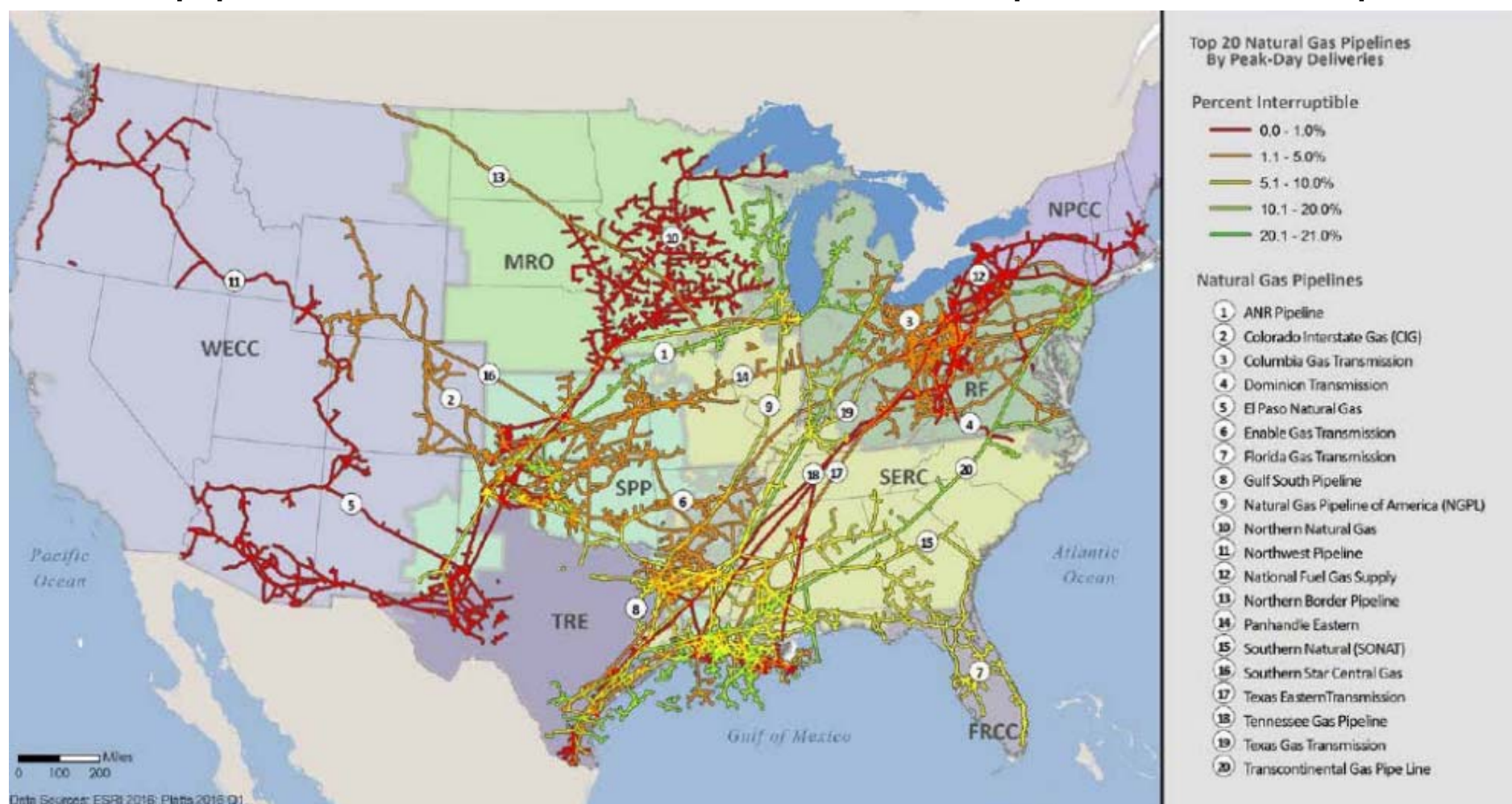


Reported GADS Outages of Natural Gas Generation Due to “Lack of Fuel” (2012-2015)



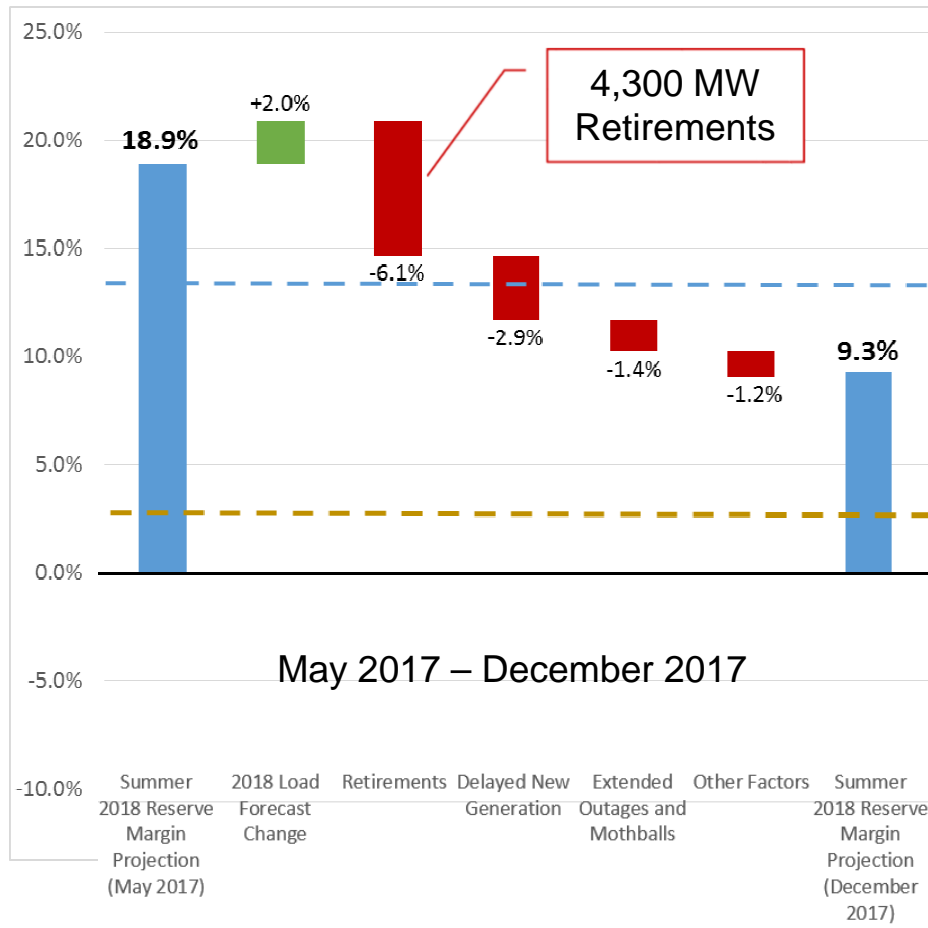
Top-20 Gas Pipelines by Peak-Day Delivery Arrangement

Red pipelines mean there were no interruptible flows on-peak



ERCOT Reserve Margin Drivers

Contributing Factors to ERCOT's Reserve Margin Changes Since May 2017 and Operational Risk for Summer 2018



- Bulk power system reliability must be maintained, regardless of the generation mix
- Maintaining a diverse resource mix increases resilience, flexibility, and reliability
- All generation must contribute to system reliability within their physical capabilities
- Industry standards and criteria must be fair, transparent and performance-based
- Reliability challenges are bigger than any one organization and time is needed to engineer the solutions



Questions and Answers

