

Implications of Increased Reliance on Natural Gas on Electric System Reliability

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RELIABILITY | ACCOUNTABILITY



To ensure the reliability of the North American bulk power system

- Develop and enforce reliability standards
- Assess current and future reliability
- Analyze system events and recommend improved practices
- Encourage active participation by all stakeholders
- Accountable as ERO to regulators in the United States (FERC) and Canada (NEB and provincial governments)

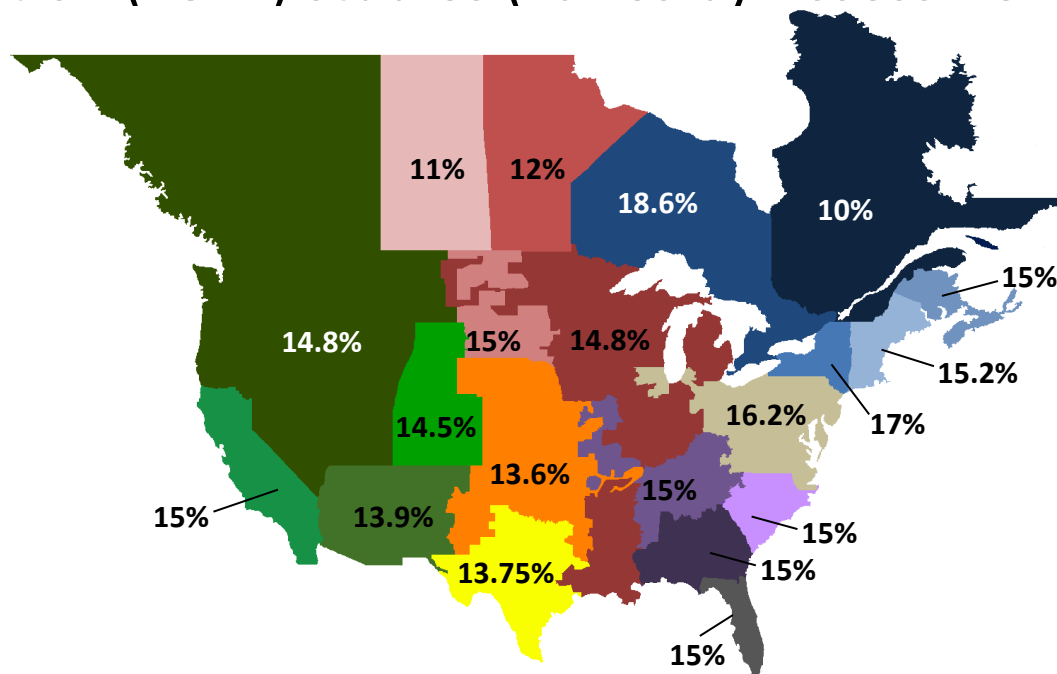


- Peak demand forecasts
- Resource adequacy
- Transmission adequacy
- Key issues - emerging trends
 - Technical challenges
 - Evolving market practices
 - System elements/dynamics
 - Potential legislation/regulation
- Regional self-assessment
- Ad-hoc special Assessments



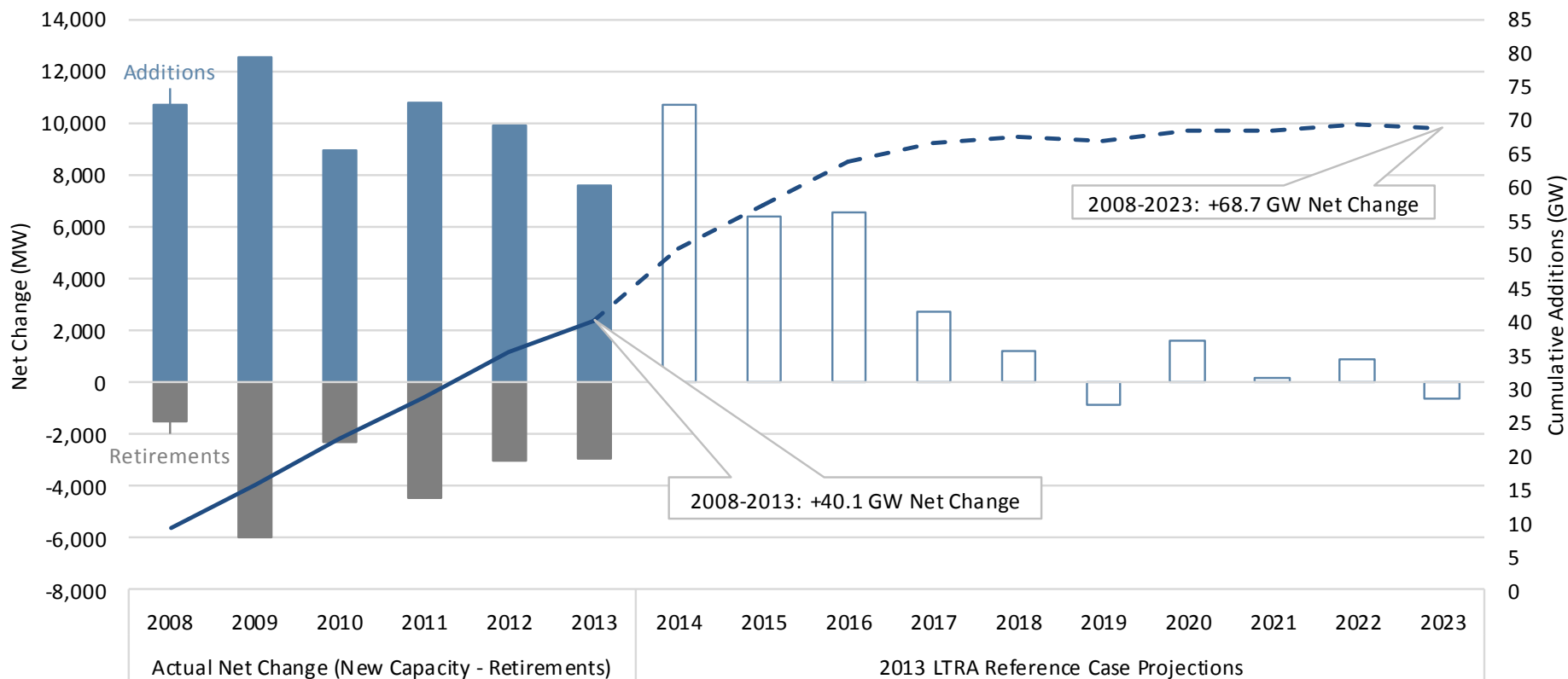


- Reference Margin Level (Target): Determined by loss-of-load expectation (LOLE) studies (varies by Assessment Area)



$$\text{Planning Reserve Margin (\%)} = \frac{\text{[Available Capacity – Net Internal Demand]}}{\text{Net Internal Demand}}$$

Gas-Fired Capacity Change (2008-2023)



Source: NERC 2013LTRA

NERC Assessment Areas

Growing Reliance on Gas-Fired Capacity

Gas-Fired Capacity as a Percent of Total Capacity

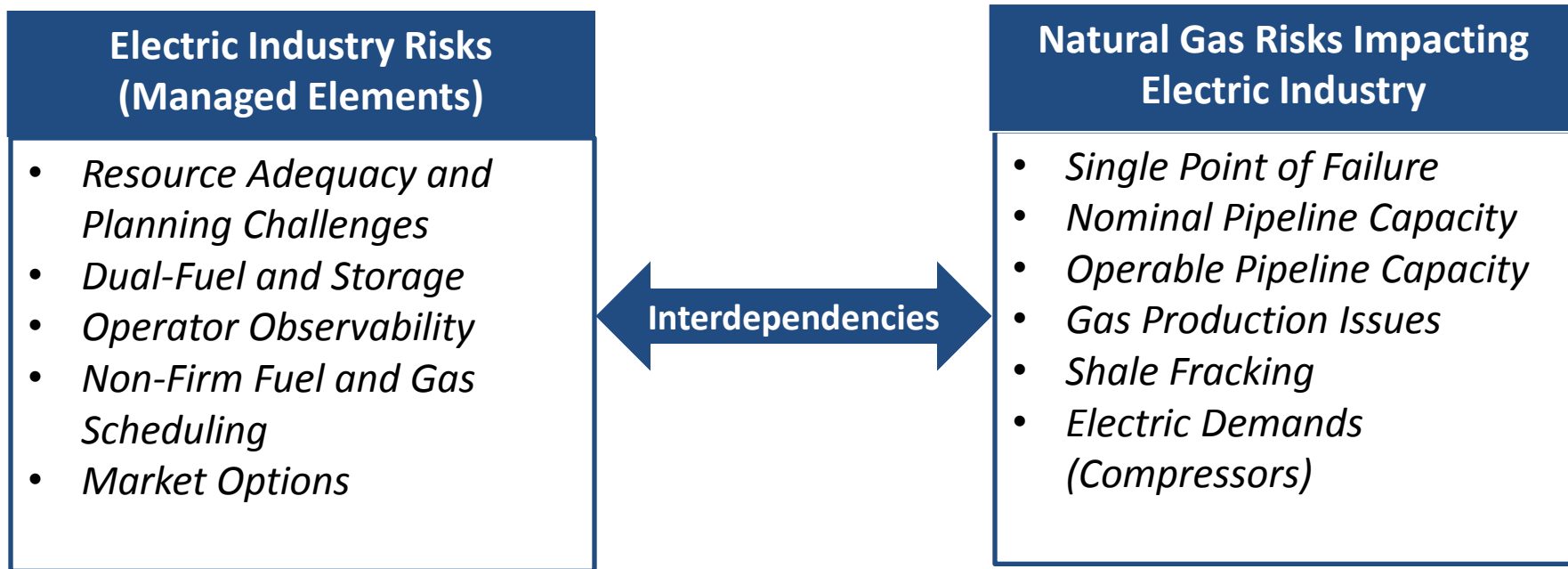
MISO	New York (NYISO)	New England (ISO-NE)	PJM
39%	55%	54%	43%



Source: EIPC: Gas-Electric System Interface Study – April 2014

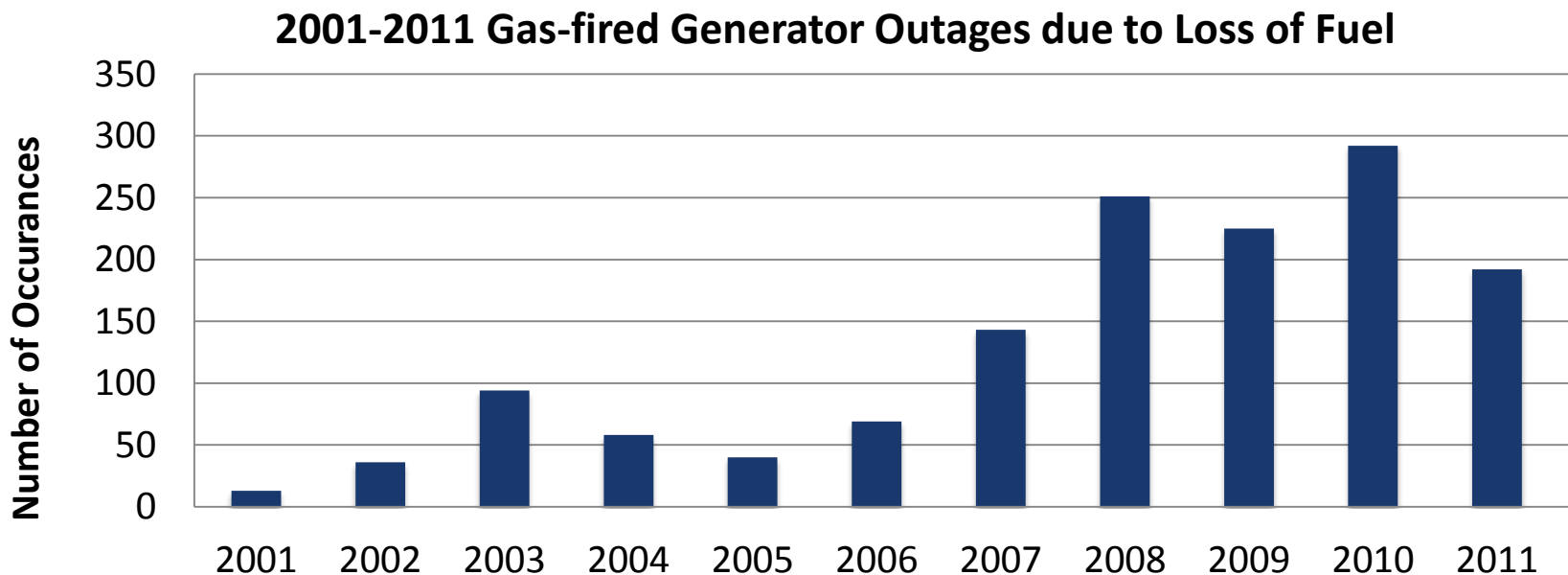
Problem Statement

An increased dependence on natural gas for generating electricity can amplify the bulk power system's exposure to interruptions in fuel supply, transportation, and delivery.

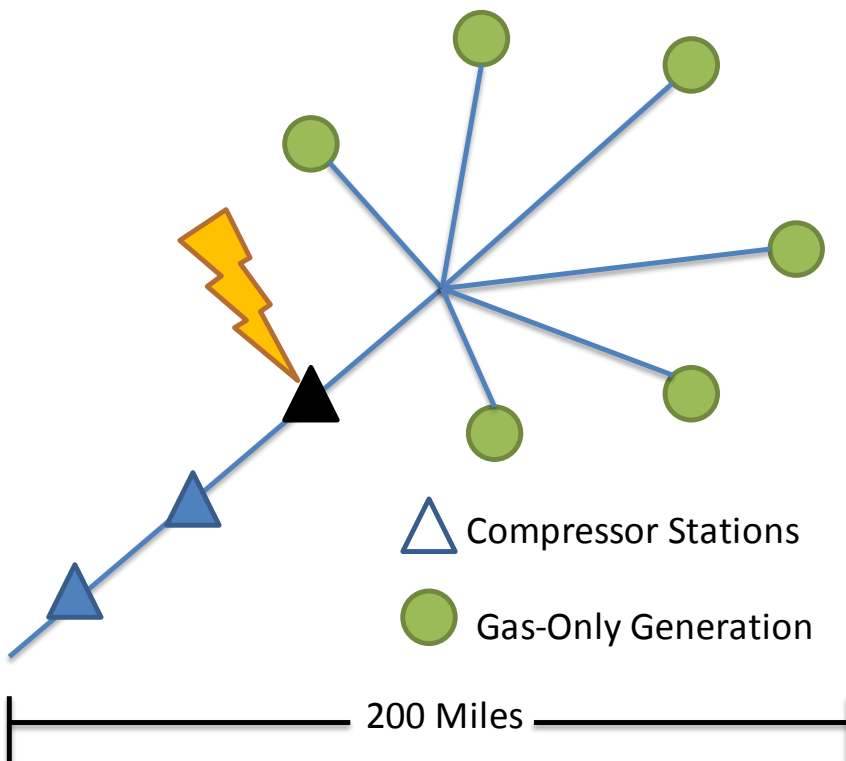


- **Resource Adequacy and Planning Challenges**
 - Integrating fuel disruption risks into planning reserve margins
 - Probabilistic assessments and leveraging NERC GADS
- **Dual-Fuel and Storage**
 - Options can help bridge temporary fuel disruptions
 - Considerations: cost, availability, testing, etc.
- **Operator Observability**
 - Promoted by FERC Order 787
 - Real-time information sharing to promote risk-informed decisions
- **Non-Firm Fuel and Gas Scheduling**
 - Varying options for firm and non-firm delivery
 - Extreme weather considerations
- **Market Options**

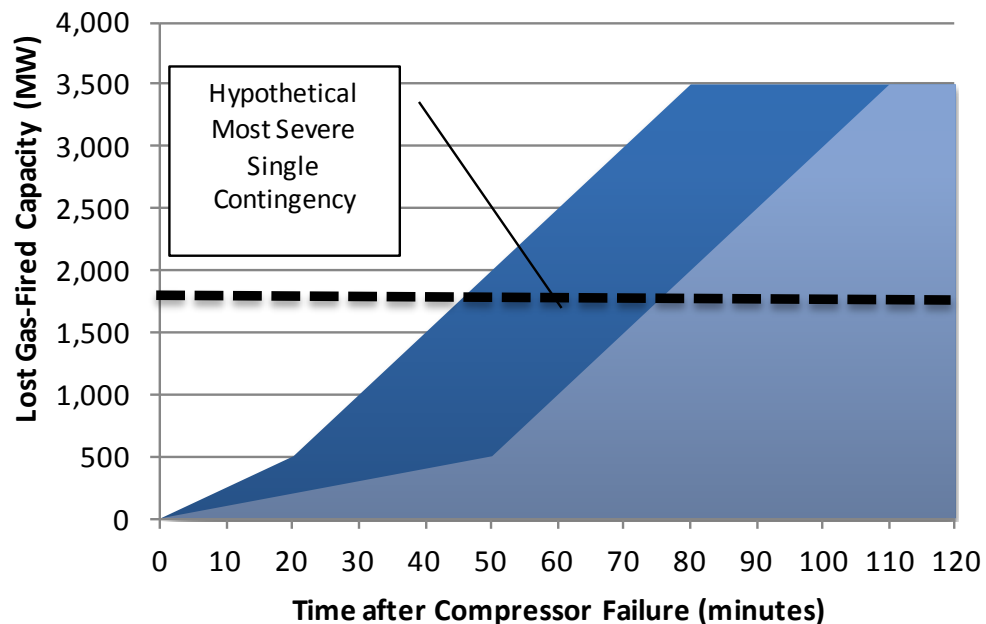
- GADS data will be important in tracking gas-fired capacity availability rates.
- Trends for some areas may reveal increasing risks



Compressor Failure Scenario



Time Profile of Capacity Loss



- 550 psi at failure (typical mid-day conditions)
- 625 psi at failure (typical morning conditions with line pack at night)

Planning

Short- and
Long-Term

- Risk-based and probabilistic analysis (3 Layer)
- Cross-industry information and data sharing
- Robust understanding of dual-fuel capabilities

Operations

Season-Ahead
through
Real-Time

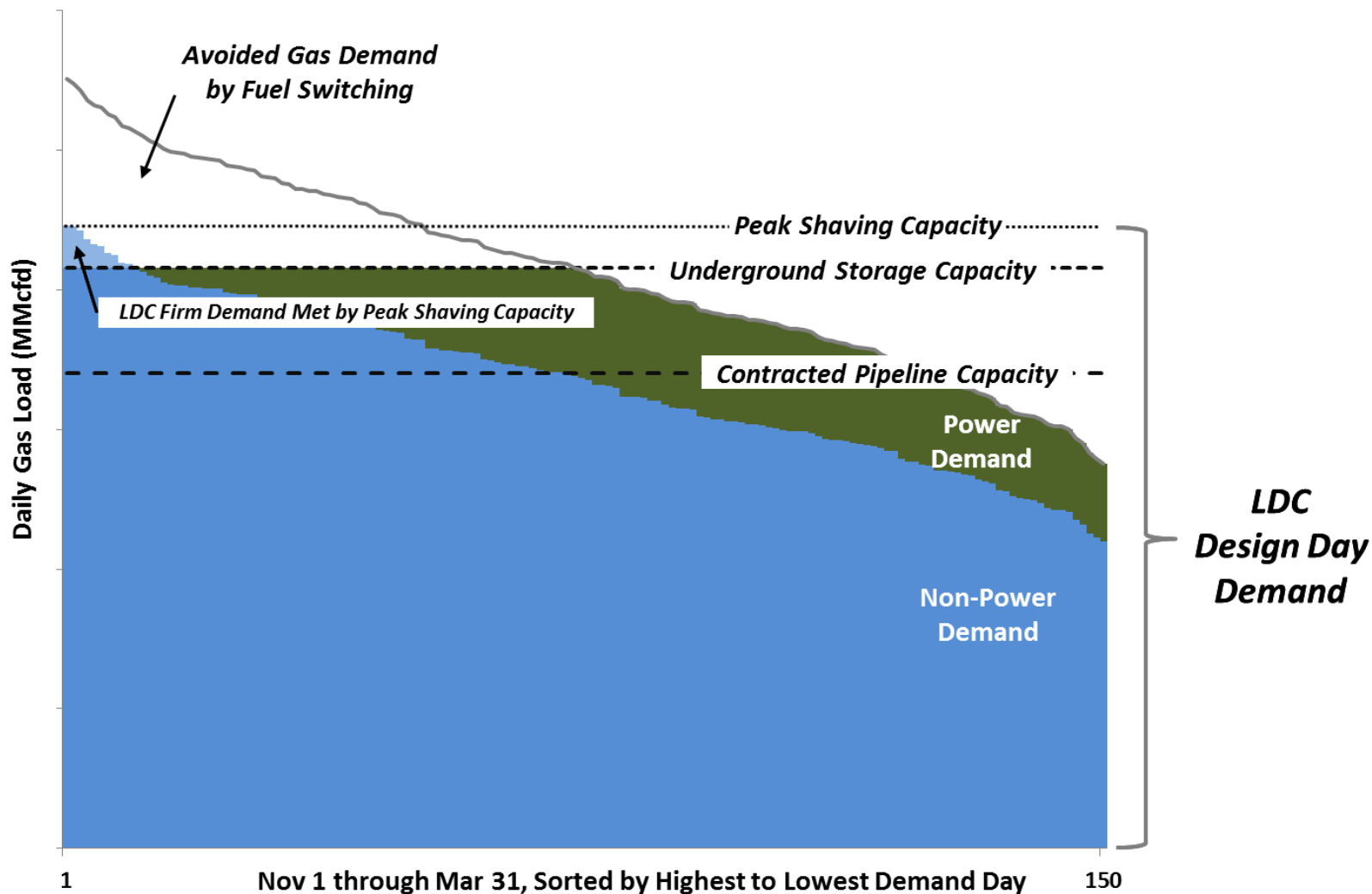
- Preparations and response plans
- Coordinated operational planning and information sharing
- Harmonized procedures for extreme conditions



Questions and Answers

- **NERC Reports on Accommodating and Increased Dependency on Natural Gas**
 - [Primer \(Phase I\)](#)
 - [Vulnerability Assessment \(Phase II\)](#)
- **NERC Reliability Assessments (Long-Term and Seasonal)**
 - <http://www.nerc.com/pa/RAPA/ra/Pages/default.aspx>

Managing Gas-Electric Demands



- Formalized communication and coordination is needed between the gas pipeline and supply industry during extreme events
 - Daily fuel schedules
 - Status of compressor stations
- System operators should re-examine inter-industry communication protocols that apply during periods of stress
- System operators will need access to sufficient flexible resources to mitigate the added uncertainty associated with natural gas fuel risks – particularly risks introduced by interruptible gas transportation service

- Operating criteria, forecasting, commitment, scheduling, dispatch and balancing practices, procedures and tools should consider fuel risks and risk mitigation measures to assist operators in maintaining bulk power system reliability.
- NERC should leverage its stakeholder groups to identify best practices in areas currently most vulnerable to gas dependency risks and taking immediate actions for improvement, such as New England.
- Such an effort could lead to insights for enhanced operator training and table-top exercises.
- Joint industry drills or table-top exercises with the key players of both gas, electric, and various state commissions would foster enhanced coordination and harmonize cross-industry issues, response plans, and mitigation measures.