Perspectives on Natural Gas/Electric Interdependency

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Natural Gas Policy Institute, National Conference of State Legislatures
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To assure the reliability and security of the North American bulk power system

- Develop and enforce reliability standards for users, owners, and operators of the bulk power system
- Assess current and future reliability
- Analyze system events and recommend improved practices
- Encourage active participation by all stakeholders
- Facilitate information sharing on security matters
- Accountable to FERC and Canadian government entities
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.
What’s Changing?

• Higher penetration of renewables – variable resources
  ▪ Most are inverter-connected
  ▪ Ramping needs increase for load following
  ▪ Capacity value

• Emergence of distributed energy

• Retirement of large fossil-fired generation plants

• Increasing energy constraints from the generation fleet
Resilience Framework

Disruptive Event

If Detectable, Pre-Position

Reliable Operation

Robustness
Disaster Prevention and Maintenance Period

Resourcefulness
Resistance Period

Coordinated & Controlled Recovery
Recovery Period

Adaptability
Lessons Learned and Implementation Period

Reliability

$R(t)$

$R_{100\%}$
Reliable

$R_{Target}$

$R_{ALR-Nadir}$

Degradation Profile

Rebound Profile

Recovered Steady-State

$t$

$T_{disruption}$

$T_{rebound}$

$T_{recovered}$
What is Energy Assurance?

• Having certainty in the aggregate ability of all resources to serve expected demand

• Limited risk in fuel supply chains
  ▪ Contracts in place
  ▪ On-site fuel storage
  ▪ Emergency provisions for deliveries

• Statistically and probabilistically confident in energy source production

• Robust, secure and reliable energy infrastructure that is also resilient — able to rapidly restore
Increased dependence on natural gas for generating capacity can amplify the bulk power system’s vulnerability to disruptions in fuel supply, transportation, and delivery.

**Threat**
- Interruption (Fuel Contracts)
- Curtailment (Physical Disruption)

**Solution Space**
- Wholesale Electricity Market
- Utility, Integrated Resource Plan, State Commission
- Resilience Planning
Regional Fuel Assurance Conditions

**New England**
- Infrastructure constrained
- Limited firm service
- “Anti-gas” sentiments
- Pay-for-Performance

**CA/DSW**
- Aliso Canyon/storage constraints
- System flexibility
- Pipeline constraints
- “Anti-gas” sentiments (CA)
- Limited firm service

**PJM**
- Significant baseload retirements anticipated
- Declining fuel diversity
- Capacity Performance

**Florida**
- Firm service in place
- Dual fuel acceptable
- 78%+ gas on peak
- Lack of fuel diversity
### Assessment Areas with More Than 50% Natural Gas as a Percent of Total Capacity

<table>
<thead>
<tr>
<th>Area</th>
<th>2022 (MW)</th>
<th>2022 (%)</th>
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</thead>
<tbody>
<tr>
<td>Florida</td>
<td>42,003</td>
<td>78.1%</td>
</tr>
<tr>
<td>California</td>
<td>42,536</td>
<td>68.2%</td>
</tr>
<tr>
<td>Texas (ERCOT)</td>
<td>51,867</td>
<td>63.3%</td>
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<tr>
<td>New England</td>
<td>16,308</td>
<td>52.3%</td>
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<tr>
<td>Desert Southwest</td>
<td>16,774</td>
<td>51.8%</td>
</tr>
<tr>
<td>Alberta</td>
<td>8,514</td>
<td>51.8%</td>
</tr>
</tbody>
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- 96 GW of natural gas in next 5 years, NERC-Wide
2017 analysis examines reliability issues associated with severe disruptions on the natural gas system

- Review of existing studies
- Evaluation of gas storage facilities
- Identification of generation clusters
Screening analysis identified 18 clusters did not meet voltage criteria and power flow was unsolved.
• 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 Standards related to transmission planning and extreme event assessments
  ▪ NERC Workshop – July 2018
  ▪ Creation of Electric Gas Working Group (EGWG) to facilitate gathering of experts and drive resources to educate and inform industry
  ▪ Reliability Guideline to be completed October 2019

• NERC should enhance its Generator Availability Data System (GADS) database for better granularity in generator outage causes
• 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
Questions and Answers