Emerging Technology Roundtable

• 1:00 p.m. – Opening Remarks and Introduction – Tobias Whitney, NERC

• 1:15 p.m. – Understanding Plant Fuel Handling Systems – Allen D. Schriver, P.E, Generator Forum

• 1:45 p.m. – Understanding Natural Gas Pipelines – Kimberly Denbow, American Gas Association

• 2:15 p.m. – Discussing dependencies between Electricity and Natural Gas – Tom Coleman, NERC

• 3:00 p.m. – Navigating the Regulatory Environment – Rebecca Massello, Interstate Natural Gas Association of America

• 3:30 p.m. – Roundtable discussion: Security and CIP considerations – Group Panel Session

• 4:30 p.m. – Closing and Next Steps – Tobias Whitney, NERC
Plant Fuel Handling Systems
Emerging Technologies Roundtable

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Agenda

- Ownership
- Gas Blending Stations
- Controls
- Protection
- DCS/SCADA Information Sharing
Ownership

Three types of Ownership Models for Pipeline to Generator Plant Interface

- Single pipeline feed: not owned or controlled by plant (dominant)
- Two or more pipeline feeds: not owned or controlled by plant
- Two or more pipeline feeds: at least one of which is owned and/or controlled by a pipeline affiliate of the plant

NAGF Gas Generation Supply survey results:

- 84 responses to survey representing 54,185 MW of generation
- 71% of gas-fired plants only have a single pipeline feed
- 81% do not own or control the pipeline supplying their plant
Gas Blending Stations

- Gas-fired plants with two or more gas pipeline feeds need a gas blending station to transfer between different gas suppliers
  - Fuel source set based on lowest price/dispatch plan
  - Flow control for selected source; pressure control for non-selected source(s)

- Gas blending stations may be inside or outside of the plant perimeter depending on location of gas yard and metering for pipeline feeds
The controller for the gas blending station is located near the valves.

The controller may be operating on signals from the overall plant controller, or it may be operated by the pipeline company depending on ownership model.
Gas Blending Protection

- The gas blending controller within a plant perimeter is protected by plant physical security policies and procedures.

- Network security
  - If owned by plant and controlled by plant controller, security protections are from plant network.
  - If controlled remotely by pipeline operator, network security provided by operator.
Example of information shared between gas pipeline supplier and gas generation facility:

- chromatograph gas data
- gas supply line flow and pressure
- Temperature
- Gas supply line valve status
Q & A
Thank you!

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Safely Transported Across the Country

Natural gas pipelines:
- transport approximately one-fourth of the energy consumed in the U.S.
- the safest form of energy delivery in the country

Natural gas is delivered to customers through a 2.5 million-mile underground pipeline system. This includes 2.2 million miles of local utility distribution pipelines and 300,000 miles of transmission pipelines that stretch across the country.
Wellhead to Burner-tip

The supply chain model is provided as courtesy of API Oil & Gas Industry Preparedness Handbook, 2019.
Wellhead to Burner-tip
Natural Gas Pipeline System

- Extensive network of interconnected pipelines
- Pipeline loops
- “Line pack”
- Flow control and redirection
- Geographically dispersed production and storage
- Pipeline safety regulations, 49 CFR Part 192.
Compressor stations typically every 50 to 100 miles on a pipeline.

More than 1,400 compressor stations in U.S. on natural gas pipeline system.

Source: Energy Information Administration
System Reliability & Redundancy
Regulatory Authorities

Transportation Security Admin., DHS Infrastructure Security Compliance Division, DOT Pipeline & Hazardous Materials Safety Admin., U.S. Coast Guard, DOE, Federal Energy Regulatory Commission
• 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

• 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**
• 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
• On-peak natural gas-fired capacity has increased to 442 GW, up from 360 GW in 2009.
• 32 GW of Tier 1 gas-fired capacity is planned during the next decade.

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<th>Assessment Area</th>
<th>2022 (%)</th>
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<tr>
<td>FRCC</td>
<td>78.1%</td>
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<tr>
<td>WECC-CAMX</td>
<td>68.2%</td>
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<tr>
<td>Texas RE-ERCOT</td>
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<tr>
<td>WECC-AB</td>
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</tbody>
</table>
Top-20 Gas Pipelines by Peak-Day Delivery Arrangement

Red pipelines mean there were no interruptible flows on-peak

Source: ANL
Identifying Generation Risk Clusters

Northwest:
25 GW – 2016
4 GW – Planned

Southeast
55 GW – 2016
7 GW – Planned

Mid-Atlantic
95 GW – 2016
50 GW – Planned

New England
11 GW – 2016
5 GW – Planned

Florida
38 GW – 2016
5 GW – Planned

South CA-AZ:
60 GW – 2016
17 GW -- Planned

East TX-OK-LA
85 GW – 2016
28 GW – Planned

* All values are approximates, various sources: EIPC, EIA-860, NERC LTRA
NERC Independent Analysis Results: Require Further Analysis
Reported GADS Outages of Natural Gas Generation Due to “Lack of Fuel”

(2012-2015)
Expeditious consideration of air permit waivers
Cyber and physical security to be diligently considered by regulators
The Energy Information Administration (EIA) should collect data on fuel storage inventories
NERC registered entities should consider the loss of key natural gas infrastructure in their planning studies.
Testing of dual fuel generators
Additional data granularity in NERC GADS cause codes
Questions and Answers
Understanding Natural Gas Industry: Security Regulatory Framework

Rebecca Massello
Director of Security, Reliability & Resilience
Interstate Natural Gas Association of America
March 7, 2018
Natural Gas Supply Chain

Physical Security
- U.S. Coast Guard/DHS – MTSA
- DHS – TWIC
- DHS – CFATS
- TSA – Pipeline Security Guidelines
- States Oversight

Safety/Resilience
- DOT/PHMSA – Pipeline Safety Act
- DOE/FERC
- States Oversight

Cybersecurity
- TSA – Pipeline Security Guidelines
- DOE – NIST Framework Implementation
- States Oversight
Maritime Transportation Security Act (MTSA)

- **Regulatory Body/Agency:** U.S. Coast Guard; Department of Homeland Security

- **Pertains to:** MTSA aims to prevent maritime transportation security incidents and marine casualties resulting from malicious acts, accidents or acts of nature against waterfront facilities and vessels

- **Applies to:** Almost all vessels involved in the production and transfer of ONG are subject to MTSA (tankers, barges, MODUs, towing vessels, service and supply).

  The Facility Security Rule applies to:
  - Facilities that receive explosives, liquefied natural or hazardous gas, or oil and other hazardous materials in bulk);
  - Transfer oil or hazardous materials;
  - Barge fleeting facilities that receive barges carrying, in bulk, cargoes regulated by 46 CFR Chapter I, subchapters D or O, or Certain Dangerous Cargoes (CDCs).

- **Year Issued:** 2002
Transportation Worker Identification Credential (TWIC)

• **Regulatory Body/Agency:** TSA; U.S. Coast Guard

• **Pertains to:** TSA conducts a security threat assessment (background check) to determine a person’s eligibility and issues the credential.

• **Applies to:** Maritime workers requiring unescorted access to secure areas of port facilities, outer continental shelf facilities, and vessels regulated under the Maritime Transportation Security Act of 2002, or MTSA, and all U.S. Coast Guard credentialed merchant mariners

• **Year Issued:** 2002
Chemical Facility Anti-Terrorism Standards (CFATS)

• **Regulatory Body/Agency:** DHS Infrastructure Security Compliance Division (ISCD)

• **Pertains to:** The Chemical Facility Anti-Terrorism Standards (CFATS) program identifies and regulates high-risk chemical facilities to ensure they have security measures in place to reduce security risks associated with certain chemicals of interest. The program uses a dynamic multi-tiered risk assessment process and requires facilities identified as high-risk to meet and maintain performance-based security standards appropriate to the facilities and the risks they pose.

• **Applies to:** Chemical Facilities Considered High Risk. Facilities that possess chemicals at or above the screening threshold quantity must submit a Top Screen. Some with end up regulated, others will not.

• **Year Published:** 2007
Pipeline Safety Regulations


- **Pertains to:** Natural Gas Pipeline Safety Act gave DOT regulatory authority over natural gas pipeline safety; 49 CFR Parts 190+

- **Applies to:** Current pipeline safety regulations apply to transmission and distribution pipelines and subset of gathering lines (including, wellheads); up to the customer meter

- **Year Issued:** 1968; Pipeline Safety Reauthorization every four years
NIST Cybersecurity Framework

- **Regulatory Body/Agency:** Department of Homeland Security/Department of Energy
- **Pertains to:** "Framework for Improving Critical Infrastructure Cybersecurity" - provides a common language organizations can use to assess and manage cybersecurity risk; a cost-effective risk management process, based on business needs, without additional regulatory requirements.
- **Applies to:** All 16 Critical Infrastructure Sectors
- **Year Issued:** February 2014
TSA Pipeline Security Guidelines

- **Regulatory Body/Agency:** TSA Surface Division - Office of Security Policy and Industry Engagement (OSPIE)

- **Pertains to:** TSA Pipeline Security Guidelines drive the development and implementation of a risk-based corporate security program by pipeline operators to address and document the organization’s policies and procedures for managing security related threats, incidents, and responses. The Guidelines include progressive security measures facilities may use, based on the characteristics of their particular facility and the assigned threat level. Operators should develop and implement a corporate security plan customized to most effectively mitigate security risk of the company’s critical assets. The corporate security plan should be comprehensive in scope; systematic in its development, and risk-based, reflecting the security environment.

- **Applies to:** Natural gas and hazardous liquid transmission pipelines, natural gas distribution pipelines, and to liquefied natural gas facility operators. Additionally, the Guidelines apply to pipeline systems that transport materials categorized as toxic inhalation hazards (TIH).

- **Year Issued:** 2010 (revised, 2011)
State Oversight

- **Regulatory Body/Agency:** Differs By State

- **Pertains to:**
  - Added pipeline safety regulations
  - Security guidance/regulations
  - Curtailment policies - service prioritization during supply constraints
  - Gun Laws

- **Applies to:** Natural gas utilities, intrastate pipelines

- **Year Issued:** Varies by State