



2022 NARUC Annual Meeting and Education Conference

CONNECTING THE DOTS

Innovative/Disruptive Technology and Regulation

**A2: Teamwork Makes the
Dream Work: *Learning about
Gas Decarbonization Guiding
Principles***



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Teamwork Makes the Dream Work: Learning About Gas Decarbonization Guiding Principles

Moderator: Hon. Tammy Cordova, Nevada

Panelists: Karsten Barde, National Grid

Mike Henchen, Rocky Mountain Institute

Joseph Pereira, Colorado Office of the Utility Consumer Advocate

Jollette Westbrook, Environmental Defense Fund

Enhancing and Maintaining Gas and Energy System Resiliency

Areas of Focus and Change

Approach and Overview

Report Key Questions

- **What characteristics of the current regulatory framework enable or disable gas resilience?**
- **How does resiliency in the gas system enhance energy system resiliency?**
- **How can resilience be valued and measured to better qualify gas infrastructure investments?**
- **What recommended changes are needed to enable gas and energy system resilience?**

Approach and Overview

Resilience Compared to Reliability

Resilience

The set of energy system abilities that allow it to prevent, withstand, adapt to, and quickly recover from system damage and/or operational disruption.



A major operation disruption occurs along a transmission pipeline, interrupting regional natural gas supply.



Gas from storage assets are quickly diverted and dispatch calls in demand response.



Deliveries are maintained to customers during system repairs.

Reliability

The ability of the energy system to deliver services in the quantity and with the quality demanded by end-users.



Power system demand starts peaking at 5:00 pm, just as variable solar generation starts ramping down for the evening.



Natural gas-fired plants ramp up to meet the spike in system demand.



Customers maintain reliable service during daily supply and demand fluctuations.

Event

Response

Outcome

Source: Guidehouse

Approach and Overview

Building a Resilient Energy Future – How the Gas System Contributes to US Energy System Resilience

Natural gas infrastructure is critical to supporting gas-powered electric generation systems – this is central to ensuring resiliency of the overall energy system.

Natural gas pipeline and storage infrastructure are critical in supporting energy grid resilience by reliably delivering natural gas, even during short and long-term duration needs (e.g., including extreme weather).

Natural gas and other low-carbon fuels will remain a core element of the US energy system for decades to come and natural gas electric generation is critical to scaling the integration of renewables.

Additional Research Insights – Impacts to the Energy System

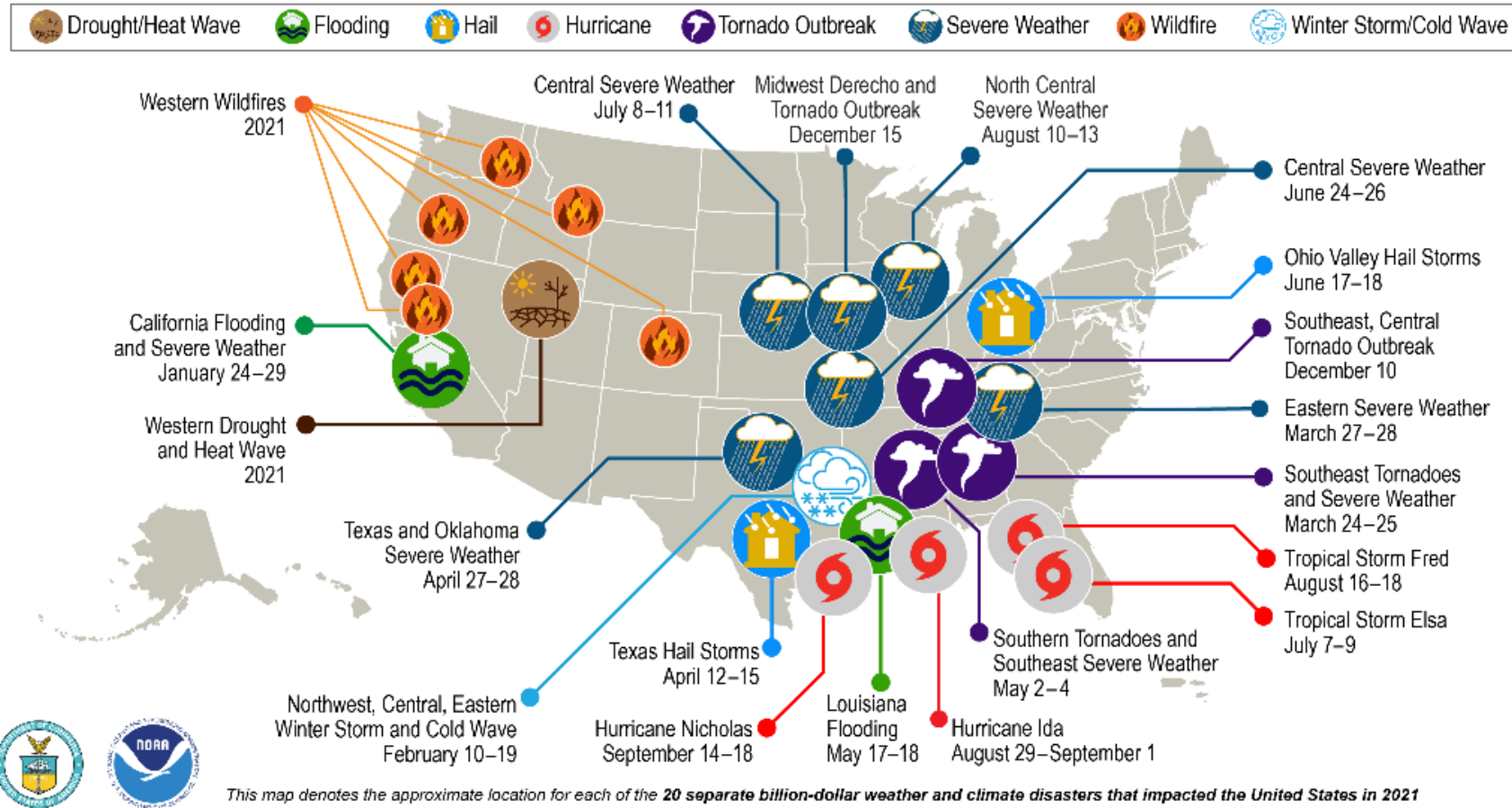
Lack of coordination between the electric and gas industries create issues in ensuring resiliency and operation of critical natural gas infrastructure.

- **Natural gas interstate and local distribution are inherently more resilient than electric transmission and distribution systems** since underground pipelines are insulated from extreme weather events.
- Resilience of the overall energy system rests upon gas system resilience since **natural gas accounts for one-third of primary energy consumption** across all principal sectors of the economy and is the primary fuel for the generation of electric power in the US.

Source: Guidehouse

Research Insights – Extreme Weather Events

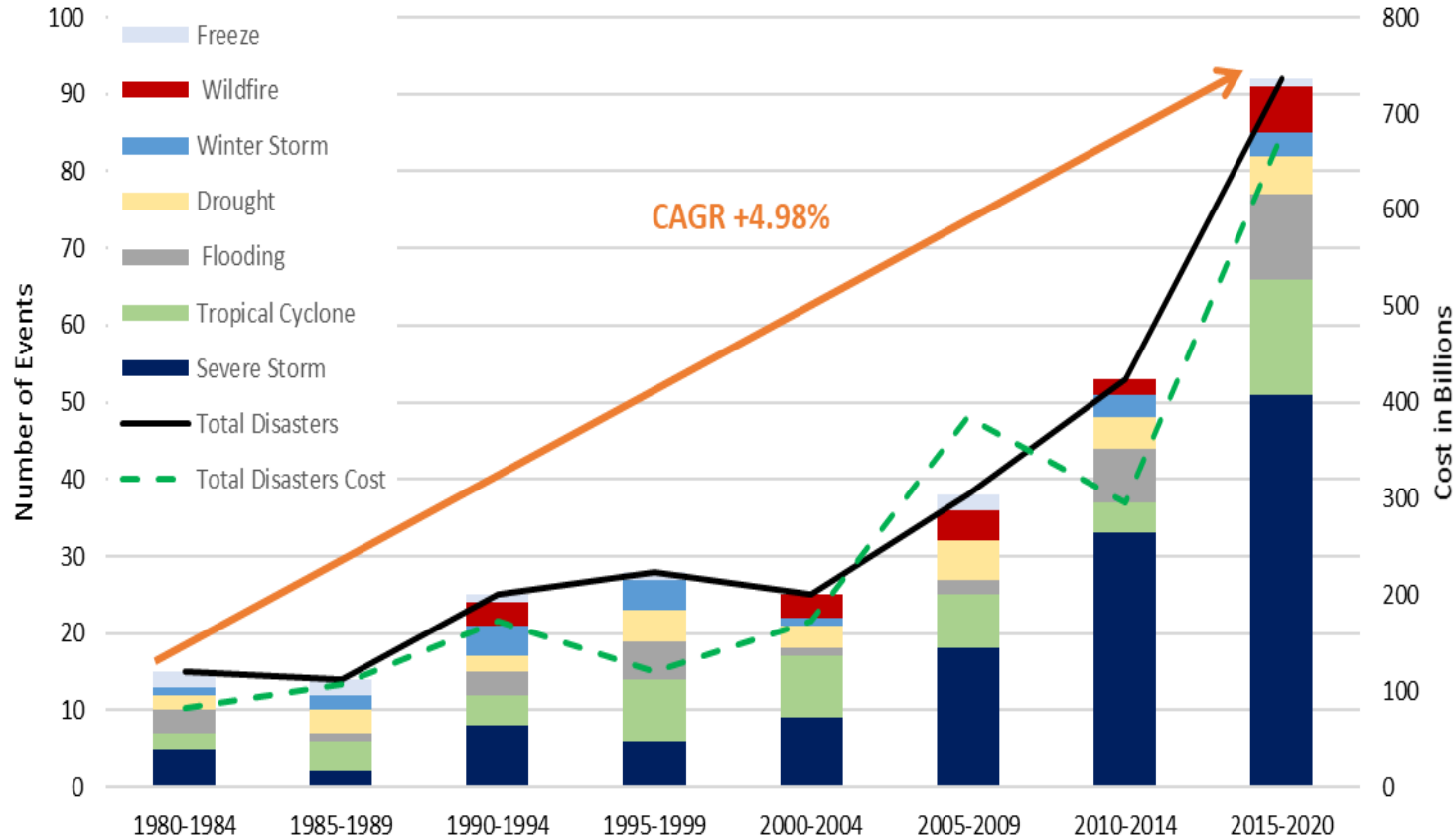
U.S. Year 2021 Billion-Dollar Weather and Climate Disasters



Source: NOAA National Centers for Environmental Information (NCEI)

Research Insights – Extreme Weather Events

Growth of U.S. Billion-Dollar Weather and Climate Disasters



Source: NOAA National Centers for Environmental Information (NCEI); Dollars are shown in nominal values over time.

Approach and Overview

Regulatory constraints exist in the gas system - many times gas utilities are not appropriately compensated for resiliency investments.




Inadequate political and regulatory support for resilience in the gas system.



Few state regulatory initiatives specifically address gas system resilience.



Resilience is often indirectly referenced and embedded within reliability and safety standards.

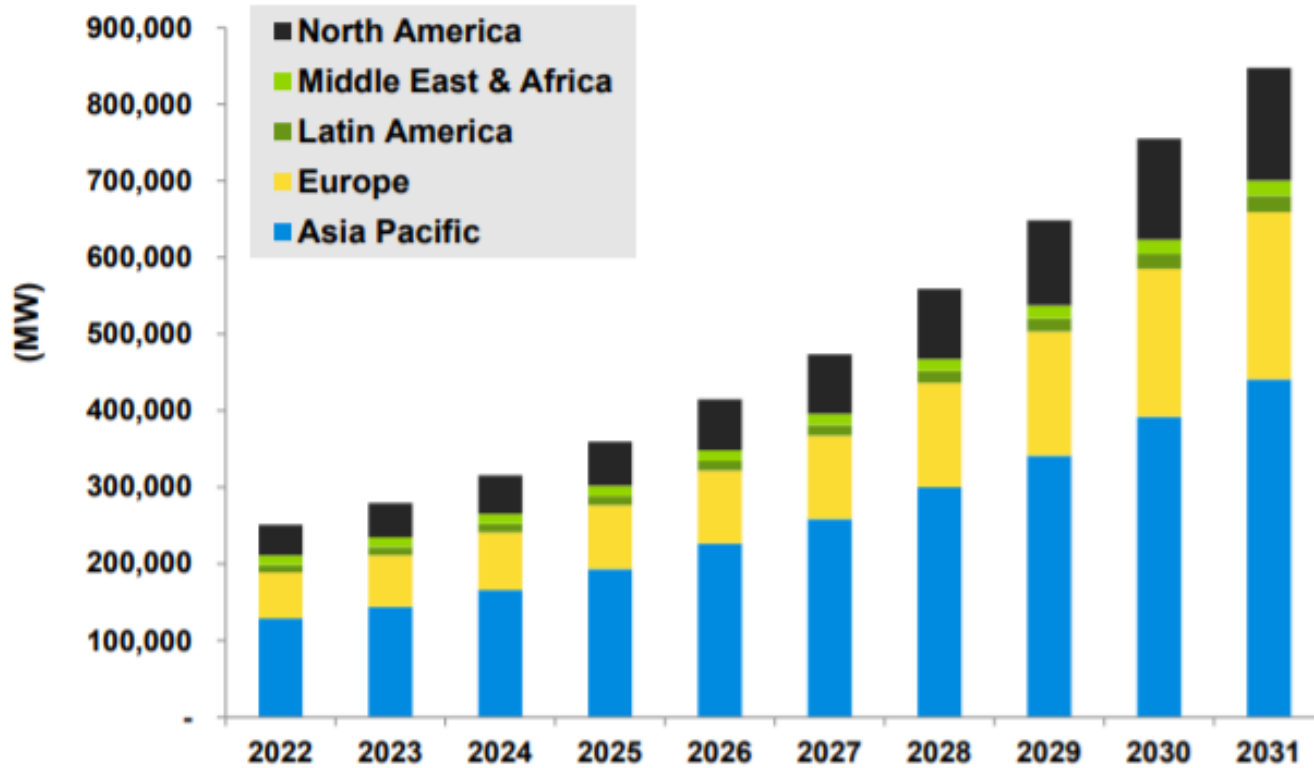


Lack of regulatory mechanisms to compensate participants for resilience investments.

Research Insights – Market Response to Resilience

Increasing service disruptions hastened the use of gas-powered distributed energy resources (DERs) to counter outages and improve customer resiliency.

Annual Total DER Capacity by Region, World Markets: 2022-2031



(Source: Guidehouse Insights)

- Customers are mitigating energy system risk by installing DERs, including stand-by and other types of dispatchable gas-powered electric generation.
- DERs allow customers to leverage the inherent **resilience of the natural gas distribution network**.
- Standby generators has soared over the past few years due to storm-induced - increased net sales of **122.5%** from 2017 to 2021.

Recommendations - Resilience Investments

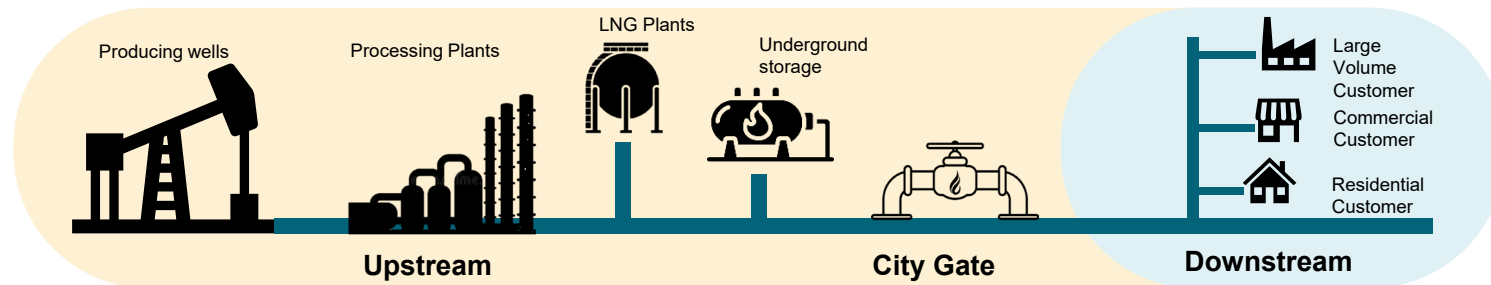
Integrated solutions are required for resilient gas service to LDC customers - primary driver of enhanced energy system resilience is improving gas resilience.

Upstream of the City Gate Investments

- **Ensure preparation for extreme weather** - Increase investments in the weatherization of well-heads, gathering, and processing systems, gas transmission networks, and storage facilities
- **Continue replacing aging pipelines and interconnections** with long lived assets that support broader energy system resilience
- **Design systems to accommodate low-carbon fuels** for future operations to provide resilience benefits and support decarbonization goals

Downstream of the City Gate Investments

- **Increase investments** in pipeline and storage infrastructure weatherization
- **Expand upstream pipeline interconnections**
- **Develop additional distributional storage facilities** to enhance the resilience of the overall pipeline distribution system
- **Expand integration of alternatives fuels** (e.g., hydrogen) or locally produced LNG
- **Modernize infrastructure** to lower emissions and enhance safety, reliability, resiliency and affordability



Recommendations - Implementing Resilience

Broader energy federal and state policies and regulatory mechanisms to increase resilience are required to support resilience investments across the energy system.

▲ Principles for Implementing Resilience



- Public acceptance for resilience investment costs
- State and Federal political support
- Regulations and frameworks emphasizing reliability and resilience
- Collaborative actions across the natural gas and electric industries
- Cost recovery mechanisms for LDCs to recover resiliency investments

🎯 Actions to Implement Resilience

- ✓ Federal and state legislative approval of resilience measures
- ✓ Resilience regulatory requirements written into state and federal frameworks
- ✓ Federal and state funding support for energy system resilience investments
- ✓ Energy system management across natural gas and electric networks



Conclusions & Key Themes

1

Climate events have created direct and indirect costs due to disruptions in electric and gas supply and the system vulnerabilities of these assets and operations.

2

Lack of integrated operational coordination and regulation between natural gas operations (i.e., pipelines, storage infrastructure) and electric operations (i.e., ISOs and electric utilities) – this exposes the entire energy system to increased risk.

3

Need to increase momentum for regulators to address energy system failures - stakeholders and the public need to better understand the role **pipeline and storage infrastructure** needs to play in the future state energy system.

4

Recommended resilience investments include replacing aging infrastructure, increasing weatherization standards, building additional storage facilities, and developing systems to integrate low-carbon fuels

5

Public, regulatory and financial support are the foundational principles to implement resilience.



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Collaborating for Gas Utility Decarbonization



Full report available

