

Resilience and Mitigation Working Group Meeting

New Mexico Energy, Minerals, and Natural Resources Department (EMNRD)
Energy Conservation and Management Division (ECMD)

N E W M E X I C O



Energy, Minerals and Natural Resources Department

April 6, 2023



Introduction and Background

Threats and Vulnerabilities

Resilience and Mitigation Measures

Next Steps

Introduction: Energy, Minerals, and Natural Resources Department Energy Conservation and Management Division



Louise Martinez

Director, Energy Conservation and
Management Division

Role of ECMD / New Mexico State Energy Office

- **Responsibilities as condition of State Energy Program funding through the U.S. Department of Energy:**
 - Monitor energy sectors across the state
 - Promote and implement energy security measures
 - Maintain and continually update the New Mexico **State Energy Security Plan (SESP)**
 - Serve as the primary agency for coordinating communications during an energy emergency per ESF #12 (Energy Annex of the New Mexico All-Hazards Emergency Operations Plan)
- **Efforts of ECMD in FY23:**
 - Contracted with Hagerty Consulting, Inc. for 2023 SESP update with extensive stakeholder engagement
 - Planning Tabletop Exercise and Workshop **May 2023**
 - Submitted application to U.S. Department of Energy for funding under IIJA Section 40101 (d) to support implementation of electric grid resilience measures targeting areas with chronic outages and vulnerabilities.
 - \$7.2 million in first year for electric grid hardening and system upgrades to support resilience
 - Expected 60% set-aside for “small utilities”
 - Request for applications expected Summer 2023

Regional Energy Security Tabletop Exercise in May 2023

To bolster energy preparedness, EMNRD ECMD will host an in-person **Regional Energy Security Tabletop Exercise** at the La Fonda Hotel in **Santa Fe on May 1-2, 2023**.

There are still spots available, and if you are interested in participating, please contact Jacqueline Waite as soon as possible.

Jacqueline.Waite@emnrd.nm.gov

New Mexico's Renewable Energy Transition

- Governor Lujan Grisham signed the **Energy Transition Act** (ETA) into law in March 2019.
- The ETA sets a **statewide renewable energy standard** of 50 percent by 2030 for New Mexico investor-owned utilities and rural electric cooperatives and a goal of 80 percent by 2040, in addition to setting **zero-carbon resources standards** for investor-owned utilities by 2045 and rural electric cooperatives by 2050.
- The law transitions New Mexico away from coal and toward clean energy and provides tens of millions of dollars of economic and workforce support for communities impacted by coal plant closures, as well as the development of renewable replacement power in San Juan County.
- **An objective of the SESP update, as well as the facilitation of this Resilience and Mitigation Working Group Meetings, is to evaluate energy security needs as the state undertakes a renewable energy transition.**

Introduction: Hagerty Consulting, Inc.



Katie Toskey

Project Manager



Justin Killingsworth

Mitigation Subject Matter Expert

Hagerty Consulting, Inc.

Emergency management and homeland security consulting firm with nearly 20 years experience supporting all levels of government and the private sector. Assists clients, like the State of New Mexico, prepare for, respond to, and recover from disasters and other emergencies.

Stakeholder Engagement Activities



PHASE 1:

Project Introductory
Email Outreach to
Stakeholders and Virtual
Stakeholder Kickoff
Meeting

PHASE 2:

State Energy Security
Assessment and
Validation Workshops

PHASE 3:

Resilience and Mitigation
and Emergency
Response Working Group
Meetings

PHASE 4:

Development of
Updated SESP and
Stakeholder
Presentations

Resilience and Mitigation Working Group Meetings

- Elicit **existing, anticipated, and required mitigation initiatives**, discuss **resources available** to support mitigation efforts and **areas where resources are needed**, and identify areas of potential **public-private partnership**.
- Dialogue will support creation of a **Risk Mitigation Approach** that describes how public and private partners across the state and region will enhance energy sector reliability and end-use resilience, including maintaining electric, liquid fuels, and natural gas system reliability, and securing energy infrastructure.





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Electricity Sector Threats and Vulnerabilities

- The U.S. Department of Energy has identified the following leading threats to New Mexico's electricity sector that have also been informed by stakeholder perspectives shared during the Energy Security Validation Workshops in February:
 - **Natural Hazards (wildfires, winter storms and freezes, extreme heat, flash floods)**
 - **Physical Threats**
 - **Cybersecurity Threats**
- The U.S. Department of Energy has identified **human-caused events and asset health as the greatest vulnerabilities** to New Mexico's electricity sector.
- **Supply chain issues** also represent a vulnerability. There is a current critical shortage of transformers, and the need represents all utilities nationwide.

Natural Gas and Propane Sector Threats and Vulnerabilities

- The U.S. Department of Energy has identified the following leading threats to New Mexico's natural gas sector that have also been informed by stakeholder perspectives shared during the Energy Security Validation Workshops in February :
 - **Corrosion** (when transported by transmission pipelines) (fourth leading cause nationwide)
 - **Outside Forces** (when transported by distribution pipelines) (leading cause nationwide)
 - **Asset Age**
 - **Cybersecurity Attacks**
 - **Severe Weather**
- 69% of New Mexico's 6,440-mile transmission system and 42% of New Mexico's 14,347-mile distribution system **were constructed prior to 1970 or in an unknown year.**
- Top events affecting natural gas transmission include: **1) Corrosion (\$3.4M per year); 2) Outside Force (\$156K per year); and Equipment Failure (\$73K per year).**
- Top events affecting natural gas distribution include: **1) Outside Force (\$1.02M per year); 2) Material/Weld Failure (\$299K per year); and Incorrect Operation (\$44M per year).**

Petroleum Sector Threats and Vulnerabilities

- The U.S. Department of Energy has identified the following leading threats to New Mexico's petroleum sector that have also been informed by stakeholder perspectives shared during the Energy Security Validation Workshops in February:
 - **Outside Forces** when transported by truck (second leading cause nationwide)
 - **Materials Failures** when transported by rail (fifth leading cause nationwide)
 - **Equipment Failures** when transported by crude oil pipeline (eighth leading cause nationwide)
 - **Corrosion** when transported by product pipelines (second leading cause nationwide)
 - **Disruptions in Other States Impacting Supply**
 - **Cybersecurity Attacks**
 - **Severe Weather**
- 45% of New Mexico's petroleum pipeline systems were **constructed prior to 1970 or in an unknown year.**
- New Mexico has two petroleum refineries, and the leading causes of disruptions include:
 - **General Outages, Repairs, Closures** (third leading cause nationwide)
 - **Loss of Containment or Flaring** (leading cause nationwide)
 - **Maintenance** (second leading cause nationwide)

Threats to All New Mexico Energy Sectors

Natural Hazards

Cybersecurity

Physical / Man-Made

Asset Health

Supply Chain

The U.S. Department of Energy identifies the following **natural hazards** as causing the greatest overall property damage in New Mexico between 2009 – 2019:

- **Winter Storms and Extreme Cold** (21 events costing \$39 million)
- **Wildfire** (five events costing \$7 million)
- **Flood** (33 events costing \$6 million)
- **Thunderstorm and Lightning** (113 events costing \$6 million)
- **Tornado** (9 events costing \$1 million)

Stakeholder Feedback: Threats

The threats identified represent data available by federal and state agencies as well as stakeholder perspectives provided during the State Energy Security Validation Workshops in February:

- 1) As the New Mexico State Energy Office proceeds with development of a Risk Mitigation Approach to be incorporated into the updated State Energy Security Plan, do you agree with the priority threats identified?**
- 2) Are there additional considerations for threats that should be taken?**





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Resilience

Resilience is the ability to adapt to changing conditions and withstand and rapidly recover from disruption.

Mitigation

Mitigation is risk management action taken to avoid, reduce, or transfer those risks. By reducing the impact of disasters, mitigation supports protection and prevention activities, eases response, and speeds recovery to create better prepared and more resilient communities.

Resilience and Mitigation Measures

- Energy infrastructure is typically constructed to **safety, security, and reliability standards set by the North American Electric Reliability Corporation (NERC), Pipeline Hazardous Materials and Safety Administration (PHMSA)**, and other federal, state, and industry regulating bodies.
- To mitigate impacts from evolving threats including natural hazards exacerbated by climate change, states and energy infrastructure operators may consider **risk mitigation technologies and operational measures** that enhance system resilience beyond the standards set by regulators.
- When evaluating whether to invest in new risk mitigation measures, **infrastructure operators evaluate the cost of the measures against the level of risk and the potential benefits of greater system reliability and faster recovery after emergency events**. For regulated electric and natural gas utilities, these investments may require approval from state public utility commissions.

All Hazards and Hazard-Specific Risk Measures

- **All-hazards measures** can apply to a range of threats and are divided into categories that align with three of the infrastructural qualities outlined in the U.S. Department of Homeland Security's Resilience Framework:
 - **Robustness:** measures that strengthen a system to withstand external hazards without degradation or loss of functionality.
 - **Redundancy:** measures that allow for alternate options, choices, and substitutions when a system is under stress.
 - **Rapid Detection/Recovery:** measures that accelerate the time it takes to overcome disruption and restore energy services.
- **Hazard-specific measures** are designed to mitigate a specific threat or risk.



All-Hazards Risk Measures

All-Hazards: Robustness

Measure	Description	Sector
Demand Response Programs	Relieve pressure on electric or natural gas delivery systems by reducing or time-shifting customer energy usage. Demand reduction during peak periods reduces the chance of system overload and service failure. In addition to enhancing reliability, demand response can also help reduce generator or supplier market power and lessen price volatility.	Electricity, Natural Gas
System Segmentation	Energy systems (power grids, gas pipeline networks, and liquid fuels pipeline networks) can be sub-divided to more efficiently isolate damaged areas, allowing undamaged segments to continue serving customers. By segmenting networks, service isolations can be more targeted and affect fewer customers.	Electricity, Liquid Fuel, Natural Gas
Undergrounding Power Lines	Placing transmission lines underground protects them against external threats, including high winds and falling branches, wildfires, extreme heat or cold, icing, dirt/dust/salt accumulation, and animals. Buried lines may be more vulnerable to flooding if located in low-lying areas and may be more difficult and expensive to maintain and repair.	Electricity

All-Hazards: Redundancy

Measure	Description	Sector
Backup Generators	Fixed or portable backup generators can provide backup power to critical facilities when grid-supplied power is interrupted.	Electricity, Liquid Fuel, Natural Gas
Battery Storage	Battery energy storage can be used to provide backup power during electric grid outages. Batteries can be deployed at utility-scale as front-of-the-meter systems, providing services like utility load peak shaving or behind-the-meter by customers.	Electricity
Microgrids	A microgrid is a group of interconnected loads and distributed energy resources that acts as a single controllable entity with respect to the grid. It can connect and disconnect from the grid to operate in grid-connected or island mode. Microgrids can improve customer reliability and resilience to grid disturbances.	Electricity
Ties Between Gas Pipelines	Natural gas system operators can add ties between gas distribution lines or “mains” to diversify the transmission system and allow additional pathways to route natural gas in the event some sections of transmission mains are damaged.	Natural Gas

All-Hazards: Rapid Detection/Recovery

Measure	Description	Sector
Advanced Distribution Management Systems	Integrate numerous utility systems and provide automated outage restoration and optimization of distribution grid performance. These functions improve the resilience of the distribution system and decrease the length of customer outages.	Electricity
Artificial Intelligence Analysis	Augment the ability of subject matter experts to prioritize transmission line operations, identify defects, and update asset management systems.	Electricity, Liquid Fuel, Natural Gas
Distribution Automation	Utilizes digital sensors and switches with advanced control and communication technologies to automate feeder switching; voltage and equipment health monitoring; and outage, voltage, and reactive power management.	Electricity
Drones for Asset Inspection	Use of drones to inspect pipelines, transmission lines, or other assets allows for safer and more frequent inspections, enhanced asset information, reduced operational costs and failure rates, and extended asset lifetimes.	Electricity, Liquid Fuel, Natural Gas

All-Hazards: Rapid Detection/Recovery (Cont.)

Measure	Description	Sector
LiDAR for Vegetation Management	“Light Detection and Ranging” (LiDAR) is remote-sensing technology that can measure how close vegetation is to power lines. LiDAR units can be deployed on the ground, drones or aircraft, to enable more effective vegetation management.	Electricity
Remote Operated Valves	More efficiently isolate systems during disruptions or peak event load management (e.g., temporarily disconnecting gas customers).	Liquid Fuel, Natural Gas
Advanced Metering Infrastructure	Integrated system of smart meters, communications networks, and data management systems that enables bi-directional communication between utilities and customers. Smart meters can provide near-real-time visibility into customer outages and help utilities allocate resources and restoration activities more efficiently.	Electricity
Supply Chain Resilience Planning	Assessing current supply chains and working with relevant stakeholders to strategically plan for the continuity and rapid restoration of those supply chains after major disruptions improves supply chain resilience.	Electricity, Liquid Fuel, Natural Gas





Hazard-Specific Risk Measures

Hazard-Specific: Cold Weather

Measure	Description	Sector
Pipeline Insulation and Trace Heating	Fiberglass insulation used to enclose piping can protect against freezing. Additionally, an electrical heating element installed along the length of a pipe and covered by thermal insulation can be used to maintain or raise the temperature of the pipe during cold weather.	Liquid Fuel, Natural Gas
Water Line Management	Draining water lines prevents rupturing that would otherwise be caused by the freezing water caught inside. Water lines that cannot be drained can be set to drip. The small amount of flow caused by the steady drip can help prevent the water inside the lines from freezing and rupturing the lines.	Liquid Fuel, Natural Gas
Heating and Pitch Adjustment for Wind Turbines	Wind turbine blades and lubricant housings can be fitted with heating elements that prevent ice accumulation that would otherwise impair operations. Wind turbines can also be configured to operate in winter ice operation mode, which changes the pitch of the blades to allow continued operation as they accumulate ice.	Electricity
Thermal Enclosures	Instrumentation can be enclosed and heated to ensure functionality and operational continuity during extreme cold conditions.	Electricity, Liquid Fuel, Natural Gas

Hazard-Specific: Extreme Heat and Drought

Measure	Description	Sector
Advanced Water-Cooling Technologies	Power plants require significant volumes of water for thermoelectric cooling. Asset owners can employ approaches to reduce their water use to make them more resilient to drought conditions. Alternative approaches include recirculating cooling, dry cooling, and wet-dry hybrid cooling technologies. Cooling equipment capable of using alternative water sources (e.g., brackish water, wastewater) can reduce the impact of droughts.	Electricity
Dry Cooling	Nearly all thermal generation, including nuclear and coal-fired power plants, requires large quantities of water for cooling. Extreme heat can lead to water shortages or make the water used for cooling too warm, forcing power plant operators to curtail electricity output. Dry cooling technologies use air-cooled heat exchangers and other technologies to significantly reduce water use.	Electricity

Hazard-Specific: Wildfire

Measure	Description	Sector
Covered Conductors	Utilities can replace bare wire overhead conductors on high-voltage transmission lines with conductors that have a plastic covering (also called tree wire). Covered conductors greatly reduce the number of faults, and the risk of ignition. Similar products include spacer cables and aerial cables.	Electricity
Fire-Resistant Poles	Wood poles can be replaced with ones made from fireproof materials, or wrapped in fireproof sheaths (e.g., wool-ceramic fiber).	Electricity
Line-Break-Protection Systems	Automated monitoring equipment, called phasor measurement units, installed on transmission lines can detect a voltage change associated with the breakage of a power line. The system can respond in near real-time by de-energizing that segment of the transmission line so that the broken power line does not spark a fire as it falls to the ground.	Electricity

Hazard-Specific: Wildfire (Cont.)

Measure	Description	Sector
Pre-Treat Assets	Pre-treating infrastructure (e.g., by applying flame retardant coatings or wrapping assets such as utility poles in flame retardant sheaths) decreases wildfire damage and expedites restoration of service.	Electricity
Reconductoring	The process of installing new conductor wires on existing towers to increase transmission capacity, thus reducing propensity for high loads and line sag, which can cause ignition. Reconductoring typically involves replacing traditional steel-reinforced lines with composite core lines.	Electricity

Hazard-Specific: Wind

Measure	Description	Sector
Breakaway Service Connectors	Designed to disconnect when the power line it is attached to is pulled by a falling limb or other debris. This avoids damage caused when a service wire is pulled down in a way that damages the meter receptacle. Meter receptacles are not owned by the utility, and a private electrician is needed to first make repairs, delaying service restoration.	Electricity
Dead-End Towers	Self-supporting structures made with heavier material than suspension towers. Dead-end towers are used at the end of a transmission line; where the transmission line turns at a large angle; on each side of a major crossing such as a large river or highway, or large valley; and at intervals along straight segments to provide additional support. Suspension towers are typically used when the transmission line continues along a straight path. When weaker suspension towers are compromised or topple, the stronger dead-end structures can stop a domino effect that takes down multiple towers.	Electricity
Stronger Utility Poles	This can involve reinforcing wood poles, replacing wood poles with concrete ones, or replacing wood cross-arms with fiberglass ones.	Electricity
Vegetation Management	Clearing vegetation away from transmission and distribution lines helps prevent damage (e.g., falling tree branches) to power lines that cause outages.	Electricity

Hazard-Specific: Flood Measures

Measure	Description	Sector
Elevate Equipment	Elevating equipment located in low-lying areas can protect it from flooding that would otherwise damage or destroy it.	Electricity, Liquid Fuel, Natural Gas
Flood Walls/Gates	Installing flood walls, gates, and/or barriers can protect essential equipment in flood prone areas from water intrusion and avoid restoration delays after major storms and floods.	Electricity, Liquid Fuel, Natural Gas
Relocate Assets	Relocating energy assets away from flood-prone areas can reduce or eliminate their exposure to flooding and inundation threats.	Electricity, Liquid Fuel, Natural Gas
Stormwater Pumps	Stormwater pumps can remove flood water and help prevent equipment from being submerged.	Electricity, Liquid Fuel, Natural Gas

Hazard-Specific: Flood Measures (Cont.)

Measure	Description	Sector
Submersible Equipment	Equipment located in flood-prone areas, such as underground power distribution systems in low-lying areas, can be modified or replaced with equipment that is designed to continue functioning when subjected to flooding from water containing typical levels of contaminants such as salt, fertilizer, motor oil, and cleaning solvents.	Electricity, Liquid Fuel, Natural Gas
Vent Line Protectors	A vent line protector (VLP) protects gas regulator vent lines from encroaching water. The VLP is usually open, but if water enters the vent line via the VLP, a float will seal the vent line shut. The float will drop when the water recedes, re-opening the vent to its normal position.	Natural Gas
Vented Manhole Covers	In flooding scenarios, manhole covers can dislodge, and the exposed manhole creates a hazard for pedestrians and vehicles. Proper vent design can allow for the flow of excess water without dislodging the cover.	Electricity, Liquid Fuel, Natural Gas

Hazard-Specific: Cybersecurity

Measure	Description	Sector
Cybersecurity Culture	Incorporate cyber resilience into the organizational culture and integrate cybersecurity considerations into enterprise risk management frameworks.	Electricity, Liquid Fuel, Natural Gas
Identification and Assessment	Identify and assess risks and implement a risk management strategy to prioritize areas of action.	Electricity, Liquid Fuel, Natural Gas
Response and Recovery	Implement robust response and recovery procedures to help maintain operations in the event of a cyberattack, with clearly allocated responsibilities.	Electricity, Liquid Fuel, Natural Gas
Information Sharing	Improve existing measures and implement new ones based on lessons learned internally from past incidents, and from external organizations via information sharing and analysis centers (ISACs) or knowledge-sharing platforms.	Electricity, Liquid Fuel, Natural Gas
Exercise and Training	Exercise threat hunting and cyberthreat intelligence activities to prepare for high-end threats from highly capable and motivated attackers.	Electricity, Liquid Fuel, Natural Gas

Stakeholder Feedback: Mitigation Measures

- 1) What mitigation measures are currently being prioritized and undertaken by your organization?
- 2) What mitigation measures would your organization like to address, but is unable to due to resource limitations? What gaps exist that the New Mexico State Energy Office should focus attention on?
- 3) What mitigation measures does your organization prioritize related to cyber, physical, and man-made threats?
- 4) Does your organization participate in public-private partnerships to implement mitigation measures in New Mexico and are there examples you're able to share?





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Upcoming Resilience and Mitigation Working Group Meeting

- A second Resilience and Mitigation Working Group Meeting will be hosted virtually on **Thursday, April 20, from 10:00 – 11:30 am MST.**
- Prior to the second Working Group Meeting, the Project Team will use stakeholder feedback to begin developing a Risk Mitigation Approach.
- The intention of the second Resilience and Mitigation Working Group Meeting is to:
 - Validate findings included in the Risk Mitigation Approach.
 - Describe federal, state, and private resources available for mitigation, and discuss the New Mexico State Energy Office's role in coordinating mitigation initiatives.

Key Stakeholder Dates

April 20, 2023:

Resilience and Mitigation Working Group Meeting

May 1-2, 2023:

Regional Energy Security Exercise (please email Jacqueline Waite if interested)

June 26, 27, 2023:

SESP Stakeholder Presentations (government and other stakeholders identified by EMNRD ECMD)



Questions

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