Oklahoma Energy Security Plan

September 2025

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PERIODIC REVIEW AND CHECK-OFF

An annual review of this plan should be conducted to update contact information, law and rule changes, and energy-related data. At least at every five-year interval, after the original plan's publication, consideration should be given to a full plan update and re-write.

Month	**Year**	**Action Taken**
April	2013	Initial Plan Publication
June	2016	Abbreviated Plan Style
June	2021	Full Plan Update & Re-write
September	2024	Abbreviated Plan Update
August	2025	Energy Profile Update

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ACKNOWLEDGEMENTS

The Oklahoma Department of Commerce and the Office of the Secretary of Energy & Environment, which collectively partner to form the Oklahoma State Energy Office, would like to thank the University of Oklahoma's Institute for Public Policy Research & Analysis (IPPRA) for their assistance and partnership regarding energy security planning activities.

Over the years, many stakeholders have given, and continue to give their time and expertise in support of the Oklahoma Energy Security Plan. In particular, the following groups have been instrumental in providing information for or feedback on the Plan:

AEP-Public Service Company of Oklahoma
American Red Cross
Association of Central Oklahoma Governments
CenterPoint Energy
Chesapeake Energy Corp.
Continental Resources
Devon Energy
Grand River Dam Authority
Indian Nations Council of Governments
Interstate Oil & Gas Compact Commission
Inter Tribal Emergency Management Coalition (ITEMC)
KAMO Power, Inc.
Liberty-Empire District Utilities (Central Region)
Marathon Oil, Inc.
Oklahoma Association of Electric Cooperatives
Oklahoma Corporation Commission
Oklahoma Department of Emergency Management
Oklahoma Department of Environmental Quality
Oklahoma Department of Health
Oklahoma Electric Cooperative
Oklahoma Energy Resources Board
Oklahoma Gas Association
Oklahoma Gas & Electric Company
Oklahoma Municipal Alliance
Oklahoma Municipal Power Authority
Oklahoma Natural Gas Company
Oklahoma Office of Homeland Security
Oklahoma Propane Gas Association
ONEGas
Southwest Power Pool
Western Farmers Electric Cooperative

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EXECUTIVE SUMMARY

The state of Oklahoma is rich in energy resources, from wind and natural gas to crude oil and solar energy. These resources, as well as additional out-of-state sources such as coal, provide energy for just over 4 million Oklahoma residents, over 400,000 businesses, and millions of vehicles.[1] Given the state's demand for energy and extensive energy infrastructure, Oklahoma has a significant responsibility for energy security, ensuring a reliable energy supply for the state, and planning for and responding when energy disruptions and emergencies occur.

Each year, Oklahoma faces a variety of energy disruptions. Most of these disruptions are limited in scope but, at times, energy disruptions extend over wider areas, impact large segments of the population, or can last for long periods of time threatening the life, health, and welfare of Oklahoma residents and creating energy emergencies. These energy emergencies are highly complex and may vary in cause, form, duration, and severity. As of 2024, Oklahoma is the third most-disaster prone state in the nation, as measured by the number of Disaster Declarations issued by the Federal Emergency Management Agency (FEMA) each year.[2] Given the number of disasters occurring in Oklahoma, their potential scope and public risk, planning for and responding to energy emergencies in the state of Oklahoma requires careful, coordinated action and makes a robust state Energy Security Plan critical.

Government is charged with ensuring the safety and well-being of its citizens and, in Oklahoma, energy security responses are considered a subset of the overall state emergency response activities. To address emergencies of all types, Oklahoma has an Emergency Operations Plan (EOP) in place that provides, in cooperation with local and federal government and volunteer service organizations, a system to mitigate against, prepare for, respond to, and recover from the effects of national security incidents and natural and technological hazards affecting the state. The EOP is maintained by the Oklahoma Department of Emergency Management (OEM). This plan defines the roles of local, state and federal governmental entities in providing disaster relief and assistance; it also contains 15 Emergency Support Functions and 3 Annexes, which assign responsibility and roles to identified state agencies, private firms and volunteer service organizations during specific types of emergencies. Energy emergency responsibilities are outlined in Support Function 12 (ESF-12). A second planning resource, the Oklahoma State Hazard Mitigation Plan (SHMP), also maintained by OEM, provides planning guidance for hazard mitigation in the state of Oklahoma. It also identifies hazard mitigation goals, objectives, actions, and initiatives for state government that will reduce injury and damage from natural hazards.[3]

This document, the Oklahoma State Energy Security Plan (SESP), is intended to complement the state's official Emergency Operations Plan's Energy Support Function (ESF-12) by providing detailed references and supplementary information about Oklahoma's energy landscape; a detailed description of how Oklahoma currently plans for, prevents, and responds to energy emergencies; and a menu of strategies for officials and stakeholders to consider as they prevent or manage these emergencies. The plan provides standard definitions for categorizing energy emergencies, both in type and severity, and provides a framework for delineating phases of energy emergency response;

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it also provides reference information that will assist officials in closely monitoring the conditions affecting energy supply and demand statewide and nationwide. In addition, the plan outlines the legal authorities granted to the various levels of government—federal, state, local and tribal—that are responsible for all four phases of energy security

After providing an overall framework, the Energy Security Plan profiles each of Oklahoma's major energy sectors through the presentation of information on energy consumption as well as provider production capacities, infrastructure under management, and programs administered.

Next, the plan outlines the state's risk mitigation approach, a multistep approach that first identifies key vulnerabilities and threats (risk), then identifies and prioritizes of potential mitigation options to address these threats, and finally implements of identified priorities using a variety of approaches. To provide a basis for the risk mitigation approach, the Plan assesses the state's energy vulnerabilities by analyzing historical events in Oklahoma that have caused energy disruptions, and also provides an overview for future plans to augment this vulnerability assessment. It then discusses potential infrastructure vulnerabilities in the various energy sectors, and outlines examples of sector interdependencies among energy sources, that should be considered in energy planning activities as these may affect recovery efforts during emergency situations. Not to be overlooked is a detailed discussion of cybersecurity planning in Oklahoma, as vulnerabilities to the energy sector are not just physical, but electronic in nature.

After providing a detailed view of Oklahoma's energy landscape, the plan turns to a detailed description of the responsibilities of the various governmental agencies in responding to an energy emergency. In particular, it discusses communication procedures between and across governmental agencies during energy emergencies and explains the way in which public information must be disseminated to citizens of Oklahoma during such events.

The final section of the plan focuses on the specific response strategies for energy disruptions and emergencies and presents issues of emerging consideration: first, the plan presents a set of preventative strategies and measures designed to mitigate the impact of an emergency prior to its occurrence; second, a detailed menu of supply and demand response options that officials may wish to consider should an energy emergency impact the state; and third, examines emerging issues for 21st century energy security planning consideration.

The Energy Security Plan is intended for use by all governmental agencies, energy suppliers, and key service providers who have responsibilities or essential capabilities for responding to energy emergencies. The plan is meant to serve as a guide rather than a list of "one-size-fits-all" procedures. In particular, the latter portion of the plan, which suggests potential responses to an energy emergency, should be treated as a "menu" of response options from which to select and implement rather than a list of standard operating procedures. While this Plan attempts to address the most common types of energy emergencies Oklahoma may experience and outlines a wide variety of measures that might be utilized to respond, the document does not claim to provide an exhaustive review of every potential cause of emergency nor every potential remedy.

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The Oklahoma State Energy Office is a partnership between the Oklahoma Department of Commerce and the Office of the Secretary of Energy and the Environment (OSEE). The OSEE maintains coordination responsibility for Oklahoma's Energy Security Plan. Questions and comments about the plan can be directed to the Secretary of Energy and Environment, Jeff Starling, at (405) 522-7099 or jeff.starling@ee.ok.gov.

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INTRODUCTION

PURPOSE OF THE PLAN

During any given year, the state of Oklahoma faces a variety of energy disruptions. Most of these disruptions are limited in scope and quickly addressed by energy providers and emergency responders. Sometimes, energy disruptions extend over wider areas, impact large segments of the population, or can last for lengthy periods of time threatening the life, health, and welfare of Oklahoma residents. For instance, in June 2023 much of the northern half of the state experienced a widespread damaging wind event that resulted in over 350,000 power outages statewide.[4] Particularly hard hit by this derecho was the Tulsa metropolitan area, which experienced wind gusts of over 100 mph and saw more than $16 million in damage.[5] Fifteen of Oklahoma's electric cooperatives, and two of Oklahoma's investor-owned utilities, suffered outages and damage. Nineteen Oklahoma counties were eventually approved for a federal disaster declaration due to this event.[6] While severe thunderstorms are a frequent event for Oklahoma, this event serves as a stark reminder that the magnitude and scale of seemingly routine hazards can quickly escalate into a regional disaster.

Events of this nature, which we refer to as energy emergencies, are highly complex and come in many forms. Types of energy emergencies range from blackouts caused by severe weather damage to fuel shortages that disrupt transportation or electric generation. Adding to this complexity, there are many different causes of energy emergencies—including spikes in demand during peak energy use, unanticipated power plant or refinery shutdowns, transmission system congestion, cyber-attacks, and natural disasters. Given this expansive scope, inherent complexity, and public risk, planning for and responding to energy emergencies in the state of Oklahoma often requires government action.

To address emergencies of all types, the state of Oklahoma has an Emergency Operations Plan (EOP)[7] in place which provides, in cooperation with local and federal government and volunteer service organizations, a system to mitigate against, prepare for, respond to, and recover from the effects of national security incidents and natural and technological hazards affecting the state. The EOP is maintained by the Oklahoma Department of Emergency Management (OEM). The EOP defines the roles of local, state, and federal governmental entities in providing disaster relief and assistance; it contains 15 Emergency Support Functions and 3 Annexes, which assign responsibility and roles to identified state agencies, private firms, and volunteer service organizations during specific types of emergencies—energy emergency responsibilities are outlined in Emergency Support Function 12 (ESF-12). Additionally, the Oklahoma State Hazard Mitigation Plan (SHMP), also maintained by OEM, provides planning guidance for hazard mitigation in the state of Oklahoma. The hazard mitigation goals, objectives, actions, and initiatives identified in the SHMP are enumerated in this plan.[8]

The document below, the Oklahoma State Energy Security Plan (SESP), is intended to complement the state's official Emergency Operations Plan's ESF-12 by providing detailed

references and supplementary information about Oklahoma's energy landscape; a detailed description of how Oklahoma currently plans for, prevents, and responds to energy emergencies; and a menu of strategies for state and local officials, tribal governments, and stakeholders to consider as they prevent or manage these emergencies. The Energy Security Plan is intended for use by all governmental agencies, energy suppliers, and key service providers who have responsibilities or essential capabilities for responding to energy emergencies. The plan is meant to serve as a guide rather than a list of "one-size-fits-all" procedures that can be generically applied without regard for the unique circumstances surrounding each emergency. In particular, the latter portion of the plan, which suggests potential responses to an energy emergency, should be treated as a "menu" of response options from which to select and implement rather than a list of standard operating procedures.

Oklahoma's Energy Security Plan was drafted in a collaborative effort between public agencies, tribal governments, and private stakeholders. More information about those involved in the writing of this document can be found on the Acknowledgements page.

The SESP also documents several coordination efforts beyond state borders that assist ESF-12 stakeholders in planning for and responding to emergencies. Participation in regional mutual aid groups is primary to these efforts, and additional formation of regional planning collaboratives is underway in Summer 2024. Oklahoma electric utilities are also members of the Southwest Power Pool (SPP), which provides regional transmission planning and serves as the balancing authority for the region. SPP maintains its own Emergency Operations Plan, which is shared with and utilized by members.

For this plan to be an effective tool, close communication among state, local, and tribal government agencies and between these agencies and the private sector is critical. Many of these communications channels are in place; these are noted in the appropriate sections of the Plan. In other cases, communications channels are less formal but nevertheless critical to maintain in order to facilitate an effective response should emergencies arise. Key governmental contacts for energy emergency response are maintained by the Office of Emergency Management (OEM), by the Oklahoma Corporation Commission, the Oklahoma State Energy Office, and through a password-protected website hosted by the U.S. Department of Energy. Detailed energy industry contact lists are required to be provided to the state annually by all regulated energy companies and are maintained by the Public Information Officer of the Oklahoma Corporation Commission.

To ensure the Plan remains up to date and functional as an emergency planning document, each year, at a minimum, the contact list and data portions of the plan should be reviewed and updated by the Oklahoma State Energy Office. Plan updates will be documented on the Periodic Review Log located on page 6 of this Plan.

As mentioned previously, questions and comments about this plan can be directed at any time to Secretary of Energy and Environment Jeff Starling at (405) 522-7099 or jeff.starling@ee.ok.gov.

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CONTENTS OF THE PLAN

With the previous discussion in mind, the following sections comprise the State Energy Security Plan (SESP) for the state of Oklahoma.

First, the SESP sets the stage for energy security planners in Oklahoma. It provides standard definitions for categorizing energy emergencies, both in type and severity, and provides a framework for delineating phases of energy emergency response; it also provides reference information that will assist officials in closely monitoring the conditions affecting energy supply and demand statewide and nationwide. In addition, the plan outlines the legal authorities granted to the various levels of government—federal, state, and local—that are responsible for all four phases of energy security.

After providing an overall framework, the Energy Security Plan profiles each of Oklahoma's major energy sectors through the presentation of information on energy consumption as well as provider production capacities, infrastructure under management, and programs administered.

Next, the plan outlines the state's risk mitigation approach, a multistep approach that first identifies key vulnerabilities and threats (risk), then identifies and prioritizes of potential mitigation options to address these threats, and finally implements of identified priorities using a variety of approaches. To provide a basis for the risk mitigation approach, the Plan assesses the state's energy vulnerabilities by analyzing historical events in Oklahoma that have caused energy disruptions, and also provides an overview for future plans to augment this vulnerability assessment. It then discusses potential infrastructure vulnerabilities in the various energy sectors, and outlines examples of sector interdependencies among energy sources, that should be considered in energy planning activities as these may affect recovery efforts during emergency situations. Not to be overlooked is a detailed discussion of cybersecurity planning in Oklahoma, as vulnerabilities to the energy sector are not just physical, but electronic in nature.

After providing a detailed view of Oklahoma's energy landscape, the plan turns to a detailed description of the responsibilities of the various governmental agencies in responding to an energy emergency. In particular, it discusses communication procedures between and across governmental agencies during energy emergencies and explains the way in which public information must be disseminated to citizens of Oklahoma during such events.

The final section of the plan focuses on the specific response strategies for energy disruptions and emergencies and presents issues of emerging consideration: first, the plan presents a set of preventative strategies and measures designed to mitigate the impact of an emergency prior to its occurrence; second, a detailed menu of supply and demand response options that officials may wish to consider should an energy emergency impact the state; and third, discusses emerging issues for 21st century energy security planning consideration.

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ENERGY SECURITY PLANNING OVERVIEW

IDENTIFYING AND CATEGORIZING ENERGY EMERGENCIES

Energy emergencies come in many forms, but most can be categorized as either service interruptions or supply shortages. Though we often treat these two types of emergencies as if they were mutually exclusive, it is important to recognize that one type of emergency can lead to another, or they can both occur simultaneously. For example, significant supply shortages can lead to service interruptions. The interconnectedness of the energy sector must also be considered, as a disruption or significant incident in another region of the United States, or potentially globally, could cause impacts to residents of Oklahoma. This factor means that Oklahoma must look beyond its own borders for both potential incidents and for regional or multi-state coordination before, during, and after an energy emergency.

Types and Potential Causes of Energy Emergencies

Service Interruptions

Sometimes when energy service is interrupted, public demand for energy cannot be met at any price. Generally, damage to local distribution infrastructure causes this type of emergency. Accordingly, response measures usually involve repairing the damaged infrastructure. In all but the most extreme instances, governmental response to a service interruption is limited because energy providers are responsible for repairing their own systems. As such, government's role at all levels is often one of support coordination rather than direct action. Incidents that result in significant infrastructure damage are frequently complex, resulting in public impacts far beyond just the energy sector. As such, the coordination role that government plays is vital to an effective and equitable response.

Although many variables can lead to infrastructure damage, some of the most common causes of damage to local energy infrastructure in Oklahoma include inclement weather on both short-term (lightning, wind, tornadoes, ice, flooding, etc.) and long-term (extreme temperatures, drought, etc.) time scales, earthquakes, accidents, or mechanical failure due to faulty or aging transmission or distribution lines. Though not often experienced in Oklahoma, intentional actions by humans to damage infrastructure through either physical or cyber attacks may also occur.

Supply Shortages

In other instances, an energy emergency can be a supply shortage. Supply shortages can be caused by insufficient fuel availability of any type, including natural gas, petroleum, and even a lack of sun to generate solar power or lack of wind to generate wind power. During such emergencies, energy supplies become insufficient or too expensive to meet public demand. Whereas the solution to service interruptions often requires local infrastructure repair, responses to supply shortages generally involve increasing supply or decreasing demand. In such instances, state officials often

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play a more significant role by encouraging consumption reductions through coordinated public information campaigns, assisting with fuel switching when feasible, or temporarily lifting restrictions, such as lifting wellhead restrictions on the production of natural gas. Energy providers can also encourage or require consumption reductions, utilize fuel reserves, engage in fuel switching when technically feasible, or purchase additional fuel, often at increased prices.

The list of variables that could cause a supply shortage is quite lengthy. For organizational purposes, they can be divided into two categories — causes that limit the energy supply and causes that stimulate an abnormal demand spike. Factors that might limit energy supply include major infrastructure damage or limitations due to causes such as: explosions, extreme cold or heat, natural disasters that impair operations, railway damage, unsuitable driving conditions, intentional acts of physical or cyber sabotage, and/or international events that radically increase the price or curtail the energy supplies from abroad. Variables that could cause demand spikes include prolonged periods of abnormally hot or cold weather that trigger a surge in demand for heating and cooling or crisis events that stoke public fear and uncertainty that causes them to stock-up on fuel and other resources.

Levels of Energy Shortage

Efforts to respond to an energy emergency must correspond with the severity of the crisis. In other words, state officials must consider the seriousness of the emergency prior to selecting and implementing appropriate response measures. For conceptual purposes, we draw from National Association of State Energy Officials (NASEO) guidelines[9] to define four levels of energy shortages, although it is important to note that the levels shown below are only intended to serve as broad guidelines. Because each energy emergency not only varies in severity but is also multidimensional, effective categorization requires qualitative assessment including analyzing the number of customers (meters) affected, the vulnerability of the affected population, and the circumstances surrounding the incident. For instance, a short electrical outage during an extremely cold winter day can be more severe than a sustained outage in the fall or spring.

Level 1:

Normal Conditions
No discernable shortage
Shortages could exist in locations outside the state or elsewhere but not pose a local threat

Level 2:

Mild Shortage
5-10% reduction in petroleum supply for a week or more
5-10% reduction in natural gas nominations
Localized infrastructure damage causing short-term electric transmission/distribution interruptions
No immediate threat to public health, safety, welfare, and/or economic vitality

Level 3:

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Moderate Shortage
10-15% reduction in petroleum products for three weeks or more
10-15% reduction in natural gas nominations
Curtailments by local gas distribution companies for two weeks or more
Moderate infrastructure damage causing widespread electric transmission/distribution interruptions
Situation threatens to disrupt or diminish public health, safety, welfare, and/or economic vitality

Level 4:

Severe Shortage
Greater than 15% reduction in the availability of petroleum products and/or natural gas for more than two weeks
Severe drops in natural gas nominations or other production problems
Severe infrastructure damage causing widespread interruptions in electric transmission/distribution that extend for several weeks
Situation poses an immediate threat to public health, safety, welfare, and/or economic vitality

Again, classifying an emergency as one level or another is as much a matter of qualitative judgment as it is a matter of quantitative or objective definition. It should be noted that in some cases, the use of levels to classify such events may lead to confusion due to reference classes not aligning or even being reverses. For instance, in many jurisdictions, a "Level 1 EOC Activation" indicates the most severe type of incident has occurred or is occurring. Likewise, movement from one level to another is not necessarily linear or incremental. There are cases where conditions can escalate from normal or mild to severe in a matter of hours. This factor calls for coordinated situational awareness across the various sectors and response organizations potentially charged with managing the incident.

ENERGY SECURITY AND THE PHASES OF EMERGENCY MANAGEMENT

In managing complex and potentially catastrophic emergencies, government officials must look beyond the traditional idea of emergency response planning. Emergency preparedness and response planning is predominantly reactive toward energy security as a whole, although preparedness and response planning does incorporate a number of proactive and preemptive actions designed to prepare for many different types of emergencies, mitigate their potential impact, and learn from those that do occur by considering results of actions taken.

As defined by the U.S. Department of Energy (DOE), energy security involves a vast array of activities that fall into three main categories: prepare and plan, mitigate and respond, and education and outreach. Preparation and planning involve identifying key assets and points of contact, designing and updating energy emergency response plans, training personnel, and conducting exercises that test the effectiveness of response plans. Mitigation and response activities include monitoring events that may affect energy supplies, assessing disruption severity, situational

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awareness, coordinating restoration efforts, and tracking recovery. Education and outreach activities include communicating and coordinating with key stakeholders, increasing public awareness, and forming partnerships across sectors and jurisdictions.

With this definition in mind, NASEO suggests that energy security include four phases: monitor and alert; assess and take action; actions and feedback; and review lessons learned.[10] In the early phases, government action revolves around preparedness and mitigation. In the later phases, governmental action involves responding to and recovering from the energy emergency, as well as learning from the event itself. Regardless of the phase, the agencies charged with responding to an emergency must have as much information as possible—including critical background information—which enables an up-to-date understanding of the situation on the ground, an in-depth understanding of the energy profile in Oklahoma, familiarity with critical infrastructure and potential vulnerabilities, as well as a keen awareness of state history and previous events. This information should be carefully considered when making key decisions during each of the four phases of emergency management.

Phase I: Monitor and Alert

Phase I involves the ongoing monitoring of energy supplies, public demand, and prices. During this phase, state agencies monitor data and information, as it becomes available through energy supply reporting systems, continuously paying attention to supply and distribution problems, with a particular focus on identifying potential supply and distribution issues.

Phase II: Assess and Determine Action

In Phase II, having noticed early signs indicating a potential energy emergency, government agencies intensify their data and information collection efforts to ensure that they have the best and most recent information. This data is used to evaluate the severity of the potential emergency, to locate the population that is likely to be impacted, and to determine whether governmental action is necessary. Depending on the type of incident that is unfolding, there is likely a need to coordinate, or at least be aware of, other emergency response activities outside of the energy sector.

Phase III: Actions and Feedback

If the government decides action is needed to ensure Oklahoma citizens' health, welfare, and safety, and the continued economic vitality of the state, Phase III activity begins. Government actions during Phase III, which is sometimes referred to as the response phase, include:

- Increase the level of communication among state agencies and the public
- Convene emergency planning and response organizations to consider and coordinate actions that might be taken by the various state departments and agencies
- Implement voluntary programs to maximize the availability of energy supplies and/or programs designed to reduce existing demand
- If the problem involves multiple states, share information among state energy coordinators
- If implementation of voluntary programs or other emergency deterrent actions fail to mitigate the emergency, take additional actions

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- If the situation continues to deteriorate, recommend a *State of Energy Emergency* be declared by the Governor, which will enable advanced response measures and activate requests for and access to federal assistance
- Continued monitoring of energy supply and demand to determine if governmental action has been effective

Phase IV: Review Lessons Learned

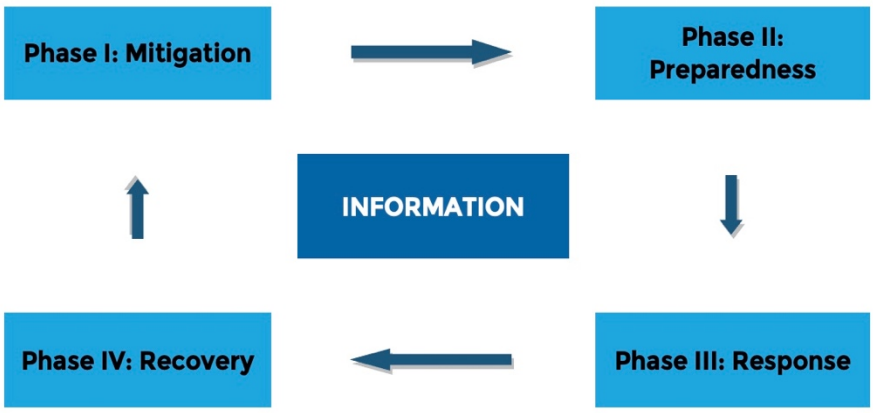
As emergency operations are phased out, state agencies thoroughly evaluate their actions and report the results to interested parties, such as the Governor's Office, cabinet level officers, legislative committees, and energy policy councils. These evaluations should include:

- Reports describing the nature of the energy emergency and a chronology of the actions taken to respond to it.
- An evaluation of the different response measures taken, with a specific focus on effectiveness and timeliness.
- A critical review of the overall performance of the state's energy security plan in addressing the specific emergency.

In Oklahoma, it is probable that following a significant incident requiring state EOC activation and coordination for response and recovery efforts, a formal After-Action Review process will be initiated by the state OEM. This eventual report will conform to FEMA After-Action Reporting guidelines, many of which may be relevant for internal review and lessons learned capture, as well as the identification of corrective actions and a timeline for improvement planning and implementation.

Oklahoma's four phases of emergency management, outlined in the state's Emergency Operations Plan (EOP),[11] utilize different category titles but are tightly aligned with the NASEO guidelines. Oklahoma's four phases of emergency management are depicted in Figure 1.

Figure 1:The Four Phases of Energy Emergency Management



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The Oklahoma EOP defines mitigation activities as ones that are designed to prevent emergency occurrences or minimize adverse consequences after an emergency. It defines preparedness activities and systems as ones in existence prior to emergencies that are used to support and enhance response to emergencies. Planning, training, and exercise activities are included in this category. Response activities and programs address immediate effects of an emergency and include direction and control, warning, evacuation, and other activities. Finally, recovery activities are ones which restore normal operation of systems. Recovery activities can be short or long term.

MONITORING ENERGY SUPPLY AND DEMAND

The information sources below provide reliable information for energy planners that can be used to monitor or predict energy supplies or situations that may occur. By maintaining an understanding of energy markets and environmental conditions, state planners and responders will be better prepared to address shortage or emergency situations that may arise.

In addition to these general sources of information, Oklahoma has two designated Energy Emergency Assurance Coordinators who receive regular updates regarding energy security issues, daily news summaries, emergency situation reports, lessons learned from other states, and links to outage and curtailment information. This password-protected site is maintained and administered by the U.S. DOE's Office of Electricity Delivery and Energy Reliability. A full discussion of the role of Oklahoma's Energy Emergency Assurance Coordinators can be found in the Communications Section of this Plan.

For more information and resources to monitor energy supply and demand by sector, see Appendix B.

For more information and resources for legal authority regarding energy emergency planning and response, see Appendix C.

OKLAHOMA'S RISK MITIGATION APPROACH

Oklahoma has a long and successful history of planning for and responding to energy emergencies. The energy reliability and resilience landscape in Oklahoma has much to be proud of; current risk mitigation activities include many protocols and requirements related to reliability and resilience that are set forth by federal and state regulatory entities, as well as adopted as best practices through participation in industry associations; other mitigation measures are currently implemented through grants and incentive programs. In documenting current risk mitigation practices, this Plan offers numerous sub-sections that provide information about Oklahoma's risk landscape as well as numerous ongoing mitigation measures that enhance reliability and end-use resilience. Sections to note include "Energy Vulnerability Assessments," "Energy Infrastructure Model Scenarios," "Cybersecurity Planning," and "Preparing for, Mitigating, and Responding to Energy Emergencies."

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However, in ever-evolving physical and cyber conditions, energy planners must not only continue existing mitigation activities, but remain aware of emerging measures and collaborative opportunities to ensure increased resilience and reliability.

This Plan is intended to provide a resource to both document current mitigation practices as completely as possible, and also serve as an anchor point for efforts around stakeholder engagement and shared planning opportunities that will encourage Oklahoma energy entities to augment both their proactive and reactive mitigation efforts. To facilitate this process, Oklahoma has created a risk mitigation approach that serves as a decision framework for the state and other stakeholders to evaluate potential mitigation measures in priority risk areas. This mitigation strategy is designed for the Oklahoma context, but also aligns with the newly-released Department of Energy *Risk Mitigation Approach Guidebook for State Energy Security Plans*. Planners interested in viewing this resource can find it at https://www.energy.gov/sites/default/files/2024-08/DOE%20Risk%20Mitigation%20Approach%20Guidebook%20for%20States_0.pdf.

As this mitigation approach is newly delineated, future efforts will include gathering energy stakeholder feedback regarding how this approach is described, internal and external testing of the framework to ensure visibility and support from the ESF-12 stakeholder community as well as inclusion of additional mitigation actions, and beginning to link programming and funding opportunities in alignment with this approach.

Oklahoma's risk mitigation approach to enhance reliability and end-use resilience follows a multistep process of 1) priority risk identification and assessment, 2) identification and prioritization of risk mitigation measures, in consultation with key stakeholders, and incorporating the newly-developed Enhanced Reliability and Resilience Score (ERRS) wherever appropriate, and 3) implementation and execution of mitigation measures. To strengthen deployment of all steps of this approach, the Oklahoma State Energy Office is increasing its convening role to ensure that Oklahoma's mitigation strategy is informed by stakeholder expertise and experiences and contains widely shared priorities that strengthen energy sector reliability, enhance energy supply resilience for end-users, and secure critical energy infrastructure. Including stakeholder feedback is a critical component for further identifying mitigation actions, understanding practical benefits and challenges to various actions, and refining assumptions underlying the approach.

(1) Risk Identification and Assessment

The first step in Oklahoma's approach involves priority risk assessment and identification. The "Energy Vulnerability Assessment" chapter in this Plan highlights examples of how the state identifies leading energy security risks. This section provides a historical analysis of energy incidents in Oklahoma, examining their frequency and causes across sectors, time periods, and geographic scales. A key finding from this risk assessment is that electricity incidents caused by natural hazards represent the most common and significant threat to energy security in the state.

Within the current Plan, Oklahoma also provides an assessment of infrastructure strengths and weaknesses in the face of these most common hazards, and planners can benefit by referring to this analysis when evaluating potential mitigation strategies. For example:

- Oklahoma's electric infrastructure offers strengths such as excess generation capacity, geographic dispersion, and heating source diversity. Weaknesses include susceptibility to natural hazards or severe weather affecting above-ground transmission and distribution lines, equipment failure, deliberate attacks, accidents, and systemic threats.
- Oklahoma's natural gas infrastructure offers strengths in production and storage capacities, underground transmission, and strategic geographic distribution. Weaknesses include potential impacts from accidents, deliberate attacks, freezing during extreme cold weather, and the need for self-identification of vulnerable infrastructure.
- Analysis of Oklahoma's crude oil infrastructure reveals strengths in the Cushing Crude Oil Hub's capacity and underground storage. Weaknesses include geographical concentration, vulnerability to localized events such as severe weather events and seismic activity, potential deliberate attacks, train derailments, truck collisions, pipeline corrosion, and equipment failure.

Oklahoma employs various metrics and tools, such as the Electric Emergency Incident and Disturbance Reports to the U.S. Department of Energy (OE-417) and the Environment for Analysis of Geo-Located Energy Information (EAGLE-I), to identify priority hazards by examining the frequency of energy outages and disruptions caused by different hazards. Consistent with the historical analysis in this Plan, these metrics highlight the significant impact of natural hazards, particularly severe weather, on the state's energy security. The EAGLE-I analysis conducted during this planning cycle (discussed more thoroughly below) identified the top 110 electricity outages or disruptions from 2014 to 2023, revealing that severe storms—such as high winds and lightning—were the leading cause of impacts, accounting for 82.7% (91 events) of these disruptions. Ice storms were responsible for 15.5% (17 events), while extreme cold accounted for 1.8% (2 events), underscoring the dominant role of weather-related hazards in Oklahoma's energy challenges.

Further, other independently conducted risk assessments within Oklahoma point to the prominence of severe storms as a priority risk for Oklahoma's energy industry. For example, Oklahoma's recently updated State Hazard Mitigation Plan (SHMP) identifies and profiles a wide variety of hazards that can cause significant disruptions across various sectors in Oklahoma.[12] These hazards include dam failure, drought, extreme heat, flooding, high winds, severe storms (hail and lightning), soil hazards (earthquakes, landslides, expansive soils/soil subsidence), tornadoes, wildfires, and winter storms (ice, freezing rain, snow). In addition to identifying and profiling these hazards, the SHMP rates them using a composite risk index that incorporates the probability, impact, duration and warning time for each hazard. As outlined in Table 1 below, the SHMP identifies four high risk hazards for Oklahoma: severe storms, flooding, extreme heat, and drought. The SHMP rates four additional hazards -- high winds, tornadoes, wildfire, and winter storms – as moderate hazards. The lowest risk hazards identified through the SHMP are dam failure and soil hazards. In addition to providing in-depth information about the risk of each hazard, the SHMP provides information about how these hazards may change in the future and contact information for subject matter experts on the different hazards.

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Because of the alignment across the numerous risk assessments outlined above, which all highlight severe storms as either high risk hazards or historical drivers of outages and disruptions, the State Energy Office will emphasize to stakeholders the importance of prioritizing actions related to severe storms, due to the high likelihood of disruptions and impacts that are possible with this hazard. It is important to note that other mitigation measures will not be excluded from consideration, however through its programming and activities, the State Energy Office will ensure that this high risk hazard is emphasized during mitigation planning and actions. In future planning years, Oklahoma energy security planners will also re-visit prior risk assessments with an eye towards augmenting the evaluation process and also ensuring a wide variety of hazards are evaluated. The SEO plans to more closely coordinate with the Oklahoma Department of Emergency Management for future risk assessments and to work towards more collaborative planning that concretely encourages activities in identified priority areas.

Table 1: Risk Assessment Results from Oklahoma's State Hazard Mitigation Plan

High Risk Hazards	**Medium Risk Hazards**	**Low Risk Hazards**
Severe Storms*	High Winds	Dam Failure
Flooding	Tornadoes	Soil Hazards
Extreme Heat	Wildfire	
Drought	Winter Storms	

Oklahoma's energy stakeholders frequently review data and seek information to re-evaluate the best information sources to inform the state's energy risk assessment. In 2024, the Oklahoma energy security planning team is further seeking best practice and technical assistance regarding risk assessment approaches as the state considers new opportunities to share information with stakeholders that wish to conduct additional risk assessments or in-depth assessments within their own jurisdictions.

(2) Identification and Prioritization of Risk Mitigation Measures

Following priority risk assessment, Oklahoma's approach moves to identifying a suite of potential risk mitigation measures that address a particular risk. Historically, this process has relied on qualitative assessments, drawing from stakeholder input and expertise or historical experiences, but has lacked a framework that allows planners the option to weigh measures against one another, making it challenging to compare and prioritize mitigation actions effectively when multiple mitigation options present themselves. To address this, the State Energy Office is creating a new scoring framework that can be used for mitigation prioritization—an "Enhanced Reliability and Resilience Score" (ERRS) for various mitigation actions, enabling direct comparison and prioritization when appropriate. While some mitigation actions are asset/owner controlled, and some are state/public entity controlled, the ERRS scoring framework can be applied regardless of the owner.

Appendix E of this plan outlines a number of mitigation measures that can be employed across various sectors and in various emergency situations. Currently, these actions are categorized according to the level of impact/emergency that may be appropriate for their use. However, these actions can also be used as a starting point for stakeholders wishing to generate prioritized

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mitigation actions relevant for their jurisdictions. The Appendix is not meant to be exhaustive, but in future planning years, will be revised and augmented using additional stakeholder feedback. However, an ERRS score can be applied by stakeholders to any of these mitigation actions to evaluate its impact on resilience and reliability, and whether it should be considered a priority action in that stakeholder's circumstance.

An ERRS can be created for each potential mitigation action by *summing* the scores for expected gains in reliability and resilience, *multiplying* this sum by the feasibility, acceptability, and social vulnerability scores, and then *dividing* by the mitigation action's cost score. This method prioritizes actions that are not only technically and economically sound but also actions that are acceptable and feasible to implement, as well as beneficial to vulnerable populations. By using ERRS, resources can be allocated to maximize system resilience and support socially vulnerable communities.

Calculating an ERRS for a Potential Mitigation Action

$$\frac{(\text{Reliability Improvement Score} + \text{Resilience Improvement Score}) \times \text{Feasibility Score} \times \text{Acceptability Score} \times \text{Vulnerable Population Impact Score}}{\text{Cost Score}}$$

In applying the ERRS approach, each criterion—reliability improvement, resilience improvement, feasibility, acceptability, vulnerable population impact, and cost—can be assigned a score by evaluating the action on a scale from one to five, based on expert judgment, stakeholder input, and contextual knowledge.

For *reliability*, planners should assign the score by assessing the degree to which a mitigation action can effectively reduce failures or enhance performance of the relevant sector, with a score of one indicating a relatively small improvement to reliability and five representing a very significant improvement.

Similarly, for *end-use resilience*, planners should assign the score by evaluating how much a given action strengthens an end-user's ability to withstand or recover from an energy event, using the same one to five scale.

The *feasibility* score can be determined by examining factors such as technical complexity and regulatory challenges, with higher scores indicating greater practicality of implementation given context and resource constraints.

Acceptability scores can be determined by examining factors such as community or political acceptability, or, how likely stakeholders and impacted populations will be to support

implementation of the measure, with higher scores indicating greater acceptability by impacted groups.

Vulnerable population impact scores can be determined by how effectively the mitigation action addresses the needs of vulnerable populations (socially, medically, financially, etc), with higher scores representing a stronger positive impact specific to these at-risk populations.

Finally, *cost* scores can be determined by assessing the economic costs of an action on a five-point scale, ranging from a score of one for a very low cost a score of five for a very high cost. Costs can be determined using historical costs, estimated costs, literature reviews, and expert/stakeholder interviews.

When these assessments are complete, the ERRS calculation shown above can be applied, and scores can be compared across mitigation actions.

The example below outlines a hypothetical scenario for use of the ERRS. Scores for reliability, end use resilience, feasibility, acceptability, vulnerable population impact, and cost are up to jurisdictional discretion.

For example, imagine that a city is evaluating two mitigation actions to enhance the reliability and end-use resilience of its energy infrastructure: installing backup generators at critical facilities (Action A) or upgrading the existing power grid to a smart grid (Action B). To assess each action, stakeholders and experts collaborate to rate the relevant metrics on a scale from one to five. Action A is anticipated to improve reliability by 4 and resilience by 3, with high feasibility (5), high community assessment of acceptability (4) and a strong positive impact on social vulnerability (4), all at a moderate cost (3). In contrast, Action B promises greater improvements in reliability (5) and resilience (5), but with lower feasibility (3) and lower community assessment of acceptability (3). It also provides more substantial benefits to socially vulnerable populations (5), though at a higher cost (5). Using the ERRS formula, Action A has an ERRS of 187, while Action B has an ERRS of 90. The higher ERRS for Option A indicates that it provides a better balance of reliability and resilience improvements, feasibility, and positive impact on social vulnerability relative to its cost. Therefore, the city would prioritize installing backup generators at critical facilities (Option A) over upgrading to a smart grid (Option B) if the goal is to maximize system resilience and effectively support vulnerable populations in a cost-efficient manner.

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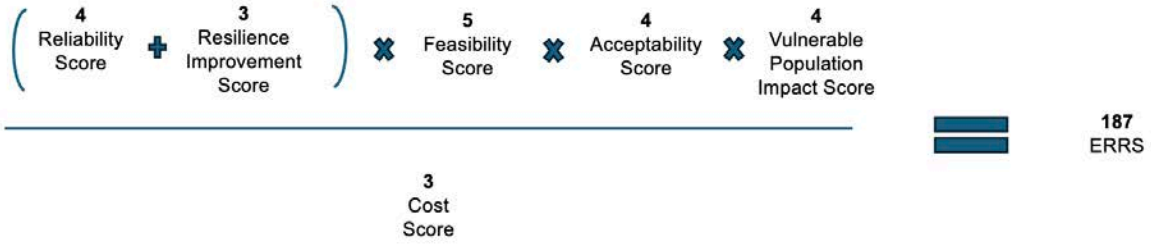
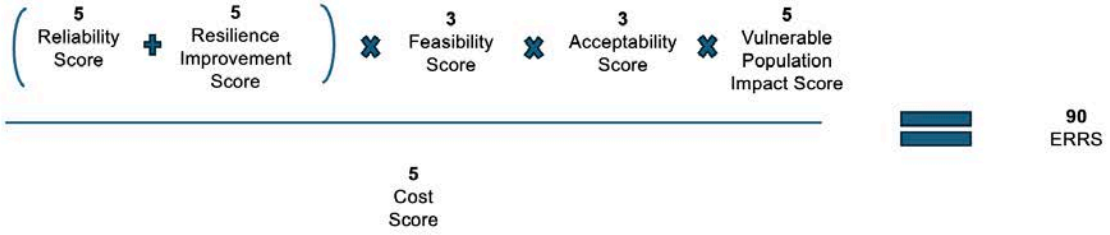
Action A



Action B



The ERRS approach to prioritizing risk mitigation measures is valuable because it provides an opportunity for systematic and structured evaluation of the benefits and costs for actions across multiple critical dimensions. At the same time, it maintains an essential role for energy stakeholders and experts throughout the state, ensuring their insights and expertise are central to the decision-making process, without requiring complex technical calculations that would limit wide use. By using the ERRS approach, in concert with jurisdiction-specific factors such as those outlined in the example table, Oklahoma stakeholders can ensure that actions selected will best increase resilience and reliability of energy systems and their components.

It is important to note that the ERRS should not be the singular tool used to prioritize risk mitigation measures – other inputs specific to a jurisdiction's risk profile can also be taken into account and incorporated into the decision-making process. Examples of other inputs that a jurisdiction might consider are: likelihood of the risk/hazard occurring, diversity of mitigation measures available, and or other stakeholder input. If desired, these inputs can also be quantified, either on a 1-5 scale or in a Low-Medium-High categorical approach. Planners can reflect their priorities using a table format for ease of comparison. A hypothetical example table appears below.

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Table 2: Example Table Format for Prioritizing Risk Mitigation Measures

Risk Statement/Scenario	Mitigation Measure	ERRS	Likelihood of Event Occurring	Timeline to Implement Mitigation Measure	Relevant Stakeholders	Potential Funding Sources	Implementing Entity
EXAMPLE: Power loss due to severe storm	*Installing backup generators at critical facilities*	*187*	*Highly likely*	*2 years*	*Investor-owned utilities, Rural electric cooperatives, Municipal utilities, etc.*	*HMGP, GRIP*	*Asset owner*

While newly developed, the State Energy Office, in collaboration with the Secretary of Energy and Environment, is spearheading a renewed stakeholder engagement initiative throughout 2024 and beyond, and introduction to the ERRS in stakeholder meetings will begin in Fall 2024. Within the next planning year, the SEO is planning to host at least one stakeholder event that will be a risk mitigation evaluation meeting, whereby stakeholders can exercise using the risk mitigation approach, testing the ERRS, and further augmenting mitigation options outlined in Appendix E.

(3) Implementation and Execution

Oklahoma's risk mitigation process culminates in implementation of mitigation strategies identified as priorities. Currently, most of these strategies are implemented by individual stakeholders. Energy stakeholders use a variety of mechanisms to pursue these priorities, including:

- Legislation and Regulations (e.g., federal and state law, administrative rules, rate design, energy standards)
  - Used to enumerate required compliance such as vegetation management plans, system hardening to meet minimum requirements, and reliability metrics
- Grants, incentives, and other direct funding
  - Often used to bolster under resourced groups, increase deployment, or pilot new technologies such as grid modernization, microgrids, energy efficiency technologies, or distributed generation
- Coordination and convening (e.g., exercises, partnerships, stakeholder engagement)
  - Used to encourage information and identification of best practices
- Continued planning, monitoring and research (e.g., additional vulnerability assessments, supply chain analysis)
  - Used to augment information sources and measure results

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Oklahoma relies on all these mechanisms. However, different energy stakeholders rely more heavily on certain mechanisms than others. For example, state agency stakeholders often rely most heavily on grants, incentives and coordination and convening as primary strategies. As an example, because of the large number of stakeholders in the energy security arena, Oklahoma's State Energy Office works to develop forums and venues to encourage engagement, relationship building, and collaboration across the energy sector. Past examples have included tabletop exercises, workshops, one-on-one interviews, and conferences that bring together a diverse range of stakeholders. These events provide opportunities for participants to discuss challenges, share best practices, and develop collaborative solutions.

The SEO also offers grants and other incentives to localities in order to engage in energy efficient practices, and monitors outcomes from these programs. Ongoing programming examples include:

- Grid Resilience and Innovation Partnerships (GRIP) Program: Administered by the U.S. Department of Energy, this program provides substantial funding to enhance grid resilience and flexibility. In 2023, Oklahoma was awarded $15.16 million through the Grid Resilience State and Tribal Formula Grants program as part of the Bipartisan Infrastructure Law. This funding supports projects that modernize the electric grid to withstand extreme weather and other disruptions.

- Energy Efficiency and Conservation Block Grant (EECBG) Program: This program offers grants to local governments and Tribes to implement energy efficiency and conservation projects. These projects range from building retrofits and energy audits to public education and the development of energy-efficient technologies. The program aims to reduce energy consumption and promote renewable energy use.

One of Oklahoma's primary state agency stakeholders, the Office of Emergency Management, also relies heavily on grants and incentives to encourage risk mitigation activities. OEM coordinates heavily with FEMA to offer and publicize hazard mitigation assistance grants such as Pre-Disaster Mitigation and Building Resilient Infrastructure and Communities (BRIC) grants, to ensure communities' ability to undertake hazard mitigation projects that reduce the risks they have from disasters.

Not all state agency entities rely on convening and incentives as primary approaches. The Oklahoma Corporation Commission relies primarily on regulatory authority to ensure that regulated energy providers in oil and gas and electric industries maintain safe operational practices, offer required programs in energy efficiency, demand management, and vegetation management, and gather required incident report and outage data.

Moving forward, Oklahoma's State Energy Office will be seeking augmented opportunities in the final risk mitigation approach category of continued planning, monitoring and research, and will be increasing efforts to bring stakeholders and subject matter experts together to share informational resources and analyses on risk assessments, as well as provide feedback on the success of existing risk mitigation approaches. This dynamic energy security planning

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environment requires continuous monitoring and continued planning to address emerging threats and leverage advancements in technology and knowledge. Innovative ideas and approaches are essential for enhancing resilience, improving response strategies, and ensuring sustainable energy security. As the state moves forward with more fully utilizing its risk mitigation approach to inform planning and funding priorities, this stakeholder feedback will ensure that the approach remains responsive to the experiences of the energy sector in Oklahoma.

Stakeholder Engagement for Strategic Planning and Prioritization

In addition to developing a risk mitigation approach, stakeholder engagement is an important component to Oklahoma's strategy. Through its role as a statewide convener, the State Energy Office seeks to build shared understanding and goals for mitigation and offer opportunities to further collaborative relationships that will result in improved information flows and outcomes. Therefore, Oklahoma is currently undertaking a stakeholder-informed process to develop additional metrics to provide evidence of successful mitigation approaches and will continue to ensure that the process to identify both priority measures and metrics includes stakeholder expertise and feedback.

Currently, the State Energy Office, in collaboration with the Secretary of Energy and Environment, is spearheading a renewed stakeholder engagement initiative throughout 2024. This effort aims to update the documentation of current practices and outcomes in risk mitigation, ensuring that Oklahoma's State Energy Security Plan accurately reflects these practices. During this stakeholder engagement initiative, planners will also ensure that ESF-12 stakeholders have opportunities to provide assessments of risks impacting their jurisdictions and provide feedback on current and future desired mitigation strategies that address these risks. This documentation and feedback will inform the state's 5-year Strategic Planning Process for energy security. By documenting stakeholder practices and embedding their expertise, planners can better explore opportunities to align practices and priorities for reliability and resilience activities across ESF-12 agencies and stakeholder groups.

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ENERGY PROFILE FOR OKLAHOMA

This section of the plan provides a summary description of Oklahoma's available energy resources, energy use, and expenditures to familiarize readers with the state's energy landscape and to provide context for the relative risks for each energy sector when considering the possibility of energy emergencies, outages, and other impacts. This section also provides an overview of major energy producers and providers, their production capacities, and complementary programs that play a role in Oklahoma's energy security and resilience. A companion discussion of Oklahoma's energy infrastructure vulnerabilities and modeled energy infrastructure emergency scenarios appears in the chapter titled "Preparing For, Mitigating, and Responding to Energy Emergencies." For purposes of organization, this section begins with an energy demand profile, then provides infrastructure overviews and discusses energy supply by energy sector in individual subsections.

OVERVIEW

Oklahoma is fortunate to have abundant and diverse energy resources within its borders and is recognized as a major energy-producing state. Significant oil and natural gas reserves are in the Anadarko, Arkoma, and Ardmore geologic basins, while modest coal deposits lie in the northeast. For decades, Oklahoma has ranked among the top oil and gas producers in the nation. The state also benefits from multiple hydroelectric dams and is a national leader in wind energy, with especially strong resources in the western region. Additionally, Oklahoma ranks high in solar potential and produces a small but steadily growing share of solar power each year. Detailed figures on both energy consumption (demand) and production (supply) are provided in the profiles below.

ENERGY DEMAND PROFILE

Oklahoma has a strong demand for energy. In 2022, residents consumed approximately 380 million Btu of energy per capita, ranking the state 11th nationally. In total, Oklahoma consumed more than 1,519 trillion Btu of energy, the 24th-highest among all states.[13] Oklahoma's higher-than-average per capita and overall energy consumption is due in part to the state's robust, yet energy-intensive, oil and gas industry. It is also due in part to Oklahoma's natural climate, which can bring both extreme heat in the summer and cold in the winter, driving up the need for climate control in residences and businesses.

In Oklahoma, four primary fuel sources meet the state's energy demand: natural gas, petroleum, renewable energy (primarily wind), and coal. Figure 2 shows Oklahoma's energy consumption by fuel source from 2014 to 2023.[14] As the figure indicates, natural gas has consistently been the dominant fuel source in Oklahoma, followed by petroleum. Renewable energy, primarily wind, has risen slowly but steadily over the past decade, while coal consumption has declined significantly. In 2023, natural gas accounted for approximately 45% of total energy consumption, petroleum 34%, renewables 13%, and coal 8%.[15]

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Figure 2: Energy Consumption by Fuel Source in Oklahoma.

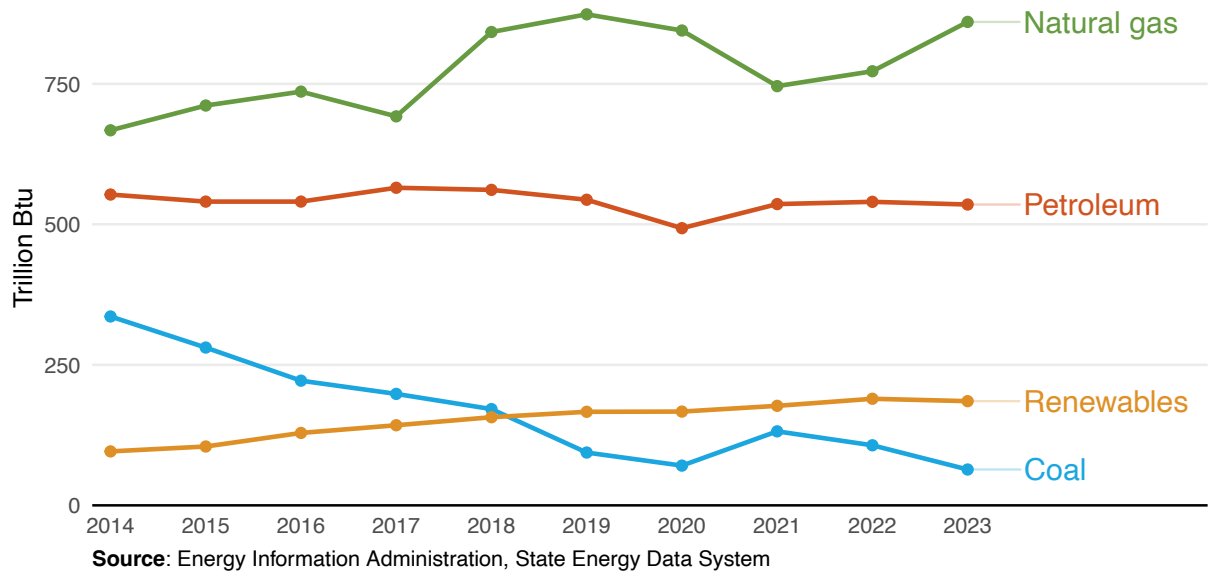

Figure 3 shows Oklahoma's energy consumption by end-use sector from 2014 to 2023.[16] Over this period, the industrial sector consistently accounted for the largest share of energy use, followed by transportation, residential, and commercial sectors. In 2023, the industrial sector consumed approximately 45% of the state's total energy, transportation 29%, residential 15%, and commercial 11%.[17] These proportions have remained relatively stable over the past decade, reflecting Oklahoma's strong industrial and transportation energy needs.

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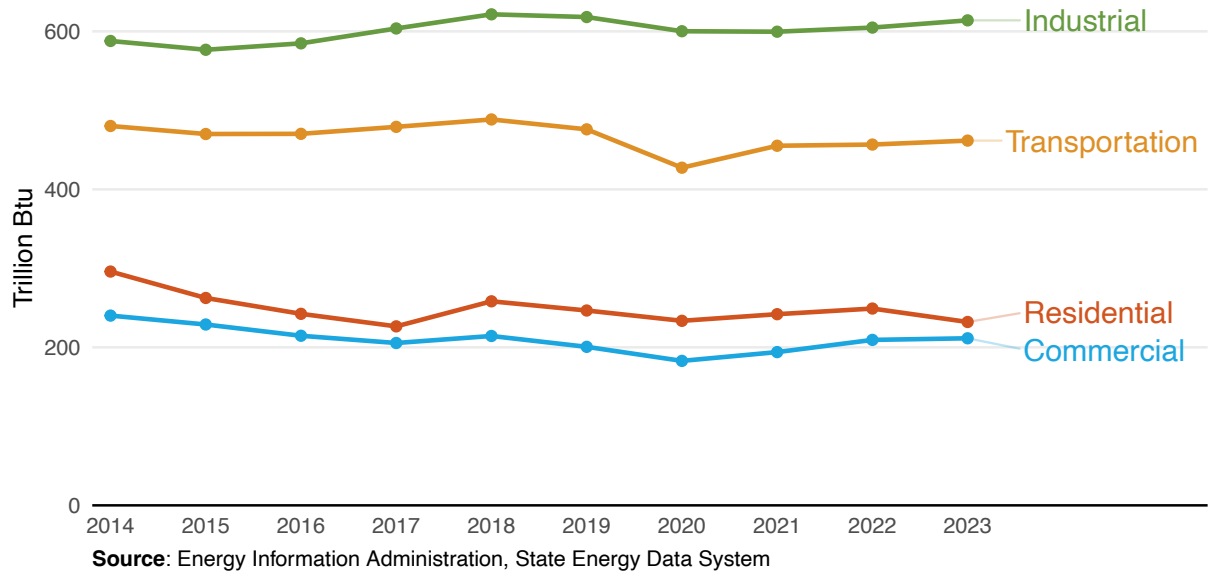
Figure 3: Energy Consumption by End-Use Sector in Oklahoma



Source: Energy Information Administration, State Energy Data System

A significant portion of residential energy use goes toward home heating, which varies by fuel source. In 2023, nearly half of Oklahoma households (49%) relied on natural gas for home heating, while 43% used electricity. Smaller shares used propane (6%), fuel oil (0.2%), or other sources (2%).[18] These patterns reflect residents' reliance on natural gas and electricity for heat, a critical, often life-saving necessity during cold winters.

ELECTRICITY SUPPLY PROFILE

Electric Infrastructure Overview

Oklahoma's electric infrastructure includes generation facilities, transmission lines, substations, and distribution networks. Figure 4 provides a statewide overview of electricity generation facilities in Oklahoma, categorized by fuel type, along with high-voltage (138-344 kV) and extra high-voltage (345+ kV) transmission lines. The size of each point reflects the facility's maximum power output (total MW). Additional information on the state's transmission lines, substations, and distribution networks is available through the EIA's U.S. Energy Atlas: https://atlas.eia.gov.

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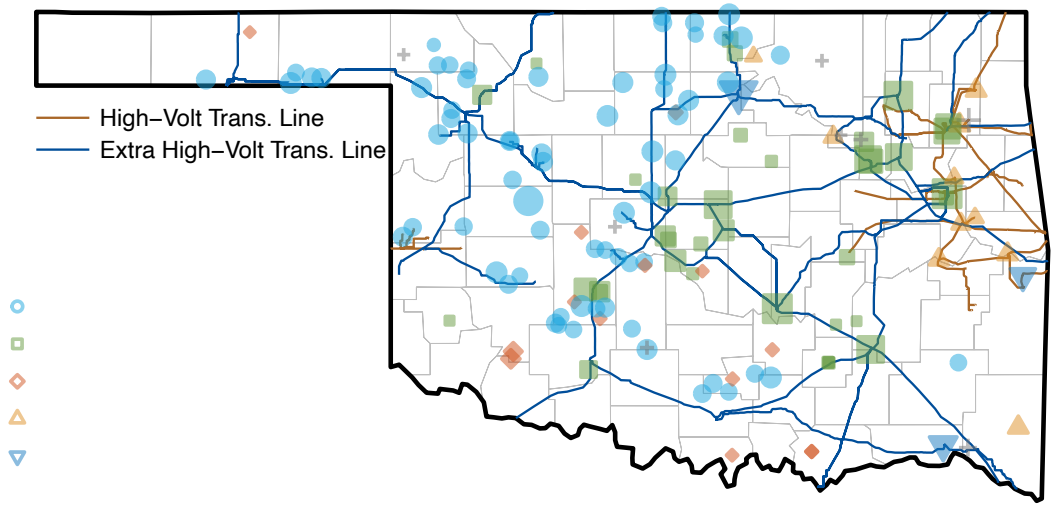
Figure 4: Electricity Infrastructure in Oklahoma



Source: Energy Information Administration, US Energy Atlas
Note: Point size corresponds to the maximum generation capacity (in megawatts)

Electricity Supply Overview

Overall, Oklahoma's electricity generation capacity ranks slightly above the national average, while its electricity consumption closely mirrors national trends. In 2023, Oklahoma's electric power industry had a net summer generation capacity of 31,690 megawatts and produced 89.2 million megawatt-hours (MWh) of electricity, the majority of which came from electric utilities.[19] These figures ranked the state 9th and 18th, respectively, among all U.S. states. Total retail electricity sales reached 69 million MWh, about 77% of total generation, placing Oklahoma 22nd nationally, close to the U.S. average of 75.97 million MWh.[20] One area where Oklahoma consistently diverges from national trends is in electricity pricing. In 2023, the state's average electricity price was $0.093 per kilowatt-hour, ranking 45th in the nation and making it one of the least expensive states for electricity.[21]

As shown in Figure 5, Oklahoma's electricity generation mix has shifted significantly in recent years. In 2014, coal and natural gas were nearly tied, accounting for 44% and 39% of the state's net generation, respectively, while renewables (primarily wind) contributed just 18%.[22] Since then, natural gas has increased, while coal's share has declined sharply. Renewables, again led by wind, have largely filled the gap. In 2023, renewables accounted for 43% of net electricity generation, natural gas 52%, and coal just 6%.[23]

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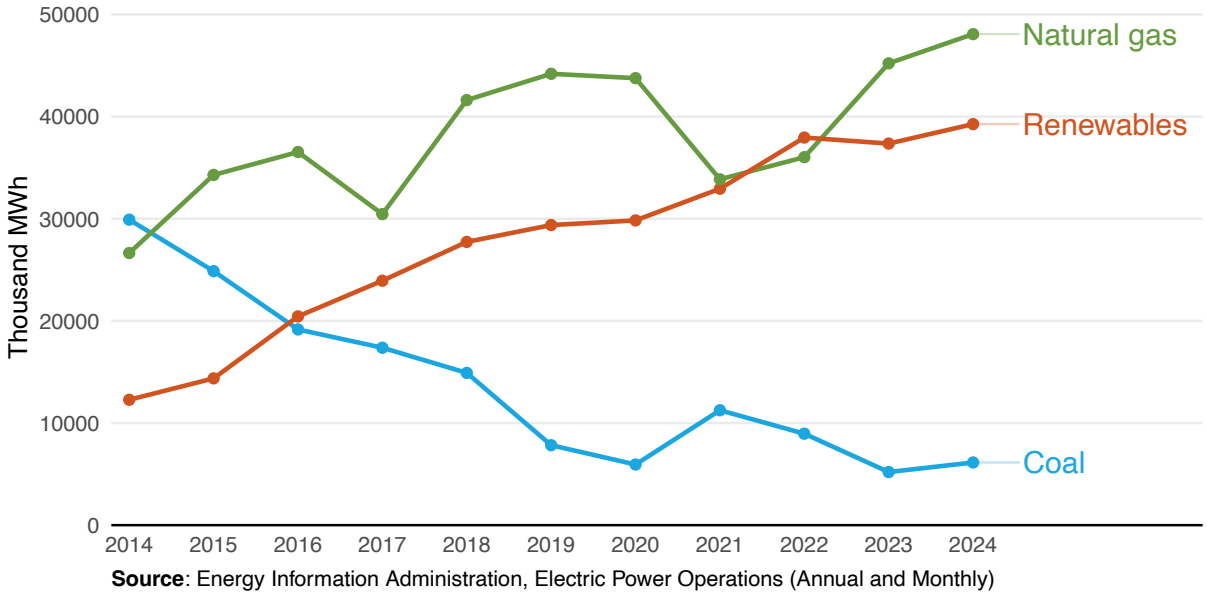
Figure 5: Total Electricity Generation by Fuel Type



Source: Energy Information Administration, Electric Power Operations (Annual and Monthly)

Electricity Providers

Electricity in Oklahoma is provided through generation, transmission, and distribution systems. Some providers operate across all three stages of electricity provision, while others focus on specific stages. The state has eight generation and transmission-level electric suppliers and dozens of distribution-level providers. Of the eight generation and transmission suppliers, six own and/or operate electric generation facilities, or portions of them, within Oklahoma. Three are investor-owned utilities that provide generation, transmission, and distribution services; three are generation and transmission cooperatives; and two are public-sector utilities. Most wholesale electric power is coordinated and optimized through the Southwest Power Pool, which manages the bulk power grid across Oklahoma and the broader southwestern region.

Investor-Owned Utilities

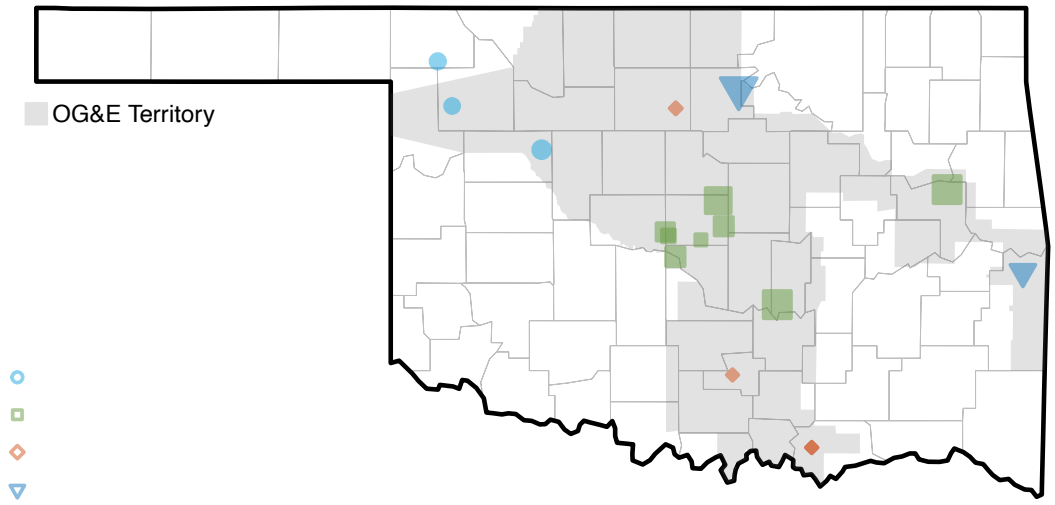
The three investor-owned electric utilities that provide electric service to most of the state, and which are also regulated by the Oklahoma Corporation Commission, are Oklahoma Gas and Electric Company, Public Service Company of Oklahoma, and Liberty Utilities (formerly Empire District Electric Company).

Oklahoma Gas & Electric

Oklahoma Gas and Electric Company (OG&E) is the largest electricity provider in Oklahoma by number of customers served. The company delivers power to nearly 907,000 customers and has

approximately 7,100 megawatts of generating capacity, as shown in Table 3.[24] OG&E owns 18 electricity generation facilities across Oklahoma and western Arkansas. Figure 6 maps the location of OG&E's retail service territory and its generation facilities in Oklahoma, categorized by fuel type. The size of each point reflects the facility's maximum power output (total MW). Only 17 facilities are shown, as one plant is located in western Arkansas. OG&E's current generation mix consists of approximately 67% natural gas, 22% coal, and 7% renewable energy. In addition to its owned resources, the company has 342 megawatts of wind capacity through power purchase agreements.[25] OG&E also operates more than 5,000 miles of transmission lines and approximately 45,000 miles of distribution lines across Oklahoma.[26]

Figure 6: OG&E Retail Service Territory and Electricity Generation Facilities in Oklahoma



Source: Energy Information Administration, US Energy Atlas
Note: Point size corresponds to the maximum generation capacity (in megawatts)

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Table 3: OG&E Generation Capacity [27, 28]

OG&E Generation Capacity				
Facility Name	**City**	**State**	**Fuel Type**	**Generating capacity (MW)**
Seminole	Konawa	Oklahoma	Natural Gas	1521.5
Muskogee	Fort Gibson	Oklahoma	Natural Gas	1510
Redbud Power Plant*	Luther	Oklahoma	Natural Gas	619
Sooner	Red Rock	Oklahoma	Coal	1038
McClain Energy Facility*	Newcastle	Oklahoma	Natural Gas	375
Horseshoe Lake	Harrah	Oklahoma	Natural Gas	532
Mustang	Oklahoma City	Oklahoma	Natural Gas	400.5
River Valley	Panama	Oklahoma	Coal	321
Crossroads Wind Farm	Canton	Oklahoma	Wind	227.5
Frontier	Oklahoma City	Oklahoma	Natural Gas	126
Centennial Wind Farm	Fort Supply	Oklahoma	Wind	120
OU Spirit Wind Farm	Woodward	Oklahoma	Wind	101.2
Tinker	Oklahoma City	Oklahoma	Natural Gas	64
Covington Solar Farm	Covington	Oklahoma	Solar	10
Mustang Solar Farm	Oklahoma City	Oklahoma	Solar	2
Choctaw Nation Solar Farm	Calera	Oklahoma	Solar	5
Chickasaw Nation Solar Farm	Davis	Oklahoma	Solar	5
Branch Solar Farm	Branch	Arkansas	Solar	5
Butterfield Solar Farm	Durant	Oklahoma	Solar	5
Keenan Wind Farm**	Woodward Co.	Oklahoma	Wind	152
Taloga Wind Farm**	Dewey	Oklahoma	Wind	130
Blackwell Wind Farm**	Kay	Oklahoma	Wind	60
Southwestern Power Administration**	Tulsa	Oklahoma	Hydro	7
***Co-owned. Capacity listed is OGE-owned generation capacity.**				
****Power Purchase Agreement. Capacity listed is OGE-purchased generation capacity.**				

Public Service Company of Oklahoma

Public Service Company of Oklahoma (PSO), a unit of American Electric Power, is the second-largest electricity provider in Oklahoma by number of customers served. It delivers power to approximately 580,000 customers, primarily in the eastern and southwestern parts of the state.[29] PSO owns/co-owns 9 electricity generation facilities, all located in Oklahoma, with a combined generating capacity of approximately 5,000 megawatts, as shown in Table 4. In addition to its owned resources, the company maintains long-term power purchase contracts to meet demand. Figure 7 maps the location of PSO's retail service territory and its owned generation facilities in Oklahoma, categorized by fuel type. PSO's current generation mix (owned + purchased) consists of approximately 59% natural gas, 8% coal, 33% wind.[30] PSO also operates approximately 3,796 miles of transmission lines and 29,979 miles of distribution lines across Oklahoma.[31]

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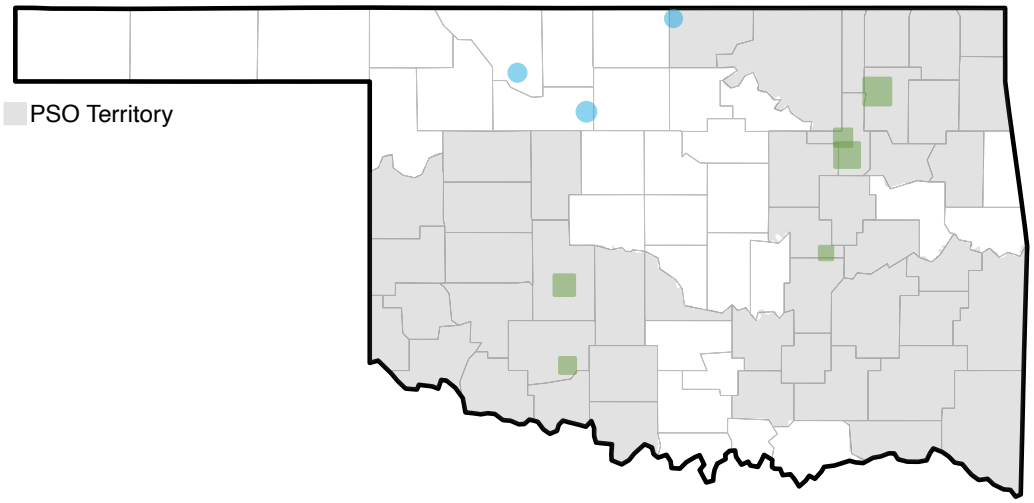
Figure 7: PSO's Retail Service Territory and Electricity Generation Facilities in Oklahoma



Source: Energy Information Administration, US Energy Atlas
Note: Point size corresponds to the maximum generation capacity (in megawatts)

Table 4: PSO Generation Capacity [32, 33]

PSO Generation Capacity				
Facility Name	**City**	**State**	**Fuel Type**	**Generating capacity (MW)**
Northeastern	Oologah	Oklahoma	Natural Gas	1377.0
Riverside (OK)	Jenks	Oklahoma	Natural Gas	1069.8
Southwestern	Anadarko	Oklahoma	Natural Gas	612
Tulsa	Tulsa	Oklahoma	Natural Gas	330.3
Maverick Wind Project, LLC*	Meno	Oklahoma	Wind	131
Comanche (OK)	Lawton	Oklahoma	Natural Gas	238
Sundance Wind Project, LLC*	Alva	Oklahoma	Wind	91
Traverse Wind Energy Center *	Weatherford	Oklahoma	Wind	455
Sleeping Bear Wind Farm**	Harper	Oklahoma	WInd	94.5
Blue Canyon V Wind Farm**	Comanche	Oklahoma	Wind	99
Elk City Wind Farm**	Roger Mills Co.	Oklahoma	Wind	98.9
Minco Wind Farm**	Grady	Oklahoma	Wind	99.2
Goodwell Wind Farm**	Texas Co.	Oklahoma	Wind	200
Seiling Wind Farm**	Dewey Co.	Oklahoma	Wind	198.9
Oneta Energy Center**	Wagoner Co.	Oklahoma	Gas	260
Balko Wind Farm**	Balko	Oklahoma	Wind	199.8
Rock Falls Wind Farm LLC	Braman	Oklahoma	Wind	154.5
Weleetka	Weleetka	Oklahoma	Natural Gas	110
***Co-owned. Capacity listed is PSO-owned generation capacity.**				
****Power Purchase Agreement. Capacity listed is PSO-purchased generation capacity.**				

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Liberty Utilities-Empire District Company
Liberty Utilities, a subsidiary of Algonquin Power & Utilities Corp., is an investor-owned public utility that provides electric service in the Central Region, which includes Arkansas, Kansas, Missouri, Illinois, Iowa, and Oklahoma. The Central Region is headquartered in Joplin, Missouri. In Oklahoma, Liberty serves customers in three far northeastern counties: Craig, Delaware, and Ottawa.[34] As shown in Table 5, The company's Central Region has a generation capacity of roughly1,400 megawatts and operates eight generation plants, none of which are located in Oklahoma.[35] Most facilities are in southwestern Missouri, though Liberty also operates plants in Riverton, Kansas, and Osceola, Arkansas.[36]

Table 5: Liberty Generation Capacity [37]

Liberty Generation Capacity				
Facility Name	**City**	**State**	**Fuel Type**	**Generating capacity (MW)**
State Line Combined Cycle*	Joplin	Missouri	Natural Gas	292.0
Neosho Ridge Wind Energy Center	Galesburg	Kansas	Wind	294.4
Riverton	Riverton	Kansas	Natural Gas	274
Empire Energy Center	Sarcoxie	Missouri	Natural Gas	262
Kings Point Wind Energy Center	Golden City	Missouri	Wind	145.6
North Fork Ridge Wind Energy Center	Mindenmines	Missouri	Wind	145.5
Ozark Beach	Forsyth	Missouri	Hydroelectric	16
Prosperity Solar Farm CSG	Joplin	Missouri	Solar	2.2
***Co-owned. Capacity listed is Liberty-owned generation capacity.**				

Cooperatives

Oklahoma is served by dozens of electric cooperatives, which play a critical role in the state's energy landscape. Collectively, they are the only utility entities with infrastructure in and service to all 77 counties in Oklahoma. Appendix D provides a complete listing of the cooperatives serving the state.

Three generation and transmission cooperative providers serve the state: Western Farmers Electric Cooperative (WFEC), KAMO Electric Cooperative, and Golden Spread Electric Cooperative. These organizations are made up of individual member cooperatives that deliver electric service at the distribution level. WFEC and KAMO are the primary providers in Oklahoma, while Golden Spread, based in Amarillo, Texas, serves only one Oklahoma distribution cooperative. Detailed membership lists for each provider are included in Appendix D.

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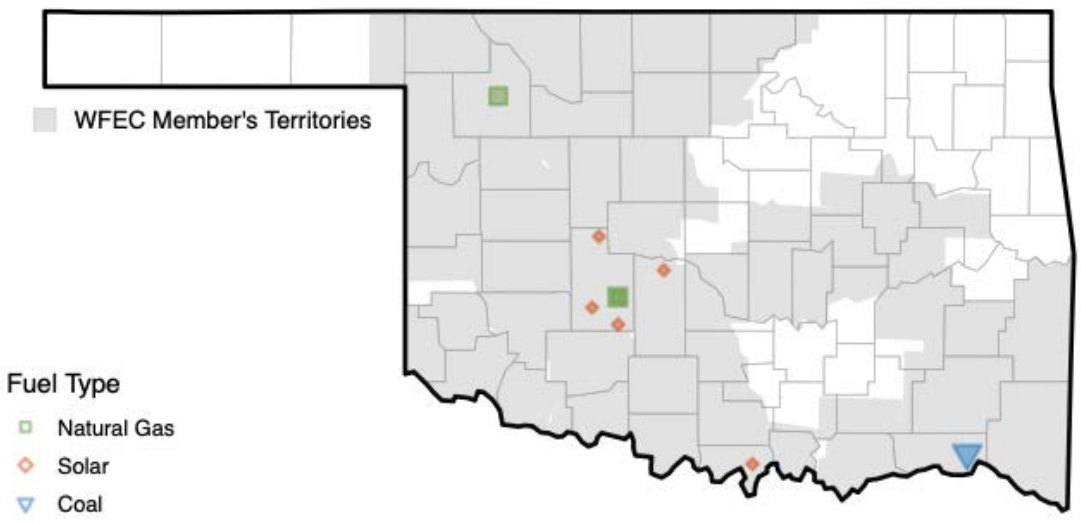
Western Farmers Electric Cooperative

Western Farmers Electric Cooperative (WFEC), headquartered in Anadarko, Oklahoma, is the largest generation and transmission cooperative in the state. Founded in 1941, WFEC is owned by its member electric cooperatives and provides wholesale power to 17 distribution cooperatives in Oklahoma, as well as Altus Air Force Base.[38] It supplies electricity through a mix of self-owned generation facilities and purchased power.[39] Figure 8 maps the retail service territories of WFEC's member distribution cooperatives and its Oklahoma-based generation facilities, categorized by fuel type and scaled by maximum generation capacity (total MW). WFEC owns and maintains more than 3,800 miles of transmission line and has roughly 2,300 MW of generation capacity, as shown in Table 6 below.[40] It also owns 100 MW of generation capacity in New Mexico and secures more than 1,000 MW through power purchase agreements with entities inside and outside Oklahoma.[41]

Figure 8: WFEC Members' Retail Service Territories and Electricity Generation Facilities in Oklahoma



Source: Energy Information Administration, US Energy Atlas
Note: Point size corresponds to the maximum generation capacity (in megawatts)

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Table 6: Western Farmers Electric Cooperative Generation Capacity [42, 43]

WFEC Generation Capacity				
Facility Name	**City**	**State**	**Fuel Type**	**Generating capacity (MW)**
Hugo	Fort Towson	Oklahoma	Coal	440.0
Anadarko Plant	Anadarko	Oklahoma	Natural Gas	417
Mooreland	Mooreland	Oklahoma	Natural Gas	322
WFEC GenCo LLC	Anadarko	Oklahoma	Natural Gas	90
LCEC Generation LLVC	Lovington	New Mexico	Natural Gas	43.5
Buffalo Bear**	Harper Co.	Oklahoma	Wind	19
Red Hills Wind Farm**	Elk City	Oklahoma	Wind	123
Rocky Ridge Wind Project**	Hobart	Oklahoma	Wind	149
Brahms BEP Wind I & II**	Curry Co.	New Mexico	Wind	20
Anderson Wind Project I &II**	Chaves Co.	New Mexico	Wind	15
Balko Wind Project**	Beaver Co.	Oklahoma	Wind	100.0
Grant Wind Project**	Grant Co.	Oklahoma	Wind	50
Minco Wind IV**	Caddo	Oklahoma	Wind	100
Caprock Wind**	Quay Co.	New Mexico	Wind	25
Skeleton Creek Wind Project**	Garfield Co.	Oklahoma	Wind	249
Sterling Wind Farm**	Tatum	New Mexico	Wind	30
Wildcat Wind Farm**	Cooke Co.	Texas	Wind	27
Chaves Solar II**	Chaves Co.	New Mexico	Solar	30
Norman Solar Park**	Norman	Oklahoma	Solar	2
Middle Daisy Solar**	Lovington	New Mexico	Solar	5
Caprock Solar**	Quay Co.	New Mexico	Solar	25.0
Cyril Solar Farm	Cyril	Oklahoma	Solar	5
Tuttle Solar Farm	Tuttle	Oklahoma	Solar	4
Hinton Solar Farm	Hinton	Oklahoma	Solar	3
Marietta Solar Farm	Marietta	Oklahoma	Solar	3
Pine Ridge Solar Farm	Apache	Oklahoma	Solar	3
***Co-owned. Capacity listed is WFEC-owned generation capacity.**				
****Power Purchase Agreement. Capacity listed is WFEC-purchased generation capacity.**				

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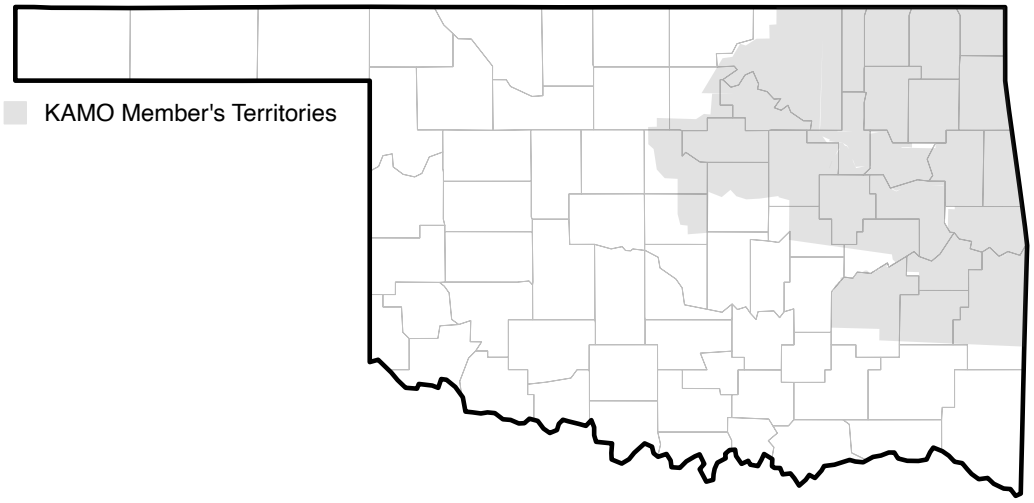
KAMO Electric Cooperative

KAMO Electric Cooperative (KAMO Power), headquartered in Vinita, Oklahoma, is a major transmission cooperative that provides wholesale electric power in northeastern Oklahoma and southwestern Missouri. It serves 17 electric distribution cooperatives, eight of which are located in Oklahoma. Figure 9 maps the retail service territories of KAMO's member cooperatives in Oklahoma. As shown in Table 7, all of KAMO Power's electric generation is purchased from Associated Electric Cooperative, Inc. (AECI), of which it is a part owner.[44] AECI operates one generation facility in Oklahoma—a combined cycle gas plant with approximately 900 MW of capacity.[45]

Figure 9: KAMO Members' Retail Service Territories in Oklahoma



Source: Energy Information Administration, US Energy Atlas
Note: Point size corresponds to the maximum generation capacity (in megawatts)

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Table 7: KAMO Generation Capacity [46, 47]

KAMO Generation Capacity				
Facility Name	**City**	**State**	**Fuel Type**	**Generating capacity (MW)**
New Madrid Power Plant	New Madrid	Missouri	Coal	1200.0
Thomas Hill Power Plant	Clifton Hill	Missouri	Coal	1130
Chouteau Power Plant	Pryor	Oklahoma	Natural Gas	888
Dell Power Station	Dell	Arkansas	Natural Gas	478
St Francis Energy Facility	Campbell	Missouri	Natural Gas	434
Holden Power Plant	Holden	Missouri	Natural Gas	261
Nodaway Power Plant	Conception Junction	Missouri	Natural Gas	171
Essex Power Plant	Essex	Missouri	Natural Gas	94
Unionville Power Plant	Unionville	Missouri	Petroleum	40

Golden Spread Electric Cooperative

Golden Spread Electric Cooperative (GSEC) is headquartered in Amarillo, Texas, and serves one Oklahoma distribution cooperative in the Oklahoma Panhandle, Tri-County Electric Cooperative (TCEC).[48] Golden Spread owns four generation facilities totaling approximately 1,700 MW, none of which are located in Oklahoma, as shown below in Table 8.[49]

Table 8: GSEC Generation Capacity [50, 51]

GSEC Generation Capacity				
Facility Name	**City**	**State**	**Fuel Type**	**Generating capacity (MW)**
Elk Station*	Abernathy	Texas	Natural Gas	583.1
Mustang Station	Denver City	Texas	Natural Gas	924.1
Antelope Station*	Abernathy	Texas	Natural Gas	162
Golden Spread Panhandle Wnd Rch	Wilderado	Texas	Wind	78.2
***Offers grid-switching capability allowing this generation facility to supply either ERCOT or SPP's transmission grids**				

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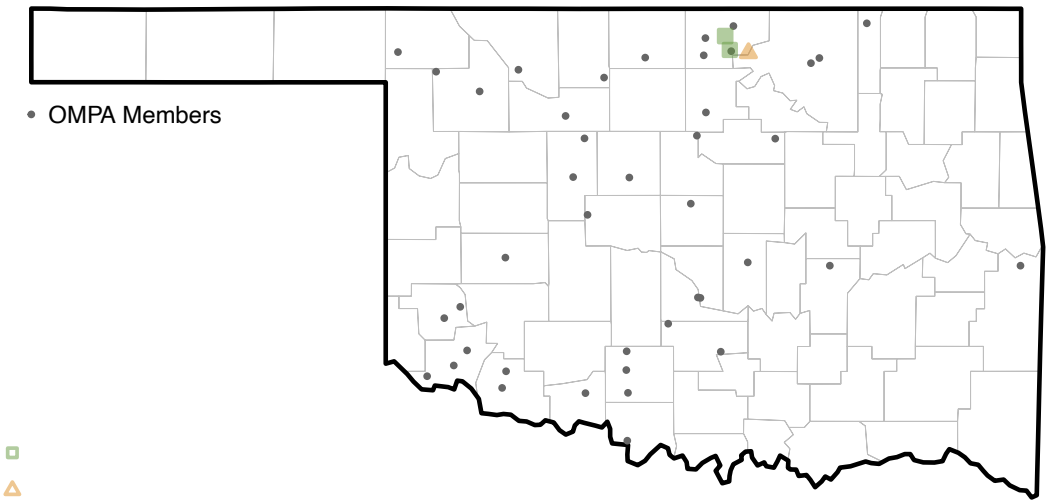
Public Sector Utilities

Under Oklahoma law, the Oklahoma Corporation Commission (OCC) does not regulate entities operated by governmental subdivisions. Among the largest electricity providers in the state, two of them—Oklahoma Municipal Power Authority and Grand River Dam Authority—are classified as public sector utilities.

Oklahoma Municipal Power Authority

The Oklahoma Municipal Power Authority (OMPA) is a not-for-profit organization established by Oklahoma statute to provide an adequate, reliable, and affordable supply of electric power to the state's municipally owned electric systems. As of 2025, OMPA serves 43 municipally owned electric systems in Oklahoma.[52] As a consumer-owned public power entity, it is owned by the member cities it serves. OMPA owns/co-owns 5 generation facilities to support its members.[53] Figure 10 maps the locations of OMPA member municipalities and owned, Oklahoma-based generation facilities. In addition to its owned generation, OMPA purchases power from a variety of resources, including approximately 141 MW of wind, 3 MW of landfill gas, and 61 MW of coal.[54] In 2024, OMPA's overall fuel mix consisted of 49% natural gas, 30% renewables, 13% coal, and 7% other purchased power.[55] See Table 9 for more generation capacity information.

Figure 10: OMPA Member Municipalities and Electricity Generation Facilities in Oklahoma



Source: Energy Information Administration, US Energy Atlas
Note: Point size corresponds to the maximum generation capacity (in megawatts)

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Table 9: OMPA Generation Capacity [56, 57, 58]

OMPA Generation Capacity				
Facility Name	**City**	**State**	**Fuel Type**	**Generating capacity (MW)**
Charles D. Lamb Energy Center	Ponca City	Oklahoma	Natural Gas	122.0
Ponca City	Ponca City	Oklahoma	Natural Gas	106.8
Kaw Hydro	Ponca City	Oklahoma	Hydroelectric	29.6
Redbud Generating Facility*	Luther	Oklahoma	Natural Gas	156
McClain Plant*	Newcastle	Oklahoma	Natural Gas	120
Landfill Gas to Energy Project**	Sand Springs	Oklahoma	Landfill Gas	3
GRDA #2**	Chouteau	Oklahoma	Coal	19
John W.Turk Jr. Power Plant**	Fulton	Arkansas	Coal	42
Oklahoma Wind Energy Center**	Woodward	Oklahoma	Wind	51
Canadian Hills Wind Farm**	El Reno	Oklahoma	Wind	49
Grant Plains Wind Farm**	Grant Co.	Oklahoma	Wind	41
***Co-owned. Capacity listed is OMPA-owned generation capacity.**				
****Purchased Power Agreement. Capacity listed is OMPA-purchased generation capacity.**				

Grand River Dam Authority

The Grand River Dam Authority (GRDA) is a non-appropriated state agency established by the Oklahoma Legislature in 1935 under 82 O.S. § 861 as a conservation and reclamation district. GRDA owns and operates electric generation, transmission, and distribution facilities, primarily serving northeastern Oklahoma. It is funded entirely through revenues from the sale of electricity and water, with no appropriated public funds.[59] GRDA owns or purchases power from 9 facilities across Oklahoma.[60] In addition to its owned generation capacity, GRDA has roughly 384 MW of wind capacity through four power purchase agreements, and 163 MW of capacity from customer capacity purchase agreements. GRDA also owns 1,198 miles of transmission line in Oklahoma.[61]

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Table 10: GRDA Generation Capacity [62]

GRDA Generation Capacity				
Facility Name	**City**	**State**	**Fuel Type**	**Generating capacity (MW)**
Grand River Energy Center	Chouteau	Oklahoma	Natural Gas	959.6
Salina Pumped Storage Project	Salina	Oklahoma	Pumped Storage	241.5
Markham Ferry	Locust Grove	Oklahoma	Hydroelectric	125.7
Pensacola Dam	Langley	Oklahoma	Hydroelectric	115.2
Breckinridge Wind Project**	Enid	Oklahoma	Wind	99.0
Canadian Hills Wind Project**	Canadian Co.	Oklahoma	Wind	46.0
Kay Wind**	Kay Co.	Oklahoma	Wind	100.0
Red Dirt Wind Project**	Hennessey	Oklahoma	Wind	139.0
Redbud Power Plant*	Luther	Oklahoma	Natural Gas	443.0
***Co-owned. Capacity listed is GRDA-owned generation capacity.**				
****Power Purchase Agreement. Capacity listed is GRDA-purchased generation capacity.**				

Regional Transmission Organizations

Southwest Power Pool

The Southwest Power Pool (SPP) is a Regional Transmission Organization (RTO) mandated by the Federal Energy Regulatory Commission. Its mission is to ensure reliable supplies of power, adequate transmission infrastructure, and competitive wholesale electricity prices on behalf of its members. There are 121 members of the SPP, including all eight of Oklahoma's electricity providers profiled above.[63] SPP's footprint covers approximately 557,546 square miles across all or parts of 14 states, as shown in Figure 11.[64] SPP provides many services to its members, including: reliability coordination, which involves monitoring power flow and coordinating responses during emergencies; tariff administration, managing transmission service requests and ensuring consistent rates and terms; transmission expansion, identifying system limitations and planning upgrades; market operations, running the Integrated Marketplace to facilitate cost-effective wholesale electricity transactions; and training, offering ongoing education for operations personnel throughout the region.[65] As of June 2024, SPP's members had a total accredited generating *capacity* of approximately 63,908 MW, primarily from natural gas (47.5%), coal (33.6%), and wind (8.6%).[66] However, actual energy *production* in 2024 was dominated by wind (38.0%), followed by natural gas (28.4%) and coal (24.7%), indicating significant utilization of renewable energy resources within the region.[67]

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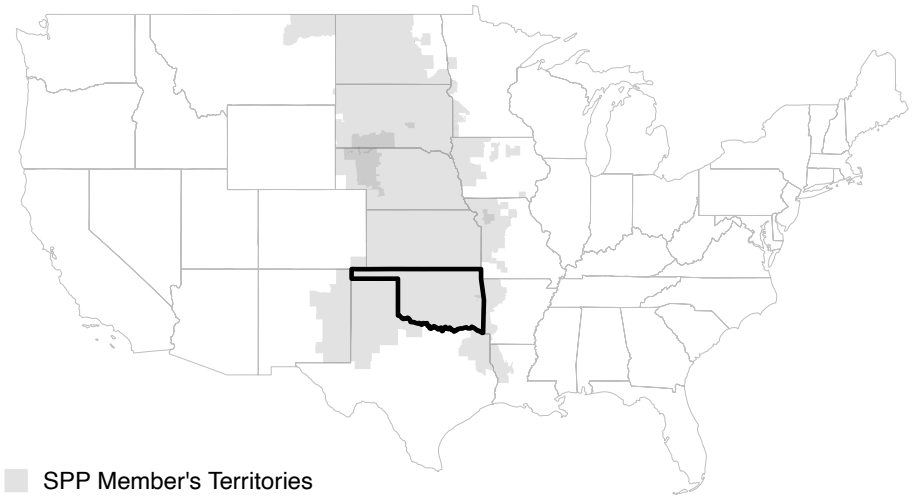
Figure 11: SPP Members' Retail Service Territories



Source: Energy Information Administration, US Energy Atlas
Note: Point size corresponds to the maximum generation capacity (in megawatts)

Energy Efficiency and Demand Management for Electricity

Energy efficiency means using less energy to accomplish the same goal or task and is a key component of ensuring an energy-resilient Oklahoma, as reduced energy demand eases the strain on energy resources. *Demand management* further supports this goal by shifting energy use from peak to off-peak times, reducing pressure on existing generating capacity. The state of Oklahoma, local governments, and electric utilities offer energy efficiency and demand management programs to help reduce overall demand, shift usage to lower-demand periods to ease system strain and delay the need for new electricity generation resources.

Utility-Administered Programs

In 2021, Oklahoma's largest regulated utility, OG&E, filed a comprehensive portfolio of energy efficiency programs with the Oklahoma Corporation Commission for Program Years 2022 to 2024.[68] It should be noted that OG&E's updated filing for energy efficacy filings for program year 2025 is still pending at the Oklahoma Corporation Commission. As part of this 2021 portfolio, OG&E offers four programs tailored to different customer segments.[69] The Home Energy Efficiency Program (HEEP) and the Weatherization Residential Assistance Program (WRAP) are offered to residential customers; the Commercial Energy Efficiency Program (CEEP) is available to commercial and industrial customers; and the Education Program (EP) is available to all customer classes, including residential, commercial, and industrial customer.[70] OG&E also offers a variety of demand response programs, including SmartHours for residential customers[71] and Day Ahead Pricing, Flex Pricing, and a Load Reduction Program for commercial and industrial

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customers.[72] As of 2024, these programs have achieved 182,908,615 kWh in actual net energy savings and 31,360 kW in actual net demand savings.[73]

Oklahoma's second largest regulated utility, PSO, also filed a portfolio of energy efficiency programs with the Oklahoma Corporation Commission in 2024 for Program Years 2025 to 2029.[74] As part of its portfolio, PSO offers a range of programs designed to serve different customer segments.[75] Residential customers are served through the Residential Energy Services program, which includes subprograms such as Multifamily and Manufactured Homes, Energy Saving Products, Home Rebates, Behavioral Modification, and Education Kits.[76] Commercial and industrial customers are served through the Business Rebates program, which includes Custom and Prescriptive offerings (including Oil & Gas, Agriculture, and Strategic Energy Management), Small Business Energy Solutions, and Commercial Midstream.[77] PSO also offers a home weatherization program for low-income residential customers, as well as two demand response programs, Power Hours for residential customers and Peak Performers for commercial and industrial customers.[78] In addition, PSO implements energy efficiency measures within electric distribution systems through conservation voltage reduction to reduce meter-level energy consumption.[79] As of 2024, PSO's programs have achieved 1,459,942,000 kW in net energy savings and 112,403 kW in actual net demand savings.[80]

Western Farmers Electric Cooperative's energy efficiency and demand management programs are handled through its member distribution cooperatives. However, Western Farmers Electric Cooperative (WFEC) does use rate signals to its members through an unbundled rate structure called managed generation charges. This signals peak demand days to members on the morning of the day of a called peak. Then, member coops can use this signal to implement their diverse demand management programs. Examples of energy efficiency and demand management programs offered by WFEC's distribution co-ops include residential time-of-use rates, energy efficiency audits, and one distribution co-op, Oklahoma Electric Cooperative, offers special nighttime electric vehicle charging rates and utilizes distributed solar generation as additional demand management programs.

The Oklahoma Municipal Power Authority (OMPA) also offers a variety of efficiency and demand management programs. For example, the WISE program provides rebates to residential customers and subdivision homebuilders in participating OMPA member cities for the purchase and installation of high-efficiency electric heat pumps.[81] The Demand and Energy Efficiency Program (DEEP) provides matching funds to qualified customers in participating member cities who implement energy-saving measures that reduce summer peak electric demand.[82] OMPA also offers free residential energy audits to customers in participating member cities to help them understand how their homes use energy and identify opportunities for savings.[83] Commercial energy audits are also available upon request.[84]

Most energy efficiency programming for the Grand River Dam Authority (GRDA) is offered through its individual municipal customers. However, GRDA has implemented several energy efficiency projects in collaboration with its industrial customers at the MidAmerica Industrial Park.

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State-Administered Programs

At the state level, beginning in 2009, 61 O.S. § 213 required that all new state-owned buildings or major renovations of state-owned buildings 10,000 square feet or larger meet Leadership in Energy and Environmental Design (LEED) standards or the Green Building Initiative's Green Globes standards.

In addition to this program, the Oklahoma Department of Commerce administers nearly $5 million in weatherization funding from the U.S. Department of Energy and the Oklahoma Department of Human Services to support residential energy efficiency efforts across all 77 counties. This funding supports the Weatherization Assistance Program, a no-cost service that helps low-income households lower utility bills and improve home energy efficiency. The program is delivered locally by nonprofit providers under contract with the Department of Commerce.[85]

Local Government-Administered Programs

Finally, numerous local energy efficiency efforts are underway across Oklahoma, many of which are coordinated by the state. These efforts primarily involve energy-efficient upgrades to municipal lighting, HVAC systems, and insulation in public buildings. They are often supported by the State Energy Program, which is administered by the Oklahoma Department of Commerce and funded by the U.S. Department of Energy. In addition, the Oklahoma Energy Independence Act (19 O.S. §§ 460.1–460.7) authorizes county governments to develop Commercial Property-Assessed Clean Energy (C-PACE) programs. Counties may establish County District Energy Authorities empowered to issue bonds or notes, engage public or private lenders, and apply for grants or loans to support local PACE initiatives. Once a county establishes an Authority and PACE program, commercial property owners can obtain loans for permanently affixed renewable energy or energy efficiency improvements, which are repaid through a special assessment on their property taxes. These assessments constitute a lien on the property until repaid in full. PACE program authorization plays an important role in encouraging additional energy efficiency investments. As of 2020, statewide program guidance is available to help counties establish C-PACE programs.[86] As of April 2024, 19 counties have opted into the Oklahoma C-PACE program.[87]

Figure 12 displays annual energy savings from utility energy efficiency programs in Oklahoma from 2013 to 2023, as reported to the U.S. Energy Information Administration. These savings reflect total reductions in electricity consumption over the course of each reporting year, based on the estimated life cycle of the programs implemented. As the figure shows, annual energy savings have steadily increased throughout the period, reaching a peak of 5,142,292 megawatt-hours in 2023.

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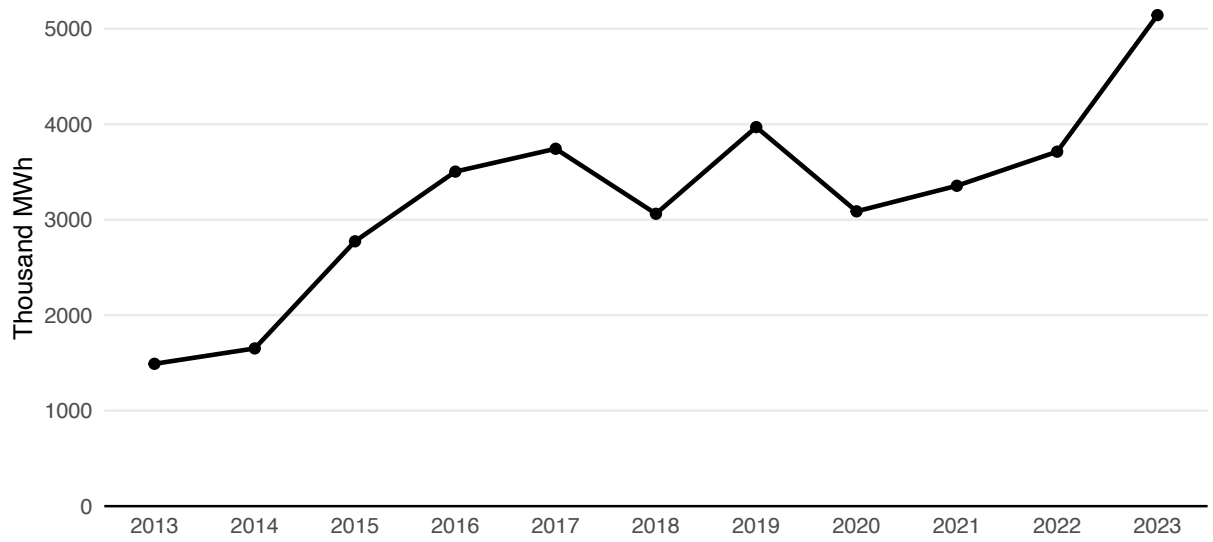
Figure 12: Savings from Energy Efficiency Programs in Oklahoma



Source: Energy Information Administration, Costs and Savings From Energy Efficiency Programs

Renewable Energy for Electricity

Renewable energy is a growing and significant source of electricity in Oklahoma, driven by the state's abundant natural resources such as wind, water, and sunlight, as well as technological advancements that have improved affordability and expanded deployment opportunities. These factors have positioned Oklahoma as a leading producer of renewable electricity in the central United States.

In 2023, renewable energy sources accounted for 45% of Oklahoma's total in-state electricity generation.[88] The vast majority of this, 94% of the state's renewable generation, came from wind energy.[89] Oklahoma remains a national leader in wind power. As of April 2024, the state had 12,648 megawatts of installed wind capacity, ranking third in the nation. Wind energy plays a critical role in Oklahoma's energy mix, contributing more than any other renewable source by a wide margin. The state's wind resources are among the most productive in the country, supporting both in-state demand and exports to neighboring regions.[90]

The state also relies on hydroelectricity to meet a portion of its electricity demand. After reaching 3,903 thousand megawatt hours in 2019, hydroelectric generation has declined steadily in recent years. In 2023, Oklahoma's ten hydroelectric facilities produced 1,483 thousand megawatt hours, accounting for approximately 2 percent of the state's net electricity generation.[91]

Consistent with recent years, solar energy provided only a fraction of a percent of Oklahoma's electric generation. Nevertheless, the state has experienced considerable growth in solar capacity since 2019. As of 2024, Oklahoma has approximately 505 MW of installed solar capacity, enough

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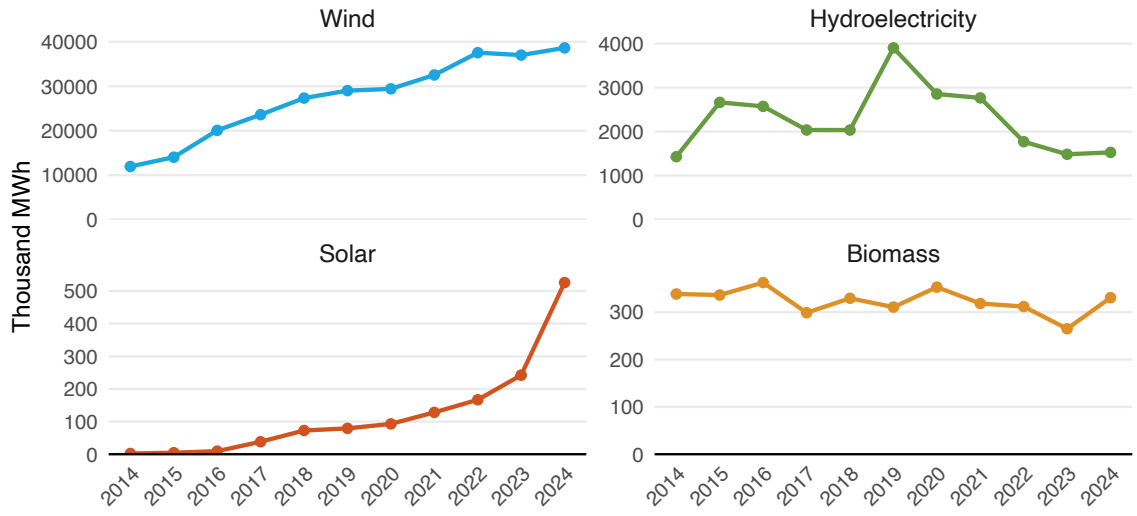
to power just over 60,000 homes.[92] Today, the majority (70%) of solar capacity in Oklahoma comes from small-scale facilities, primarily rooftop solar panel systems.[93]

Biomass represents an emerging fuel source within Oklahoma's energy portfolio, although it accounts for only a small share of the state's electricity generation at about 0.3%.[94] In Oklahoma, most biomass energy is produced by burning wood and wood waste, though landfill gas, agricultural waste, and municipal waste also contribute to the state's biomass supply.[95]

Figure 13 shows the change in Oklahoma's electricity generation from renewable fuels between 2014 and 2024. Note that the y-axis differs for each plot to reflect the wide variation in generation levels across fuel types. This approach allows each trend to be visualized more clearly, but it also means the vertical scales are not comparable across plots. As the figure indicates, electricity generation from wind has steadily increased over the past decade. Hydroelectricity, by comparison, peaked in 2019 and has declined in the years since. Solar generation remains relatively small. While growth was slow from 2014 to 2023, the increase between 2023 and 2024 was notable, with generation nearly doubling in a single year. Biomass generation remained relatively steady throughout the period.

Figure 13: Electricity Generation by Renewable Fuel Type in Oklahoma



Source: Energy Information Administration, Electric Power Operations (Annual and Monthly)

CRUDE OIL AND PETROLEUM PRODUCTS SUPPLY PROFILE

Crude Oil and Petroleum Products Infrastructure Overview

Oklahoma's crude oil and petroleum infrastructure includes wells and gathering lines, drilling pads, pipelines, compressor stations, refineries, storage facilities, water transfer and saltwater disposal sites, as well as product and rail terminals. While the precise locations of the thousands

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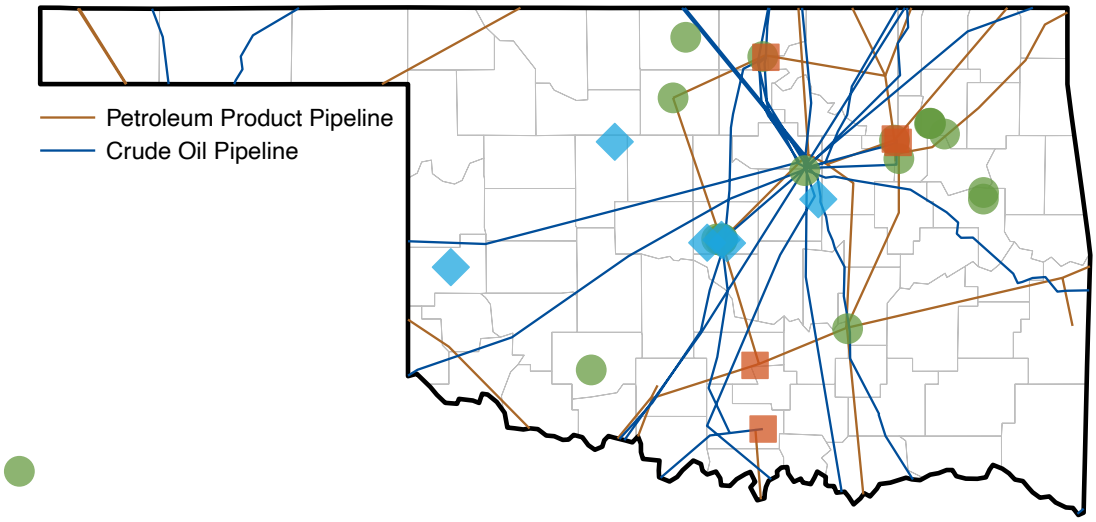
of wells and drilling sites are too numerous to display in this report, Figure 14 highlights key infrastructure in Oklahoma's crude oil and petroleum sector, including 5 petroleum refineries, 19 petroleum product terminals, 6 crude oil rail terminals, and many significant pipelines stretching for thousands of pipeline miles across the state. Additional information is available through the EIA's U.S. Energy Atlas: https://atlas.eia.gov.

Figure 14: Crude Oil and Petroleum Product Infrastructure in Oklahoma



Source: Energy Information Administration, US Energy Atlas

Crude Oil and Petroleum Products Supply Overview

Oklahoma is home to numerous crude oil producers that collectively contribute a significant share of national output, accounting for nearly 3% of total U.S. crude oil production in recent years.[96] As of 2023, the state ranks 6th nationally in crude oil production, averaging approximately 550,000 barrels per day.[97] Figure 15 shows the 30-year history of oil production in Oklahoma. As the figure indicates, production declined steadily from the mid-1980s through the early 2000s. However, beginning in 2010, the use of hydraulic fracturing, an extraction technique that removes oil from tight shale rock formations, led to a significant resurgence in production. In 2023, Oklahoma produced approximately 156.8 million barrels of crude oil. Looking to the future, Oklahoma had 1,830 million barrels of proven crude oil reserves in 2022, representing approximately 3.8% of total U.S. reserves.[98]

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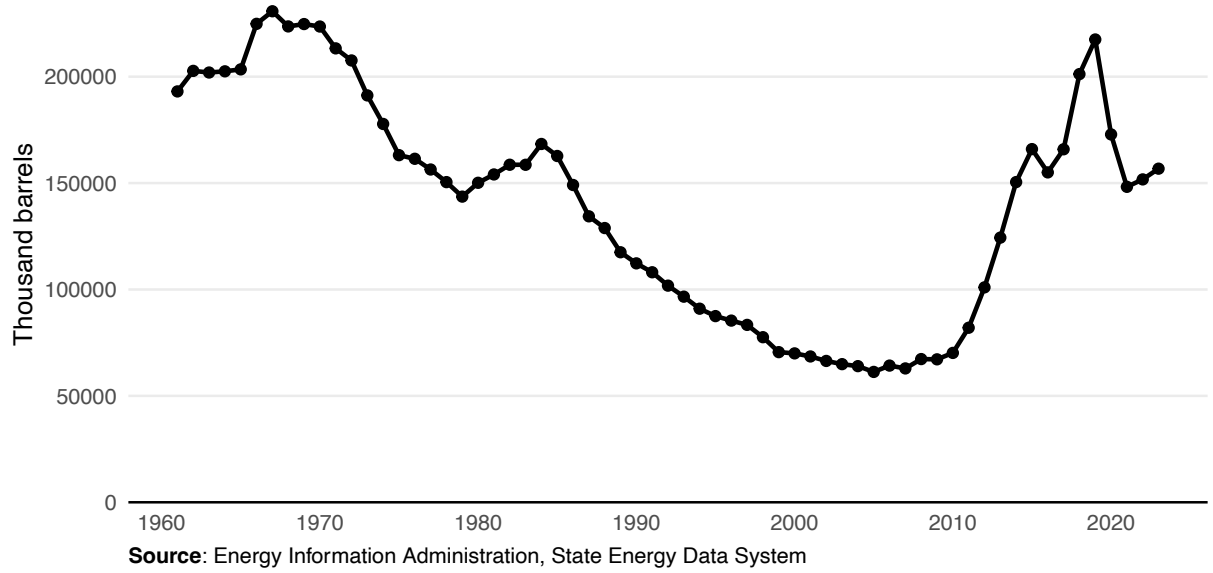
Figure 15: Crude Oil Production in Oklahoma



Source: Energy Information Administration, State Energy Data System

In addition to producing crude oil and refined petroleum products for in-state consumption, Oklahoma exports substantial volumes of both to neighboring states and other regions of the country. Several petroleum product pipelines connect the state's refineries to regional and national markets, while crude oil pipelines bring supply into Oklahoma from other states and Canada. These pipelines converge near the city of Cushing in central Oklahoma, a critical hub known as the "pipeline crossroads of the world." Cushing serves as the designated delivery and pricing point for West Texas Intermediate (WTI), the U.S. benchmark crude oil. It hosts over 70 inbound, outbound, and intra-terminal pipelines and accounts for approximately 14% of the nation's crude oil storage capacity, excluding the Strategic Petroleum Reserve.[99] Crude oil that remains in-state is delivered to Oklahoma's five major oil refineries. In 2023, Oklahoma's refineries had a combined processing capacity of about 547,000 barrels per calendar day, which is about 3% of the U.S. total refining capacity.[100]

Exploration & Production Supplier Profile

The following section highlights selected profiles of leading crude oil producers operating in Oklahoma. Given the large number of producers in the state, it is not feasible to include them all in this report. Many of the profiles reference Oklahoma's two major oil-producing regions: the South Central Oklahoma Oil Province (SCOOP) and the Sooner Trend Anadarko Canadian Kingfisher (STACK).[101] These geologic formations contain multiple productive zones, enabling extraction from several layers of hydrocarbon-rich rock located thousands of feet below the

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surface. Together, the SCOOP and STACK formations account for the majority of Oklahoma's current oil and natural gas production.

Ovintiv, Inc.
Based in Denver, Colorado, Ovintiv, Inc. is a leading production company, with global resources, focused on North America. Ovintiv's Oklahoma resources lie in several counties of the Anadarko Basin and produced an average 21,900 barrels of crude oil per day in 2024 (ref70). The company's leases include areas of Blaine, Canadian, Custer, Dewey, Grady, Kingfisher, Major, and McClain counties. The majority of the crude oil produced in this area is transported to sales points by pipeline.[102]

Devon Energy
Devon Energy is an Oklahoma-City based oil and gas exploration and production company with multi-state operations. Its primary Oklahoma exploration and production occur in the Anadarko Basin's STACK development, which is located primarily in Canadian, Blaine and Kingfisher counties. In 2024, the Anadarko Basin development produced 13,000 barrels of crude oil a day, only 4% of Devon's total oil production.[103] The Delaware Basin in Texas remains Devon's most significant asset, with 2024 yielding an average of 220,000 barrels of crude oil a day, or 63% of Devon's total crude oil production.[104] While the STACK play had previously contributed to a significant portion of Devon's production profile, Devon no longer regards this play as a significant portion of their business. However, the acquisition of the Williston Basin business of Grayson Mill in the third quarter of 2024 should lead to significant increases in production volumes in 2025.[105]

Continental Resources
Continental Resources is an Oklahoma-based company with major oil and gas exploration and development holdings in North Dakota, Montana, Oklahoma, Texas, and Wyoming. Within Oklahoma (Continental's South Region), the company has properties in the SCOOP and STACK plays in the Anadarko Basin development area.[106] The SCOOP play leases extend across Garvin, Grady, Stephens, Carter, McClain, and Love counties. Most of Continental's leased acreage in the STACK play is in Blaine, Dewey, and Custer counties. In the fourth quarter 2024, Continental produced an average of over 126,000 barrels of crude oil per day from the Anadarko Basin.[107] The company also has significant future production ability in this region. As of the end of 2024, Continental had 76.8 million barrels of crude oil in proved developed and 91.9 million barrels of proved undeveloped reserves in its South Region.[108] As Continental is an exploration and production company only, it sells the majority of its crude oil production to refining companies or midstream marketing companies at major market centers.[109] Much of Continental's production is directly connected to pipeline gathering systems with the remaining product transported by truck either directly to a refinery or to a point on a pipeline system.[110]

Transportation & Storage Profile

Similar to the exploration and production segment, a wide array of companies are engaged in the transportation and storage of crude oil and other petroleum products within Oklahoma. Although

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it is not feasible to profile every entity, the following highlights a selection of the largest and most prominent companies operating in this segment.

Phillips 66
Phillips 66, based in Houston, Texas, operates several major crude oil pipelines in Oklahoma: the Oklahoma Crude, CushPo, STACK PL, and Line O pipelines.[111] The Oklahoma Mainline stretches from Wichita Falls, Texas, to Ponca City with a capacity of 100 MMbbl/d, the Cushing pipeline stretches from Ponca City to Cushing with a 130 MMbbl/d capacity, and the Line 0 pipeline stretches from Cushing to Borger, Texas, with a capacity of 37 MMbbl/d. Phillips 66 has two crude oil storage locations in Oklahoma, with 675,000 barrels of storage capacity at Cushing and 1.23 million barrels of storage at Ponca City. In addition to its crude oil pipelines, Phillips 66 operates multiple petroleum products pipelines that carry products to points within or through Oklahoma.[112]

NGL Energy Partners LP
NGL Energy Partners is a Tulsa-based, publicly traded partnership that provides multiple services to producers and end-users, including transportation, storage, blending and marketing of crude oil, NGLs, and water solutions. NGL owns the Grand Mesa Pipeline that transports crude oil from the Denver-Julesburg Basin in Colorado to Cushing, OK, where their storage facility can hold 3.6 MMBbls of crude.[113]

Energy Transfer LP
Energy Transfer LP is a Dallas-headquartered company formed in 1996. Energy Transfer is a leading provider of midstream services across the U.S., with over 125,00 miles of pipeline spread across 44 states.[114] Energy Transfer is the owner of the Enable Oklahoma Intrastate Transmission (EOIT) pipeline, a 2,200-mile pipeline system that provides natural gas transportation and storage services to customers in Oklahoma. EOIT transports natural gas from both the Anadarko and Arkoma Basins. Energy Transfer also owns many other assets that refine and process natural gas, as well as crude oil.[115]

NATURAL GAS SUPPLY PROFILE

Natural Gas Infrastructure Overview

Natural gas infrastructure in Oklahoma consists of power plants, processing plants, pipelines, and storage facilities. While the precise locations of the thousands of gas wells are too numerous to display in this report, Figure 16 highlights major infrastructure in Oklahoma's natural gas sector, including 70 natural gas processing plants, 12 underground storage sites, and many miles of interstate and intrastate pipelines. Additional information is available through the EIA's U.S. Energy Atlas: https://atlas.eia.gov.

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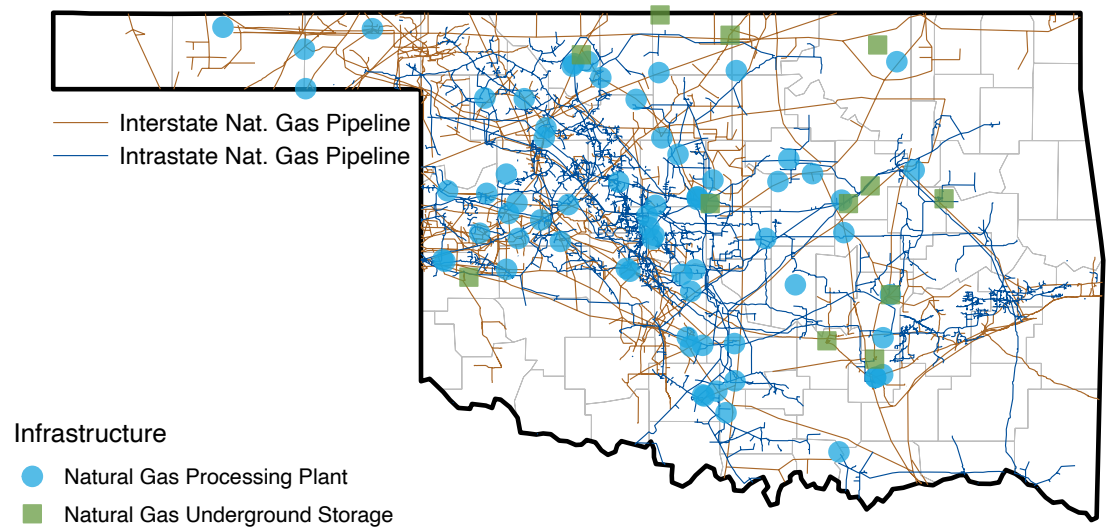
Figure 16: Natural Gas Infrastructure in Oklahoma



Source: Energy Information Administration, US Energy Atlas

Natural Gas Supply Overview

Oklahoma is one of the top six natural gas producers in the United States, accounting for roughly 7% of total U.S. production.[116] The state also holds significant coalbed methane reserves in the Arkoma Basin and the Cherokee Platform in eastern Oklahoma, although extraction from these sources has declined in recent years. Notably, Oklahoma produces three to four times more natural gas than it consumes, making it a key supplier to other regions of the country.[117] In 2020, the state had over 40,000 producing gas wells.[118] In 2023, Oklahoma's total natural gas production exceeded 2,825,931 million cubic feet (marketed production), with much of the surplus transported via pipeline to markets in Kansas, Texas, and Arkansas.[119] In 2024, the city gate price in Oklahoma was $6.18 per thousand cubic feet, compared to a national average of $4.26.[120]

Figure 17 shows the 30-year history of natural gas marketed production in Oklahoma. As the figure illustrates, production levels have fluctuated over the past three decades. Natural gas output increased significantly in the 2010s due to advances in drilling and production technologies, particularly horizontal well stimulation. In addition, the Shale Act of 2011 enabled horizontal development in shale formations, leading to unprecedented oil and gas production from tight shale resources. Regarding future natural gas production, Oklahoma had an estimated 41,771 billion cubic feet of dry natural gas and 2,759 million barrels of natural gas plant liquids in known reserves as of 2022.[121] Additionally, as of June 2025, the state had 163,290 million cubic feet of working gas in underground storage.[122] On an annual basis, Oklahoma typically withdraws slightly more natural gas from underground storage than it injects, indicating a net drawdown to help meet demand.[123]

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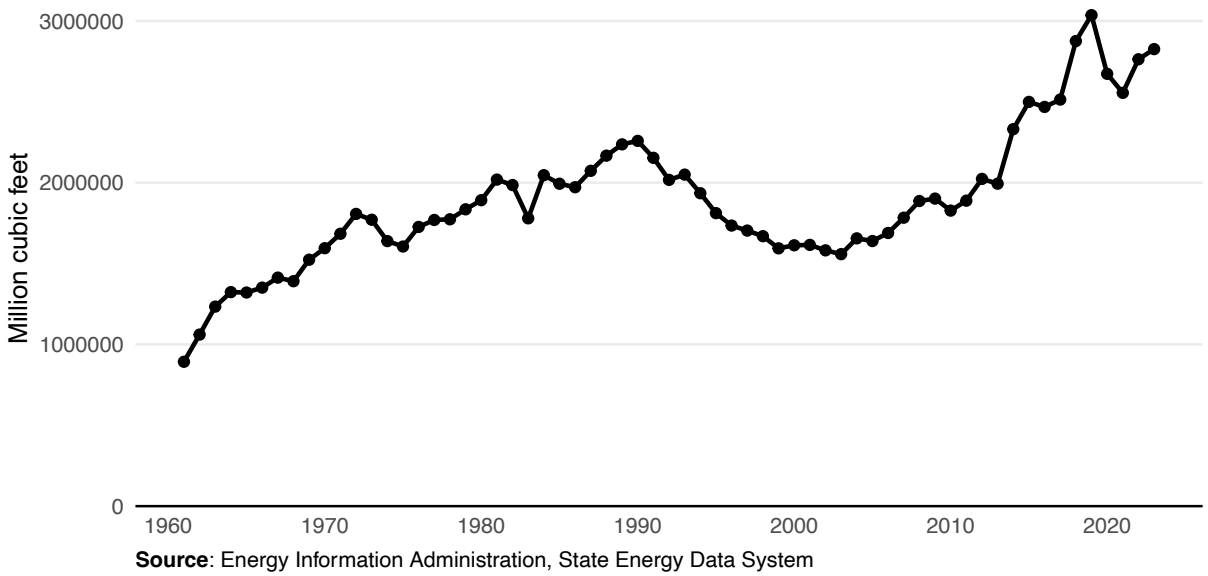
Figure 17: Natural Gas Production in Oklahoma



Source: Energy Information Administration, State Energy Data System

In addition to robust production and storage capacity, Oklahoma is a key hub in the national natural gas pipeline network. The state's extensive pipeline infrastructure supports both in-state distribution and interstate transport of natural gas. While the state does not regulate interstate pipelines, the federal Pipeline and Hazardous Materials Safety Administration (PHMSA) oversees the U.S. Department of Transportation's national regulatory program to ensure the safe transportation of natural gas, petroleum, and other hazardous materials by pipeline. The Oklahoma Corporation Commission's (OCC) Pipeline Safety Division administers the intrastate regulatory program to ensure the safe transportation of natural gas within Oklahoma. The Commission develops rules and oversight practices covering pipeline design, construction, testing, operation, maintenance, and emergency response. Its authority derives from state statutes and certification agreements with the U.S. Department of Transportation. The OCC's safety jurisdiction includes over 50,000 miles of pipeline, more than 258 intrastate gathering, transmission, and distribution operators, and 33 intrastate hazardous liquid operators.[124]

Exploration & Production Supplier Profile

Continental Resources

As referenced in the crude oil section, Continental Resources is an Oklahoma-based company with major oil and gas exploration and development holdings in both Oklahoma and North Dakota. In Oklahoma, the company operates primarily within the SCOOP and STACK plays in the Anadarko Basin development area (ref95). The SCOOP play extends across Garvin, Grady, Stephens, Carter, McClain, and Love counties, while most of Continental's leased acreage in the STACK play is

located in Blaine, Dewey, and Custer counties.[125] In 2024, Continental produced over 533 million cubic feet of natural gas per day from the Anadarko Basin.[126] The company also holds significant potential for future production in the region. As of the end of 2024, Continental reported approximately 1.87 million MMcf of proved developed natural gas reserves and nearly 1.5 million MMcf of proved undeveloped reserves in the Anadarko Basin.[127]

Ovintiv, Inc.
Based in Denver, Colorado, Ovintiv Inc. is a leading oil and gas production company with global resources and a focus on North America. In Oklahoma, Ovintiv's operations are concentrated in several counties within the Anadarko Basin, where the company produced an average of 265 million cubic feet of natural gas per day in 2024.[128] Its leases include areas in Blaine, Canadian, Custer, Dewey, Garvin, Grady, Kingfisher, Major, McClain, and Stephens counties.[129]

Expand Energy
In October 2024, the Oklahoma City-based Expand Energy Corporation (formerly Chesapeake Energy Corporation) acquired Southwestern Energy Company, forming the largest independent natural gas producer in the United States. Expand operates in three major regions: Haynesville, Northeast Appalachia, and Southwest Appalachia. In 2024, the company produced a total of 3,611 million cubic feet of natural gas per day across these three operations.[130]

Transportation & Storage Profile

Nearly 120 natural gas and hazardous liquid pipeline operators in Oklahoma are registered in the National Pipeline Mapping System (NPMS). NPMS provides a public pipeline viewer that displays pipeline locations by county. The viewer can be accessed at: https://pvnpms.phmsa.dot.gov/PublicViewer/. The profiles below provide an overview of selected pipeline operators with substantial infrastructure in Oklahoma.

ONEOK
ONEOK is a Tulsa-based midstream provider offering natural gas and natural gas liquids gathering, transmission, processing, and storage services. Its intrastate transmission system includes approximately 5,200 miles of pipelines with a peak capacity of 4.3 billion cubic feet per day.[131] This system is connected to seven underground storage facilities, 35 processing plants, and 130 producing fields within Oklahoma.[132] It also includes 12 interstate and six intrastate pipeline interconnects.[133] ONEOK provides gas storage services through approximately 47 billion cubic feet of working gas storage capacity across four depleted gas reservoirs, Haskell, Osage, Edmond, and Depew, all located in Oklahoma. These storage fields have maximum daily injection and withdrawal capabilities of approximately 700 million and 1,500 million cubic feet, respectively.[134] The company also owns ten natural gas processing plants in the Mid-Continent region with a combined capacity of 1 billion cubic feet per day and has access to an additional 200 million cubic feet per day through a long-term processing services agreement.[135]

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Williams
Williams is a Tulsa-based midstream services company that transports, stores, and processes approximately one-third of the natural gas supply in the United States. The company's Central operating area includes pipeline and storage infrastructure in Oklahoma, including the 190-mile Bluestem Pipeline, which extends from Kingfisher to Conway, Kansas.[136] In total, Williams operates roughly 917 miles of pipeline in Oklahoma, along with storage facilities, compression stations, and gas treating services located throughout the state.[137]

Natural Gas Utilities Distribution Profile

The six natural gas companies that provide retail (distribution) service to most of the state, and which are regulated by the state[138], are:

Arkansas-Oklahoma Gas Corporation
Summit Utilities Oklahoma, Inc. (formerly CenterPoint Energy)
Navitas Utility-Fort Cobb/LeAnn Gas
Oklahoma Natural Gas, a division of ONE Gas
Greenlight Gas (formerly Panhandle Natural Gas)
West Texas Gas Company

Of these regulated utilities, the two largest providers are Oklahoma Natural Gas and Summit Utilities.
Oklahoma Natural Gas Company
Oklahoma Natural Gas Company is a division of Tulsa-based ONE Gas. ONE Gas is among the largest natural gas distributors in the United States, serving more than 2 million customers in Oklahoma, Kansas, and Texas. In Oklahoma, Oklahoma Natural Gas serves approximately 924,000 residential, commercial/industrial, and transportation customers (the vast majority of which are residential) and maintains 20,300 miles of transmission pipelines and distribution mains in the state.[139]

Summit Utilities
Summit Utilities, owned and operated by Summit Utilities, Inc., is a natural gas energy provider to over 525,000 customers throughout Arkansas, Oklahoma, and the Texarkana, Texas area.[140] Across the three states Summit serves, Summit operates 17,000 miles of gas main pipeline. Ninety cities/municipalities in Oklahoma are serviced by Summit.[141]

Public Sector Utilities

State law does not allow the OCC to regulate any natural gas utility operated by a city. Instead, local governments and/or municipal boards regulate these city-operated utilities. In Oklahoma, at least 45 municipalities operate natural gas utilities. Those that have been identified through their participation in the Oklahoma Gas Association include:

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Afton Public Works Authority
Avant Utilities Authority
Billings Public Works Authority
Burbank Municipal Natural Gas Dept.
Burlington Municipal Natural Gas Dept.
Chelsea Gas Authority
Chouteau Public Works Authority
Cleveland Municipal Authority
Copan Light, Water & Gas System
Corn Municipal Natural Gas Dept.
Covington Municipal Natural Gas Dept.
Drumright Gas Authority
Freedom Gas Distribution System
Geary Utility Authority
Gore
Grove Municipal Services Authority
Guymon
Hardesty Municipal Natural Gas Dept.
Haskell Municipal Natural Gas Dept.
Hooker
Jay Utility Authority
Jones City Gas Company
Kaw City
Keyes Utility Authority
Kiefer Public Works Authority
Mannford Public Works Authority
Oilton Public Works Authority
Orlando Public Works Authority
Pryor Municipal Utility Board
Ripley Public Works
Roland
Romona
Seiling Public Works Authority
Sperry Utility Service Authority
Stilwell
Tahlequah
Taloga
Town of Cashion
Town of Fairfax
Town of Granite
Town of Hulbert
Town of Slick
Tuttle Public Works Authority
Vici Public Works Authority

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Wakita Utilities Authority
Wann Public Works Authority
Webbers Falls
Willow Natural Gas Dept.
Yale

Trade Associations & Other Stakeholders

In Oklahoma, a number of trade associations represent the natural gas industry. These organizations are responsible for training, regulatory issues, future planning, and industry relations. Although there are many organizations to which companies may belong, some of the major natural gas associations serving Oklahoma include:

American Gas Association (AGA)
Natural Gas and Energy Association of Oklahoma (NGEAO)
Oklahoma Gas Association (OGA)
Petroleum Alliance of Oklahoma
Oklahoma Municipal Natural Gas Coalition

Energy Efficiency for Natural Gas

Both major natural gas providers in Oklahoma offer energy efficiency programs for natural gas. Oklahoma Natural Gas offers residential efficiency rebates for furnace, water heating, or space heating systems and Summit Utilities Oklahoma offers a wide variety of both residential and commercial efficiency rebates as well as educational programs. In 2019, Oklahoma Natural Gas's programs saved over 365,000 Mcf across over 65,000 participants and Summit's programs saved a combined 107,230 Mcf across over 74,406 participants.[142]

COAL SUPPLY PROFILE

Oklahoma has a modest amount of coal deposits, ranking 21st in the nation for coal production in 2023.[143] In 2023, Oklahoma coal mines produced approximately 2 thousand short tons of coal in 1 mine in Okmulgee County. Coal, primarily out of state coal, is the fuel source for approximately 5.8 percent of the electricity generation in the state, a percentage that has decreased markedly in the past decade.[144] The coal utilized for electricity generation in Oklahoma is primarily from Wyoming and delivered by railcar.[145]

Active coal mining in Oklahoma is regulated by the Federal Office of Surface Mining and Reclamation.[146] However, the Oklahoma Department of Mines and the Oklahoma Conservation Commission do operate programs related to land reclamation that has been disturbed due to mining operations and other federally mandated programs related to health and safety in mining.[147]

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PROPANE SUPPLY PROFILE

Liquefied Petroleum Gas, also known as LP Gas or propane, is a source of heating fuel and transportation fuel in Oklahoma. Propane is a byproduct of both crude oil and natural gas production. The Oklahoma LP Gas Administration regulates the propane industry, enforcing safety codes and conducting investigations after accidents occur.

In 2023, propane was the primary heating source in 6.2 percent of Oklahoma homes. The national average for this same year was 5.0 %.[148] This is largely due to the rural nature of much of Oklahoma, which makes natural gas cost prohibitive as a fuel source. Propane is transported in pipelines or via truck for distribution to customers.

The National Propane Gas Association is the national trade association representing the U.S. propane industry.[149] The Oklahoma Propane Gas Association is the statewide organization for propane gas retailers.[150] Its sister organization, the LP Research, Marketing and Safety Commission offers programming and education to improve safety related to LP Gas.[151]

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SEISMICITY PROFILE FOR OKLAHOMA

OVERVIEW

Earthquakes have the potential to impact Oklahoma's energy infrastructure. Some of the hazards related to earthquakes include ground shaking, liquefaction, lateral spreading, landslides, sloshing, elephant foot buckling, seiches, and fatigue. Brief explanations of each of these hazards are provided below. While many of these hazards are typically associated with large earthquakes (Magnitude (M) 6.0 and larger), the significant number of moderate (greater than M5.0) and small earthquakes seen in Oklahoma in recent years can also cause damage to energy infrastructure through ground shaking, sloshing, elephant foot buckling, and fatigue.

- **Ground Shaking:** Ground shaking is caused by seismic waves generated during earthquakes. Ground shaking during earthquakes can last from several seconds for smaller earthquakes to a few minutes for larger ones. The intensity of ground shaking typically reduces as the distance from the epicenter (the point on the earth's surface vertically above the point where an earthquake originates or the hypocenter) increases. Ground shaking is typically more hazardous to above-ground structures than buried structures due to independent movement in above-ground structures between the ground and the structure. Ground shaking due to moderate earthquakes has caused substantial damage to residential structures and minor damage to bridges in Oklahoma.[152]
- **Liquefaction:** Liquefaction occurs when water pressure in the pore spaces of loose, saturated, sandy/silty soils increases during ground shaking and turns these soils into thick liquids similar to quicksand. Liquefaction can lead to buildings sinking into the ground and buried pipelines and tanks floating to the surface. Two instances of minor liquefaction near the Arkansas River have been documented in Oklahoma.[153]
- **Lateral Spreading:** Lateral spreading occurs when soil masses on gentle slopes move due to ground shaking. Lateral spreading typically occurs when soft clays or liquefiable soils underlie a strong surface crust. Lateral spreading can cause extensive damage to buried pipelines.
- **Landslides:** Landslides during earthquakes occur when soil masses on steep slopes move downhill due to ground shaking. Landslides can cause extensive damage to both buried and above-ground structures on or near the slopes.
- **Sloshing:** Sloshing is agitation of liquids in storage tanks due to ground shaking. Sloshing can damage liquid storage tanks. Due to sloshing, the stored liquid can also overtop the tank. Sloshing can pose a hazard to Oklahoma energy facilities with large numbers of tanks such as the crude oil and petroleum storage facility at Cushing.
- **Elephant Foot Buckling:** Elephant foot buckling is the outward bulging of above-ground liquid storage tanks near the ground surface due to rapid increase in fluid

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pressure during earthquakes. Again, facilities such as Cushing with large numbers of liquid storage tanks are vulnerable to this hazard.

- **Seiches:** A seiche is a standing wave caused by an earthquake in an enclosed or partially enclosed body of water such as a lake, pond, or reservoir. This hazard poses a potential risk to Oklahoma's hydroelectric infrastructure near a dam or a reservoir.
- **Fatigue**: Fatigue occurs in components of structures that undergo large numbers of cycles of loads. An individual load cycle may not be large enough to cause a failure, but large numbers of small cycles can lead to fatigue failure. Due to large numbers of small and moderate earthquakes in Oklahoma, fatigue failure is a concern to Oklahoma energy infrastructure such as pipes, transmission towers, and storage tanks.

Earthquakes can be broadly classified into two types, natural and induced. Natural earthquakes are primarily caused by volcanic or tectonic activity. Earthquakes occurring from any man-made activity are classified as induced earthquakes. These man-made activities could include mining, blasting, and disposal of wastewater generated during oil and gas production into deep disposal wells. Oklahoma has experienced both natural and induced earthquakes. Seismicity-related natural earthquakes are discussed first and then seismicity related to induced earthquakes is discussed. Finally, the ODOT ShakeCast model is presented as a potential adaptable strategy for future seismicity monitoring and response in the energy sector.

NATURAL SEISMICITY

Oklahoma's natural seismicity is primarily defined by a collection of faults in the southwestern part of the state. Of these faults, the only fault deemed to be active is the Meers fault (see Figure 18 on the next page).[154] The U.S. Geological Survey (USGS) considers a fault that has moved in the past 10,000 years as an active fault. Oklahoma has, however, experienced natural earthquakes outside of this region in the past. For example, in 1952, El Reno experienced a M5.5 earthquake that caused wide-spread minor damage in El Reno and surrounding cities.[155] Approximately seven natural earthquakes have occurred since 1918 with magnitudes capable of causing even minor damage.[156] On average, natural seismic activity in Oklahoma results in about 1.5 M3.0 or greater earthquakes per year.[157]

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Figure 18: Faults in Southwestern Oklahoma

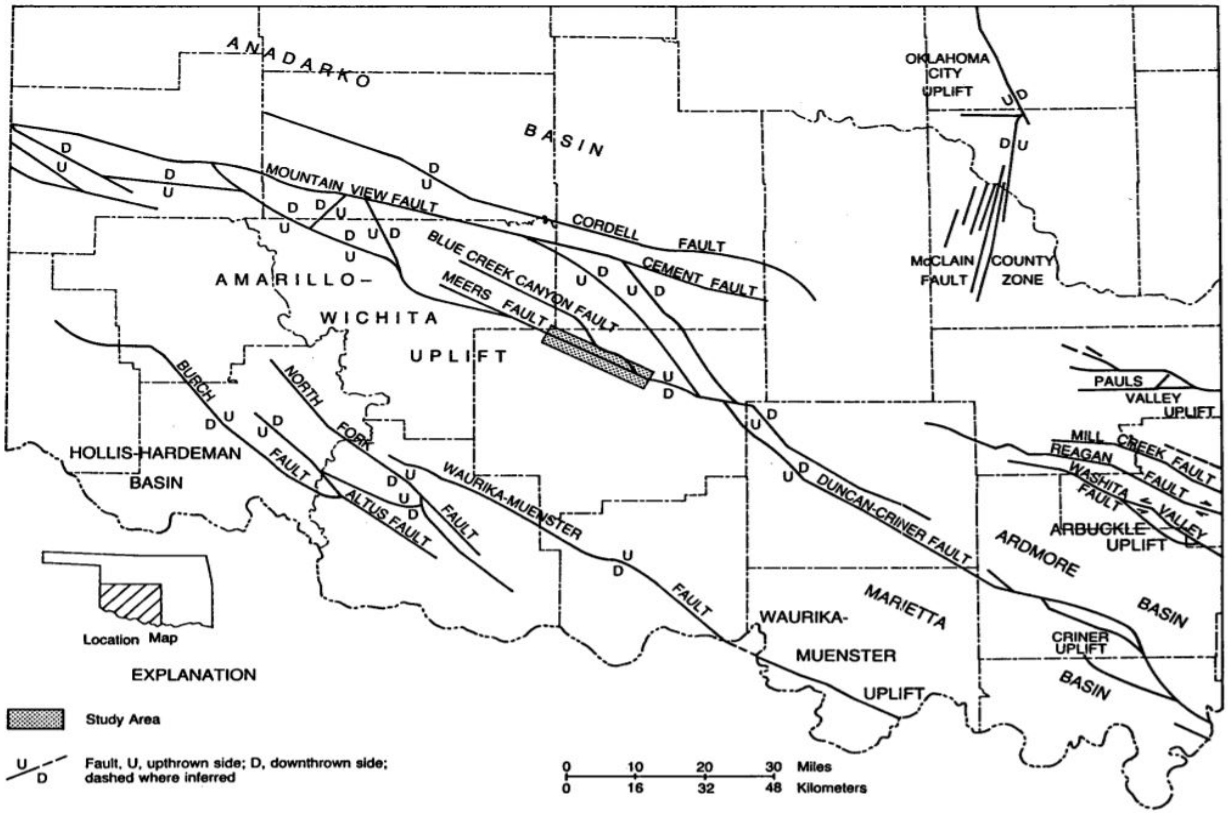
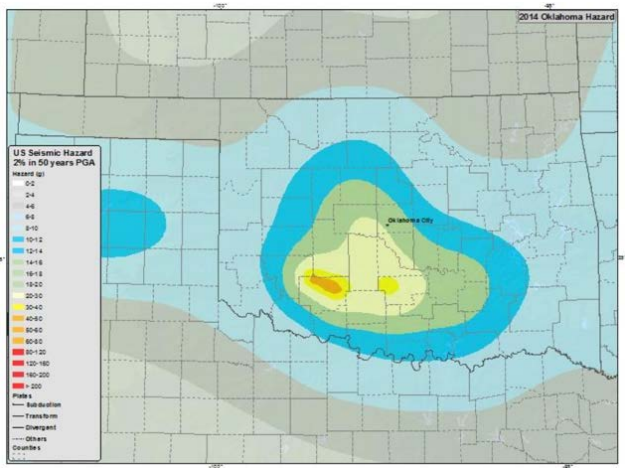


Figure 19: Natural Seismic Hazard Map for Oklahoma



Because only the Meers fault is considered an active fault, USGS develops natural seismic hazard maps for Oklahoma based on probabilistic seismic hazard analysis of activity on the Meers fault. Figure 19, next page, illustrates the Peak Ground Acceleration (PGA) (maximum acceleration on the ground surface) contours (as a percentage of gravitational acceleration of the earth, g) with a 2% probability of exceeding in 50 years (i.e., 2% probability of exceeding the given value at a location in 50 years) from the Meers fault.[158] PGA values are typically used as an indicator of ground shaking intensity and can be related to seismic damage to structures. For example, in general, PGA values in the range of 0.3 to 0.5 g (30 – 50% of g) can be expected to cause major damage and the values less than 0.1 g (10 % of g) will likely result in minor or no damage.

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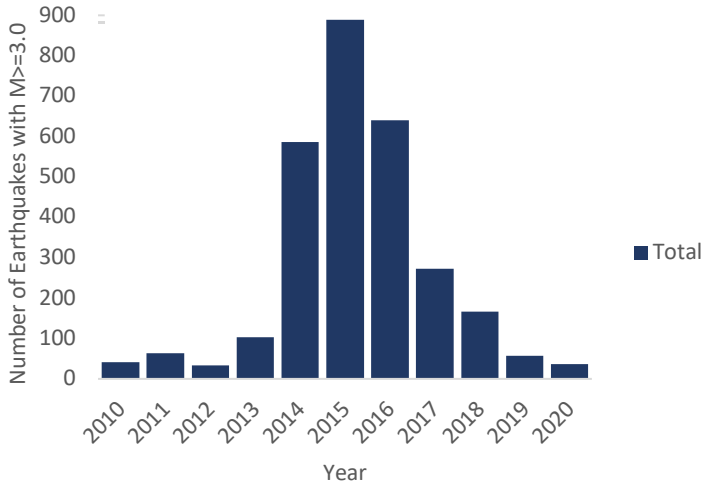
INDUCED SEISMICITY

Starting in 2009, there was a dramatic increase in number of earthquakes in Oklahoma. In 2009 there were 20 M3.0 or greater earthquakes compared to an average of about 1.5 such earthquakes per year prior to that year. In 2015, Oklahoma experienced a peak of 889 M3.0 or greater earthquakes,[159] the largest number of earthquakes in Oklahoma in a single year.

Figure 20: Number of Earthquakes in Oklahoma with a Magnitude Greater or Equal to 3.0: 2010-2020



Oklahoma experienced its largest recorded earthquake on September 3rd, 2016, registering at M5.8 near Pawnee, Oklahoma. The number of earthquakes in Oklahoma with M3.0 or greater from January 1st, 2010, to December 31st, 2020, are shown in Figure 20.[160]

Studies by Keranen et al.[161] have linked this increase in seismic activity in Oklahoma to wastewater injection in disposal wells. On April 21st, 2015, the Oklahoma Geological Survey (OGS) released a statement that the underground injection of wastewater associated with oil and gas production was likely tied to the swarm of earthquakes that had hit Oklahoma.[162] With the support of the OGS, the OCC began implementing plans to reduce seismicity across the state of Oklahoma on May 11th, 2015.[163] This plan included well shutdowns along with reduced injection volume. Seismicity in Oklahoma has decreased following both the actions taken by the OCC and the reduction in production activities related to a reduction in oil prices in recent years. Due to continuously changing seismic activity, it is difficult to produce a seismic hazard map for induced seismicity in Oklahoma similar to the map shown in Figure 19 for natural seismicity. USGS, however, attempted to produce such a hazard map for a single year in 2016.[164] Such maps are no longer valid since the induced seismic activity has now significantly declined. The long-term impact of already injected wastewater to create earthquakes in Oklahoma is not fully understood and therefore induced earthquakes still have the potential to impact Oklahoma's energy sector from effects related to ground shaking, sloshing, elephant foot buckling, and fatigue.

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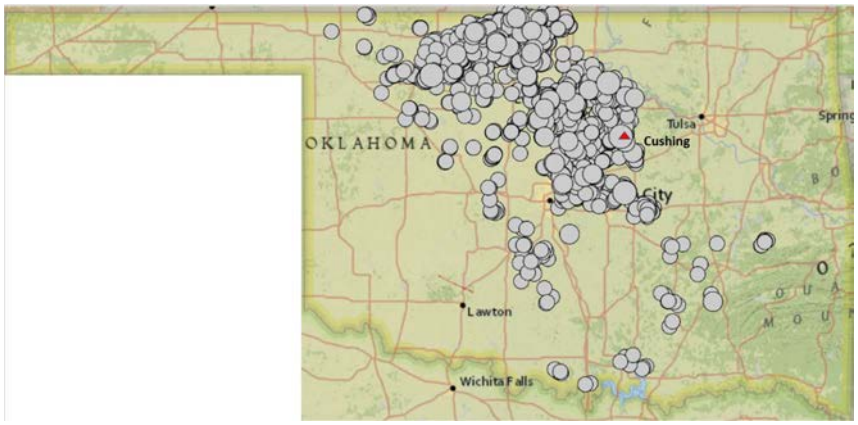
Figure 21: Epicenters of Earthquakes in Oklahoma: 2010-2020



The epicenters of earthquakes in Oklahoma from January 1st, 2010, to December 31st, 2020, are shown in Figure 21.[165] The concentration of earthquakes begins just east of Oklahoma City and stretches northwest to the northern border of the state. Cushing is located within this concentration of epicenters. As the effects of ground shaking and related effects are more pronounced near an epicenter of an earthquake, a future large, induced earthquake in the same vicinity of the past earthquakes as shown in Figure 35 has the potential to affect the facilities in Cushing significantly.

ODOT SHAKECAST: A MODEL FOR SEISMICITY TRACKING AND RESPONSE

The Oklahoma Department of Transportation (ODOT) has taken a proactive approach to inspect its bridges following earthquakes[166] and developed a detailed post-earthquake response plan for Oklahoma bridges.[167] The ODOT's bridge inspection system is based on USGS's ShakeCast,[168] but customized for Oklahoma bridges. Following an earthquake, ShakeCast automatically retrieves shaking intensities, compares these intensities to users' facilities' damage potential or fragility curves, and sends email notification of damage reports to responsible parties within 10 – 20 minutes following an earthquake. ODOT's post-earthquake response plan details items such as earthquake response protocols, response team qualifications and training, and corrective actions (bridge closures, temporary repairs, etc.). A future mitigation and response strategy for critical energy infrastructure could include adaptation of the system implemented by ODOT. Critical Oklahoma energy facilities, such as those in Cushing, could likely utilize a similar approach based on ShakeCast for tanks and other infrastructure and include this approach in a post-earthquake response plan to ensure consequences of damage can be minimized. This could also help assure that the damaged facilities can be brought back online rapidly following an earthquake.

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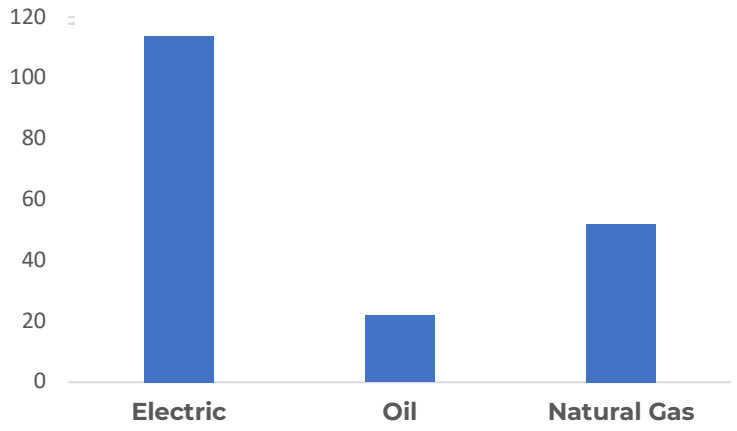
ENERGY VULNERABILITY ASSESSMENTS

This section provides information about events in Oklahoma that have historically caused energy disruptions and outlines potential or known vulnerabilities in Oklahoma's energy infrastructure that should be considered as part of energy planning and emergency response activities. This information is intended to acquaint officials and stakeholders with potential scenarios, patterns, trends, and frequencies of energy incidents in the state of Oklahoma and to provide a basis for risk scenarios.

HISTORICAL ANALYSIS OF ENERGY EMERGENCIES IN OKLAHOMA

To better understand and plan for likely emergency scenarios, a comprehensive history of Oklahoma's energy emergencies was compiled by the University of Oklahoma's National Institute for Risk & Resilience, which conducted a media analysis of reported energy incidents that occurred between January 2016 and December 2019. Oklahoma's two major newspapers—the Tulsa World and the Oklahoman—were used. In all, 188 unique events were documented with the characteristics listed in Figures 22 through 26.[169, 170] This analysis represents a full analysis of recent emergencies; for an analysis of the previous 4-year time period (January 2011 to December 2015) please refer to the 2016 Oklahoma Energy Assurance Plan. Overall results between these two time periods were consistent.

Figure 22: Number of Oklahoma Energy Incidents, by Sector, 2016-2019



As listed in Figure 22, shown above, electricity incidents are by far the most prevalent, making up 60.6% of the 188 events. Oil and natural gas incidents accounted for 11.7% and 27.7% of the emergency events, respectively. There were no reported events outside of these three categories.

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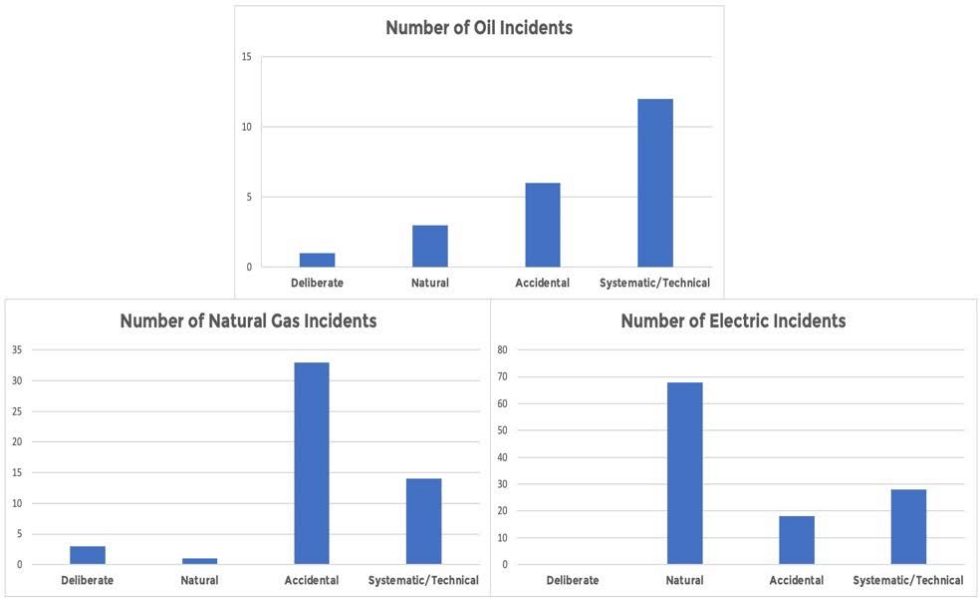
Figure 23 provides a brief look at the cause for each of the 188 energy incidents. Of the energy incidents with a reported cause, most were accidental or systemic/technical in nature. When looking at the oil sectors, most of the incidents were caused by accidents or systemic/technical failures. In the natural gas sector, the majority of incidents with a reported cause were accidental compared to the electricity sector where the majority of incidents were caused by natural disasters.

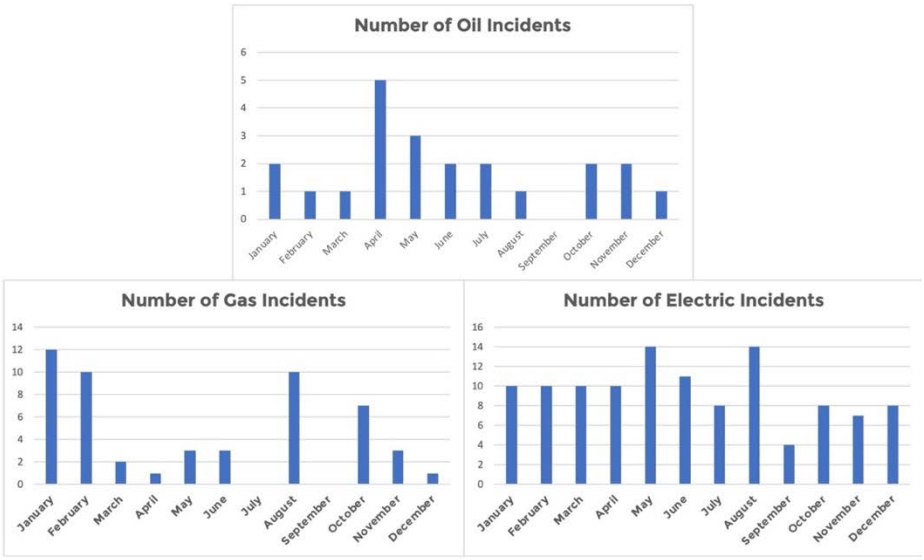
Figure 23: Number of Oklahoma Energy Incidents, by Sector and Reported Cause, 2016-2019



Next, Figure 24 breaks out each of these events by month. The analysis shows that there is no obvious monthly trend to the occurrence of oil incidents. There were no oil events for the months of September.

Next, the majority of natural gas incidents have occurred in January and February. In comparison, electric incidents are spread throughout the year, with noted peak months in May and August, with 14 incidents occurring in each month.

Figure 24: Number of Oklahoma Energy Incidents, by Sector and Month, 2016-2019



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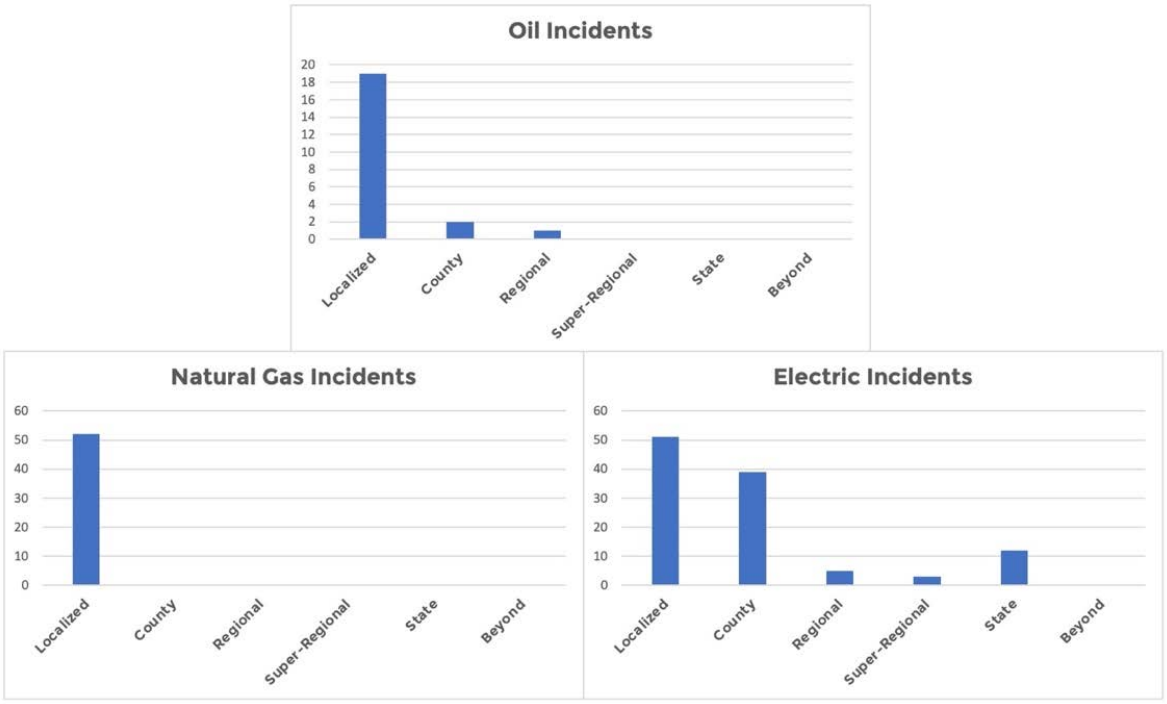
Finally, Figure 25, below displays the scope of impact of each energy incident by sector. Incidents with no clear scope reported in the news article were not coded. There was only one incident from each the natural gas and oil categories with an unreported scope. These data reveal a distinctive pattern—natural gas and oil incidents tend to be localized in nature whereas electricity incidents

Figure 25: Number of Oklahoma Energy Incidents, by Sector and Reported Scope, 2016-2019



range from local to statewide in scope. This fact, combined with the previous analysis, indicates that electricity incidents are the most common type of energy emergency in Oklahoma and have the potential to affect the largest number of people. This makes electricity incidents of the highest consequence and probability in Oklahoma. In fact, U.S. Department of Energy reports indicated 12 electric events affecting Oklahoma over a five-year period rose to the standard of required federal reporting.[171] Under any of the following circumstances, an electric provider must file a report:

- Physical attack that causes major interruptions or impacts to critical infrastructure facilities or operations
- Cyber event that causes interruptions of electrical system operations
- Complete operational failure or shutdown of the transmission and/or distribution electrical system

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- Electrical System Separation (Islanding) where part/parts of a power grid remain operational in an otherwise blacked out area of the partial failure of an integrated electrical system
- Uncontrolled loss of 300 Megawatts or more of firm system loads for more than 15 minutes from a single incident
- Load shedding of 100 Megawatts or more implemented under emergency operational policy
- System-wide voltage reductions of 3 percent or more
- Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the electric power system
- Physical attack that could potentially impact electric power system adequacy or reliability
- Vandalism which targets components of any security systems
- Cyber event that could potentially impact electric power system adequacy or reliability
- Loss of electric service to more than 50,000 customers for 1 hour or more
- Fuel supply emergencies that could impact electric power system adequacy or reliability

FUTURE APPROACHES TO AUGMENT VULNERABILTY ASSESSMENT CAPABILITIES

As part of Oklahoma's 5-year Strategic Planning Process for energy security, and to provide Oklahoma's planning community with additional analyses in support of the state's risk mitigation approach, the state is actively updating and developing a more comprehensive approach to its Energy Vulnerability Assessment. This new approach will enhance the media-based analysis in this section by incorporating data from a wider range of public sources, including Electric Emergency Incident and Disturbance Reports (OE-417)[172] submitted to the U.S. Department of Energy and the Environment for Analysis of Geo-Located Energy Information (EAGLE-I). These sources will enable a more detailed analysis of the causes and consequences of energy emergencies in the state, offering higher geographic and temporal resolution.

Figure 26 below illustrates this approach by using data from EAGLE-I to plot power outages by county in Oklahoma from 2014 to 2023.[173] The horizontal lines indicate days when ten or more counties experienced a significant outage. Blue lines represent outages caused by ice storms, green lines indicate outages caused by severe weather (e.g., high wind or lightning), and red lines identify events caused by extreme cold, such as Winter Storm Uri. As this example illustrates, additional analysis of this sort will improve our understanding of energy vulnerability in Oklahoma; a comprehensive utilization of these additional sources is planned for the upcoming planning year and should be available by late 2025.

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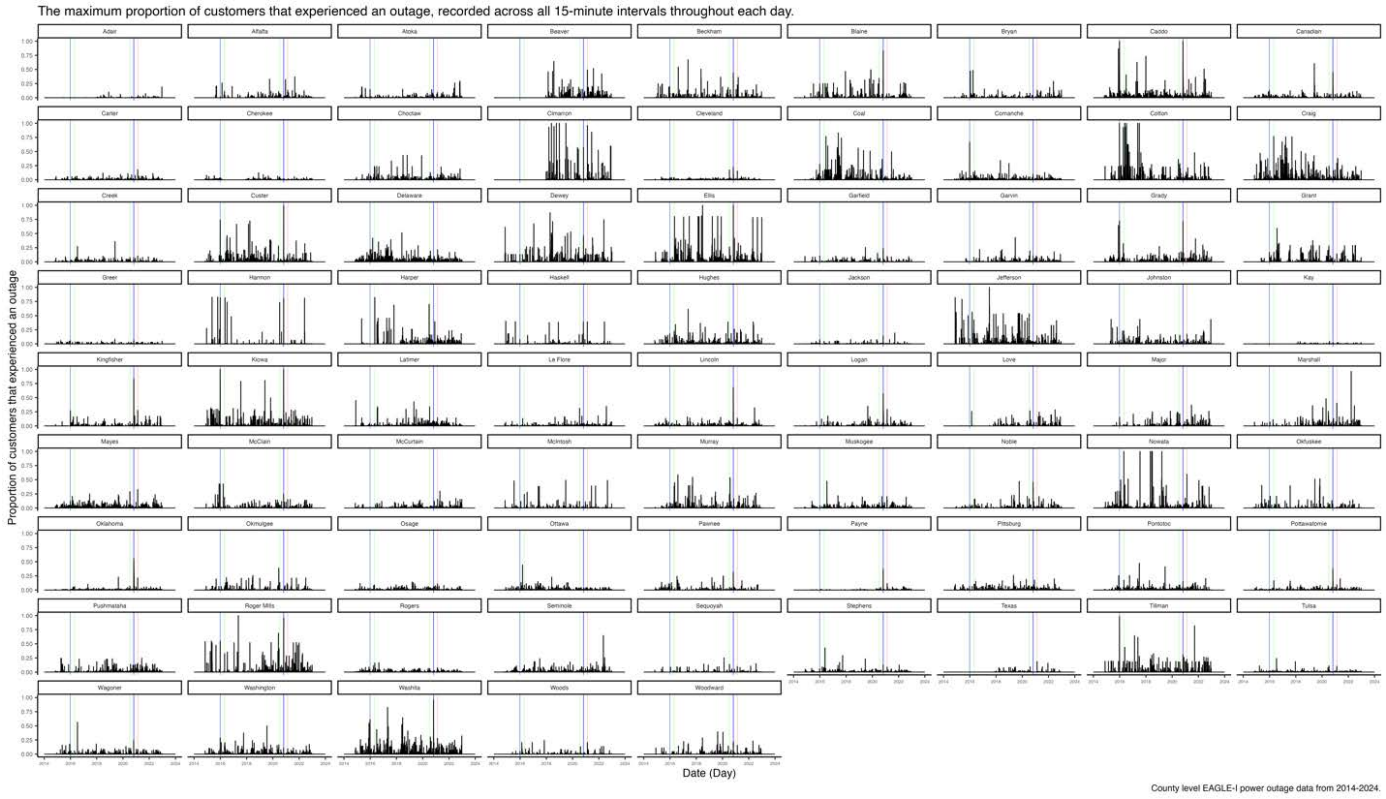

Figure 26: Oklahoma Power Outages, By County, 2014-2023

Furthermore, Oklahoma's energy security planners are looking for future opportunities to bolster the risk assessment by working with other emergency planners, such as OEM's State Hazard Mitigation Planners, to quantify risks within an Oklahoma context. By integrating the state's preexisting hazard rankings from the SHMP[174] with other available tools including the U.S.DOE CESER's Risk Score approach[175], the State Hazard Mitigation Plan has potential to effectively and consistently evaluate Oklahoma specific-threats, vulnerabilities, and consequences. Quantifying risks will also allow for a replicable, precise input into the ERRS risk mitigation formula (see pg. 22). Additional integration between Oklahoma's State Energy Office and its Office of Emergency Management has begun, and will be increased for planning year 2025, with an eye toward opportunities to further integrate independent risk assessment tools.

INFRASTRUCTURE STRENGTHS AND WEAKNESSES

Protecting the state's critical energy infrastructure can be key in preventing at least some energy emergencies and, to protect this infrastructure, an understanding of its inherent vulnerabilities is also critical.

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The section below discusses strengths and weaknesses of Oklahoma's energy portfolio and infrastructure. As natural hazards present significant risks to Oklahoma's energy infrastructure, first an overview of natural hazards in Oklahoma is presented and then strengths and weaknesses of electric, natural gas, and crude oil/petroleum infrastructure are discussed. The primary basis for these discussions is the "State of Oklahoma Energy Sector Risk Profile"[176] published by the U.S. Department of Energy (U.S. DOE). The U.S. DOE produces this document following extensive analyses of available data sources and identifies significant natural hazards with the potential to cause disruption of the energy infrastructure.

Data presented in U.S DOE's Oklahoma Energy Sector Risk Profile, collected from the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Geological Survey (USGS), indicate that the most common natural hazard in Oklahoma between 2009 and 2019 was Thunderstorm/Lightning. The second and third most common natural hazards were Earthquake and Flood, respectively. The three natural hazards that caused greatest overall property damage in Oklahoma between 2009 to 2019 were Tornado, Thunderstorm/Lightning, and Winter Storm/Extreme Cold. Electric utilities in Oklahoma reported Weather/Falling trees as the leading cause for outages between the years 2008 and 2017. The Oklahoma Corporation Commission (OCC) has been working with electricity providers to reduce the number of incidents related to falling trees under OAC 165:35-25-15; additional discussion of vegetation management can be found in the chapter titled "Preparing for, Mitigating, and Responding to Energy Emergencies."[177]

In the past, Oklahoma has not experienced significant impact to natural gas infrastructure due to extreme cold, however, during an extended extreme cold weather spell in February 2021, natural gas supply was strained due to frozen natural gas wells combined with record demand[178] and Oklahoma's neighboring state, Texas, has seen significant impacts to natural gas production and delivery due to cold weather several times since the late 1980s. These historical events and Oklahoma's recent experience demonstrate that energy security planners should account for the possibility of cold weather to impact natural gas production and delivery in the future.

Electric Infrastructure Strengths and Vulnerabilities

Oklahoma's electricity infrastructure strengths include production capacity, geographical distribution of power plants, and diversity in heating sources. As indicated in the "Energy Profile for Oklahoma" chapter, Oklahoma's generation capacity exceeds its typical annual usage; the state also has multiple electric utilities that are members of the Southwest Power Pool (SPP). These features strengthen the state's ability to withstand temporary drops in generation by shifting resources to other generating facilities or drawing from out-of-state generation resources within SPP. The "Energy Profile for Oklahoma" chapter also contains a map of Oklahoma's electric infrastructure, showing good geographic dispersion of electric generation facilities throughout the state. This is a strength because localized events such as earthquakes and tornadoes are less likely to cause multiple generation facilities to be impacted simultaneously. The third strength of Oklahoma's energy infrastructure is the diversity in heating sources, see the "Energy Profile for Oklahoma" chapter for more information. This diversity in home heating sources means that even

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a state-wide electric outage, while still significant, will not necessarily result in a complete outage in home heating.

Oklahoma's electricity infrastructure weaknesses are primarily due to natural hazards and their effect on above-ground transmission and distribution lines. For instance, Oklahoma experienced an unusually early ice storm October 26 - 28, 2020 when there was still significant foliage on trees that allowed ice accumulation to weigh down branches onto power lines. Independent of the falling tree limbs, power lines and power poles were also damaged by the ice leading to widespread outages. A secondary effect of the fallen tree limbs was the creation of traffic interruptions, complicating damage repair efforts. As discussed in the "Preparing for, Mitigating, and Responding to Energy Emergencies" chapter, Oklahoma has made efforts to clear vegetation surrounding power lines; however, even with these efforts Oklahoma infrastructure is frequently impacted by severe weather, ice storms, and fallen trees.

Another weakness is the age of Oklahoma's electricity infrastructure. OG&E, a major electricity provider in Oklahoma, has reported that 27 percent of outages not caused by weather are due to equipment failure.[179] The U.S. DOE reports faulty equipment/human error as the second leading cause of electricity outages in Oklahoma. Failures related to aging infrastructure include the failure of electrical equipment, such as transformers and switches, as well as structural failure of power poles.

Overall, many variables can threaten the complex web of electrical infrastructure which includes items such as generation facilities, transmission lines, substations, transformers, and dams. Threats to electric infrastructure might include:

- *Deliberate attacks* on the electrical system, which could come in many forms. Almost all electricity infrastructure represents potential targets. The intent of some attacks, such as terrorist actions, may be to disrupt electricity networks while others may be a result of vandalism or crime, such as copper theft, both of which could lead to system failures. Hard-to-replace components of the electric grid, such as the custom-built transformers that increase the voltage of electricity to levels suited for bulk transmission and then reduce voltage for distribution to customers, are particularly vulnerable. Very few of those transformers are manufactured in the United States and replacing them can take many months. Furthermore, as the electric grid becomes increasingly automated the power grid is susceptible to attacks from cyber terrorists. A complete discussion of cybersecurity issues can be found later in this section.
- *Natural disasters* pose a particularly high risk in Oklahoma. Local distribution infrastructure and transmission lines, in particular, are severely impacted by the ice storms, high winds, lightning, and tornados that routinely occur throughout the state. Other threats include floods (often exacerbated by drought conditions) which can damage all sorts of electric infrastructure and disrupt the hydroelectric system.
- *Accidents* pose an additional threat to electric infrastructure in Oklahoma. Transmission lines are particularly vulnerable and can often be damaged by local construction projects or transportation accidents.

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- *Systemic threats* such as a prolonged supply disruption to the common feedstocks for electric generation (natural gas or coal) have the potential to disrupt electric providers' ability to meet consumer demand. Further, aging infrastructure can fail, potentially resulting in widespread or prolonged outages.

Natural Gas Infrastructure Strengths and Vulnerabilities

Similar to the electric infrastructure, it is important to consider both the strengths and potential threats to Oklahoma's natural gas infrastructure, which includes wells, transmission lines, gathering lines, distribution lines, and underground storage facilities.

Oklahoma's natural gas infrastructure is a key feature of Oklahoma's overall energy infrastructure. Oklahoma's natural gas strengths include production and storage capacities, underground transmission and distribution, and the geographic distribution of the processing plants. As indicated in the "Energy Profile for Oklahoma" chapter, Oklahoma produces four times as much natural gas as it consumes. In addition, the U.S. EIA indicates that in January 2021, Oklahoma had 86,495 MCF (or approximately 86 Bcf) of working gas in underground storage;[180] this in-state storage capacity serves as a strength during cold weather events where production may be temporarily limited.

A further strength of Oklahoma's natural gas infrastructure is its primarily underground location, offering the majority of natural gas infrastructure protection from the state's frequent severe weather events.

A third strength is the geographic distribution of natural gas processing plants throughout the state. As with the electric infrastructure, the natural gas infrastructure map shown in the "Energy Profile for Oklahoma" chapter indicates that the natural gas processing plants cover the entire state with some concentrations in western and southern Oklahoma. This prevents localized events, such as earthquakes and tornadoes, from impacting all processing plants simultaneously.

One of Oklahoma's natural gas infrastructure weaknesses is the potential for impacts from accidents or deliberate attacks on the many pipelines crisscrossing the state. The U.S. DOE reports that, between the years 1984 and 2019, the most frequent events affecting natural gas transmission and distribution pipelines were categorized as miscellaneous/unknown or outside force.[181] The U.S. DOE classifies "outside force" as those due to vehicular accidents, sabotage, and vandalism and "miscellaneous/unknown" as releases or failures resulting from any other cause not listed or of an unknowable nature.

Further, natural gas infrastructure has a vulnerability in the potential for natural gas wells or pipelines to freeze during extreme cold weather, as Oklahoma saw recently during the polar vortex weather event of February 2021. During this event, and potentially in any extended cold weather event, natural gas infrastructure production may suffer due to well heads or instrumentation freezing[182] while simultaneously consumption increases for home heating. These two factors

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combined resulted in a shortage of gas to meet immediate needs and therefore the second largest reported withdrawal of gas from underground storage in the United States on February 19th, 2021.[183]

In Oklahoma, natural gas pipeline operators have undertaken a process to self-identify their most vulnerable infrastructure and equipment. The list and location of this infrastructure is kept confidential by the operators, but the analysis is complete and on-hand in case of need. Overall, potential threats to this identified infrastructure might include:

- *Deliberate attacks* which could be realized too many portions of natural gas production facilities. Most of the wellheads are in remote areas and are largely unsecured. It is not uncommon for accidents to occur and rupture these wellheads. In addition, intentional damage by either terrorists or vandals could occur. A similar potential exists for the pipeline, processing facilities, pump stations, and ultimately the gas meters – all are potential targets for accident or intentional attacks.

- *Natural disasters* are highly probable events in the state. Oklahoma is regularly impacted by high winds, wildfires, tornados, and lightning which could damage surface infrastructure. Every 5-10 miles, a natural gas pumping station exists above-ground to re-pressurize the lines; these stations are often located in remote areas and are largely unprotected. In addition, the region is modestly seismically active, and the potential exists for damage to occur from a seismic event affecting either surface infrastructure or underground pipelines.

- *Accidents* such as accidental, third-party damage due to construction digging. According to the U. S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA), there are currently 484 miles of natural gas transmission lines and 32,773 miles of gas distribution lines in Oklahoma,[184] and although this abundance of infrastructure makes supply far-reaching and reliable, it also increases the potential for accidents to occur.

- *Systemic threats* which include pipeline corrosion due to aging infrastructure, overall demand increases due to favorable pricing, or newly developed end uses for natural gas.

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Crude Oil and Petroleum Products Infrastructure Strengths and Vulnerabilities

Oklahoma's crude oil and petroleum products infrastructure, which includes crude oil production rigs, storage facilities, pipelines, refineries, and fueling stations, face a variety of threats. In particular, Oklahoma is home to the Cushing Crude Oil Hub. This is a major hub in oil supply connecting the Gulf Coast to rest of the United States and Canada. Up to 75 percent of nation's crude oil passes through this junction, supplying significant amounts of oil to the eastern and midwestern portions of the United States; Cushing holds roughly 15 percent of the nation's crude oil storage capacity.[185] In addition to acting as a supply hub, Cushing is surrounded by several tank farms (see Figure 27), most of which are owned by major petroleum companies including BP, Enbridge Energy Partners, Plains All-American Pipeline, and SemGroup Energy Partners. When combined, the Cushing tank farms can store as much as 46.3 million barrels of oil at a time.[186] The major pipelines that supply Cushing include Spearhead (90,000 bbl/d), Pegasus (96,000 bbl/d), and Keystone (591,000 bbl/d).

Figure 27: Aerial View: Cushing Tank Farm

As with the natural gas infrastructure, one strength of Oklahoma's crude oil and petroleum pipeline infrastructure is its primarily underground location, protecting the infrastructure from severe weather incidents. However, Oklahoma's crude oil and petroleum energy infrastructure weaknesses include the geographical concentration in Cushing, potential deliberate attacks, train derailments, truck collision/rollovers, pipeline corrosion due to aging, and other equipment failure.

The geographical concentration of storage tanks and other infrastructure in Cushing makes it vulnerable to localized events such as earthquakes and tornadoes. As mentioned in the "Seismicity Profile for Oklahoma" chapter, Cushing lies within the epicenters of recent induced earthquakes in Oklahoma. Oklahoma's largest recorded earthquake (M5.8) occurred on September 3rd, 2016, in Pawnee, roughly 25 miles north of Cushing. The OCC has taken steps to reduce induced earthquakes in Oklahoma, however, should a major earthquake occur in or near Cushing it would cause major damage to Oklahoma's crude oil and petroleum energy infrastructure. In addition, the geographical concentration poses a prime target for deliberate attacks. Deliberate attacks on pipelines or storage tanks, while not frequent, can cause not only casualties and economic damage, but also severe environmental damage.[187]

Another infrastructure weakness in this sector is the necessary reliance on trucking for petroleum transport. The U.S. DOE reports that the event types causing the largest economic loss in petroleum transport in Oklahoma by rail and truck between 1986 and 2019 were classified as miscellaneous/unknown followed by derailment or collision/rollover and reports 1.59 incidents per year between the years of 1986 and 2019.[188]

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Critically, Oklahoma's oil and petroleum infrastructure also suffers from the effects of aging. The U.S. DOE reports that the most common event types causing damage to pipelines are Corrosion and Equipment Failure, and half of Oklahoma's pipeline systems were constructed prior to 1970 or in an unknown year. The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides a public database which details incident reports filed each year. The information supports the U.S. DOE's findings that Corrosion and Equipment Failure are the leading causes affecting crude oil pipelines. PHMSA reports four (4) incidents of Corrosion and eleven (11) incidents of Equipment Failure in 2020. Incidents due to Corrosion and Equipment Failure will likely continue as the infrastructure ages.[189]

Overall, Oklahoma's crude oil and petroleum products infrastructure have the following vulnerabilities:

- *Deliberate attacks* could threaten all types of critical petroleum infrastructure. Oil production rigs, storage facilities, pipelines, and refineries are all vulnerable to deliberate attacks. First, crude oil is often stored in above-ground tanks at the production sites, tank farms, and refineries. In some cases, these tanks are largely unprotected. The state requires a 24-hour emergency number to be posted at each well site, but this is the only state asset protection requirement—additional protection measures are at the company's discretion. These isolated and unsecured tanks, while vulnerable, would pose little impact on the overall supply of energy to the state if they were to be damaged intentionally or otherwise. As at the Cushing Pipeline Hub or in the vicinity of refineries, some areas have high concentrations of tanks. These areas are more secure, but not completely. The state does require additional protective measures at disposal sites, such as gates, and cities can set more stringent measures if they choose for sites located within urban areas. In addition, according to the U. S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA), there are currently 4,052 miles of crude oil pipelines in Oklahoma.

- *Natural disasters* also present a risk to crude oil and petroleum infrastructure. High winds and tornadic events could damage production and refinery operations, lightning could strike infrastructure like storage tanks leading to supply shortages, and seismic activity could potentially damage infrastructure.

- *Accidents* are potential risks, particularly for production and pipelines. In particular, accidental pipeline rupture due to unrelated construction digging can be common.

- *Systemic threats* such as the inability to increase crude oil production beyond the current reserves or refining capacity that may be unable to increase production to support anticipated increased future demands.

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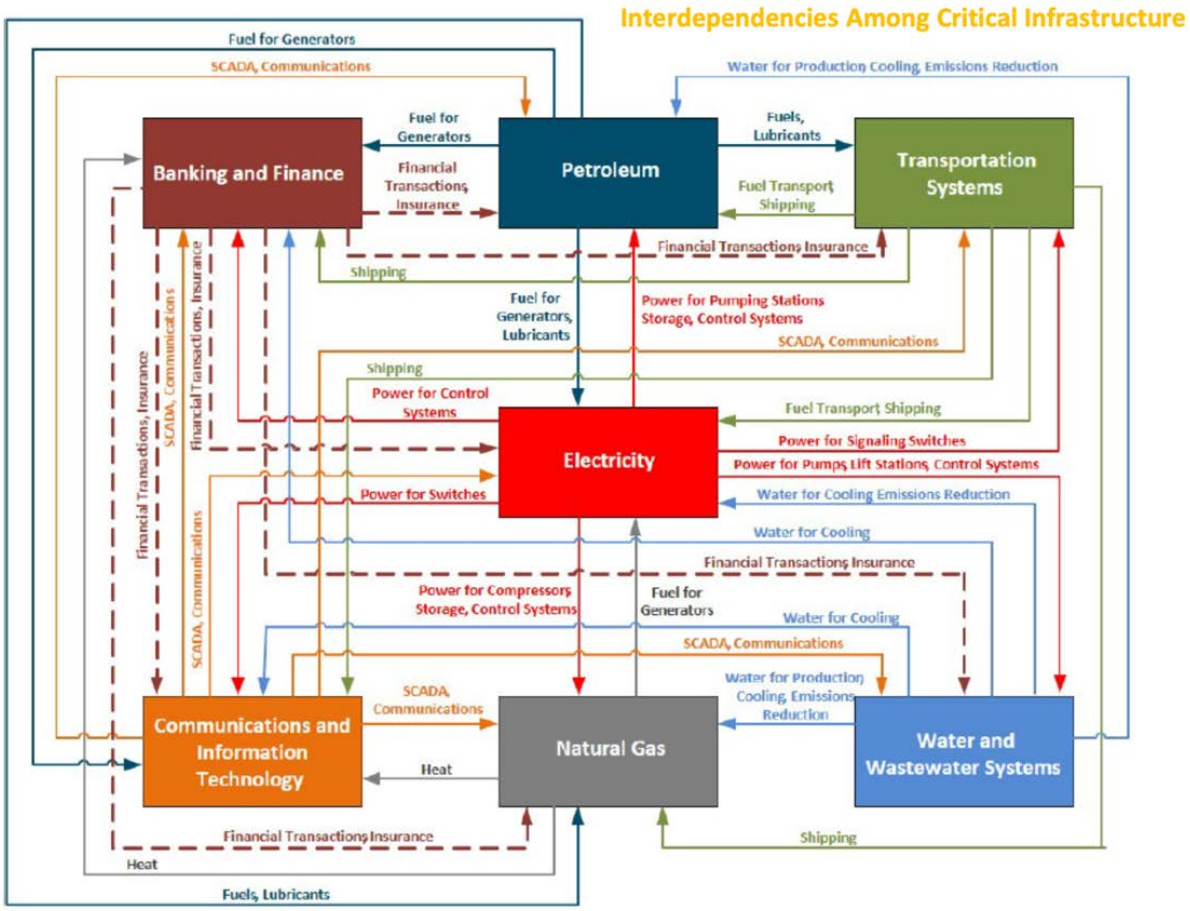
SECTOR INTERDEPENDENCIES

One of the greatest vulnerabilities when planning for energy emergencies is interdependencies, both within the energy sector between energy sources and between the energy sector and other industry sectors. In any type of energy emergency or supply disruption there can be downstream consequences that affect other areas of the economy and the response to the emergency itself. As illustrated in Figure 28, interdependencies are complex and have impacts on critical infrastructure.[190]

Figure 28: Interdependencies Among Critical Infrastructure



Given the complexity and many opportunities for interdependencies, it is wise to plan for scenarios in which energy shortages or emergencies impact other vital industries critical to restoration of normal conditions; this should include extremely severe or extended outages. Planners should begin by evaluating which interdependencies may be most likely or have the greatest impact within their jurisdiction. There are resources available to guide planners through an evaluative process for interdependencies. Planners are encouraged to review and utilize these resources and compare

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the results to existing plans to incorporate any needed additional redundancies, mitigations, or backups.[191] In addition, planners should exercise simulative scenarios that include interdependent system or cascading failures to identify weaknesses in existing plans and prepare for severe events.[192]

A few of interdependency scenarios that have or could affect Oklahoma are outlined below and are presented by sector.

Examples of interdependencies after an electric disruption may include:

- Failure of petroleum supply infrastructure to function when electric power is interrupted
- Outages or slowdowns at refineries and gas processing plants due to electric outages
- Outages of natural gas appliances as restoration of electrical service triggers pilot lights simultaneously and de-pressurizes gas lines
- Failure of water supply and purification systems to operate when electric power is lost
- Secondary utility system time-to-failure when back-up storage is exhausted
- Failure of information system networks, including wired and cellular telephones after an electrical outage
- Failure of 9-1-1 systems due to electrical outages
- Failure of environmental control systems after an electric disruption
- Failure of retail gas companies to pump gas, as they are dependent upon electricity for pump function

Looking to the future, Oklahoma energy security planners should analyze opportunities to lessen the interdependencies between the electric sector and other aspects of the economy or have contingency and redundancy plans in place to overcome the secondary consequences of an energy supply disruption or emergency.

First, certain changes to infrastructure that is reliant on electric power would reduce the kind of mutual dependencies that result in wider blackouts. For example, critical traffic signals could be equipped with battery backup to reduce the possibility that during an electric failure there will also be a loss of traffic control. Similarly, small generators could be placed in areas where power is needed for pumping water as many rural Oklahoma customers utilize well water pumped with electric motors and may lose water service when their electricity fails. In addition, the location of large fueling stations can be pre-identified so that in case of electric failure—and therefore gasoline pump failure—large battery-powered generators can be quickly delivered to these sites in order to ensure fuel availability for emergency responders and critical needs. During restoration efforts, electric utilities should work collaboratively with natural gas providers to cooperatively bring small sections of electric customers back online so that gas lines are not suddenly de-pressurized as electric-start pilot lights on furnaces all re-light simultaneously.[193]

To prevent failure of land line telecommunication systems, providers rely on back-up batteries located at their central offices. In the case of cellular communications, battery-powered backup

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generators are utilized at cell towers for short-term outage situations. These towers can also be re-charged using mobile generators. In addition, larger cellular providers and private companies offer Cellular on Wheels (COWs), a vehicle-mounted cellular tower that can be moved from location to location as needed. An alternative to a COW is a Cell on Light Truck (COLT), which is a cell tower incorporated into a light truck. More information on COWs and COLTs can be found in the Department of Homeland Security's *Portable Cellular Systems Applications Note*.[194] For longer-term outage situations, fuel-based generators can be installed but it is unknown how widely these are utilized by telecommunications providers in Oklahoma.[195]

Finally, the natural gas system is equipped with compressor pumps that run on natural gas instead of electricity so that the system can survive an extended blackout.

Downstream consequences of a natural gas disruption may include:

- Loss of electricity generation due to lack of fuel availability
- Loss of a primary home heating source in the state
- Loss of fuel source for Compressed Natural Gas (CNG) vehicles, which may particularly affect municipal and state fleets as well as private fleets

Just as electric disruptions can lead to natural gas disruptions, the inverse can be true. If natural gas supplies are disrupted, as was seen due to freezing wellheads and pipelines during the February 2021 Polar Vortex event, electric generating facilities, residential natural gas appliances, and CNG stations may lose access to sufficient natural gas fuel to maintain full or even partial output. Opportunities to lessen this interdependency could include increased natural gas storage for electric generation facilities or weatherization of natural gas infrastructure to prevent freezing.

Downstream consequences of a petroleum disruption may include:

- Transportation disruptions if fuel shortages persist; these disruptions may affect not only Oklahoma but states that rely on Oklahoma's exported petroleum for their own supplies
- Disruptions to deliveries of propane by truck to rural customers, thereby creating a secondary energy shortage
- Inability of diesel-fueled generators to function as backup power sources for critical infrastructure such as hospitals or cellular towers

To reduce downstream consequences from petroleum disruptions, states should encourage diversity in fuel sources for the transportation sector, perhaps exploring compressed natural gas, biodiesel, or electric vehicle opportunities for trucking, fleet, and emergency response vehicles so that, in extended disruptions, fuel deliveries can still occur and emergency response can continue in at least some capacity.[196]

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ENERGY INFRASTRUCTURE MODEL SCENARIOS

OVERVIEW

By focusing on either a scenario that has occurred with historical frequency, or a scenario that may be low probability but of high consequence, this section provides a model within each major sector that may strain Oklahoma's energy infrastructure. The specifics of Oklahoma's infrastructure strengths and weaknesses are discussed in previous sections. Based on the available data published by the U.S. DOE in its state risk profile, as well as utilizing other sources for information on infrastructure strain for each infrastructure sector, the most critical scenario is discussed.

Infrastructure strain occurs under myriad circumstances. For stakeholders and planners interested to model scenarios specific to their unique circumstances, if details of all the components of an infrastructure system are known, modeling of the systems can be performed using software already available or under development. For example, the Federal Emergency Management Agency (FEMA) provides a tool known as HAZUS that estimates risk to infrastructure systems from earthquakes, floods, tsunamis, and hurricanes.[197] For Oklahoma scenarios, both the flood and earthquake modules may be pertinent for planners who would like to select or already know the specific inputs into infrastructure strain that they would like to test and model. Another tool currently under development at Colorado State University, known as IN-CORE, provides resiliency measures for a wide range of systems and events including buildings, water, and electric power systems subjected to events such as earthquakes, tsunamis, tornadoes, and hurricanes.[198] An alternative approach is to employ investment-oriented models which focus on how resilience within an energy system can be enhanced.[199]

ELECTRICITY: WINTER ICE STORM SCENARIO

One of the most common scenarios that strain Oklahoma infrastructure is a winter ice storm. Recently, Oklahoma experienced an unusually early ice storm in October 2020 that left 400,000 homes and businesses without power at its peak.[200] As mentioned in the Strengths and Weaknesses section, the primary weakness of Oklahoma's electricity infrastructure is the use of above-ground transmission and distribution lines, with distribution lines particularly vulnerable to ice accumulation and falling trees, especially when combined with the high winds that frequently accompany Oklahoma storms. Oak Ridge National Laboratory recently released an analysis of electric infrastructure vulnerability models with predictive analysis for various weather impacts; ice combined with wind commonly results in line damage and failure.[201] Further, winter storms generally affect large areas causing power outages in multiple cities. The wide geographic distribution of damage coupled with poor road conditions during storms complicates efforts of electric utilities to repair damage. Specific damage from this scenario event can include broken power poles and power lines, buckled high power transmission towers, tripped circuit breakers due

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to electrical short circuits, and blown transformers over a wide area. This scenario may be further complicated if the ice storm is accompanied by particularly low temperatures, as occurred in the February 2021 Polar Vortex event in Oklahoma and Texas. At these near-or-below zero temperatures, electric generating facilities themselves may be compromised, if the infrastructure is not insulated, with expected effects to include frozen pipelines that deliver natural gas to the electric generation facilities, frozen instrumentation at the facilities, or icing on wind turbine blades that prevent a delivery of reliable or full electric output.

Although very rare, planners must at least consider the consequences for low-probability high-consequence events and can look to illustrative examples from outside Oklahoma to anticipate and understand the heaviest possible impacts. For example, one of the worst natural disasters in Canadian history happened in 1998 during the ice storm in Quebec and Ontario, when these regions received 1-3 inches of freezing rain that accumulated as ice on electric infrastructure.[202] The impacts were catastrophic, with some towers buckling under ice accumulations that exceeded their design loads, and impacts ranging from damage to high-voltage transmission lines, to utility poles, distribution lines, and thousands of other structures. Again, while a scenario like this may be extremely unlikely, planners must at least consider scenarios that fall outside the normal parameters for Oklahoma severe ice storms and strain infrastructure beyond its normal limits.

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NATURAL GAS: POLAR VORTEX

As mentioned above, in February 2021, Oklahoma experienced a significant polar vortex event that impacted the natural gas sector. This event was noteworthy for both its severity (96 of the 120 total Oklahoma Mesonet's reporting stations recorded their all-time low temperature) and longevity, lasting nearly two weeks.[203] Portions of northern Oklahoma remained below freezing for 334 hours, with even location in extreme southeast Oklahoma recorded more than 200 consecutive hours below freezing.[204]

During the event, a critical shortage of natural gas supply occurred, prompting the state regulatory body, the Oklahoma Corporation Commission, to take the rare step to temporarily lift caps on natural gas production.[205] Similar failures were also reported in Texas during this cold weather spell with both well freeze-offs and processing plant freeze-offs occurring.[206] As natural gas is a significant fuel source for electric power plants in Oklahoma and regionally, the natural gas fuel shortages heavily impacted electric production. Oklahoma is part of the Southwest Power Pool (SPP), and SPP's capacity to generate electricity from gas-fired generators fell by nearly 50 percent during this event because operators could not obtain the natural gas required to run their power plants.[207] As a result, SPP enacted rolling outages and curtailments for member utilities, including Oklahoma Gas & Electric and Public Service Company of Oklahoma. The impacts of this extreme cold were felt across a wide geographic region of the country, and all of Oklahoma's neighboring states faced similar, if not more severe, energy challenges. The geographic scope of this event highlights the importance of communication, coordination, and situational awareness activities that cross state borders, for both industry and governmental organizations.

In general, and in addition to the well and processing plant freeze-offs Oklahoma experienced in February 2021, extreme cold weather can also cause damage to natural gas pipelines.[208] Some of these potential damages that should be considered as part of planning processes include pipe breakage due to frost heave, damage to above-ground pipeline components due to snow and ice accumulation, damage from thermal stresses due to extreme cold temperatures, and damage from expansion of freezing water within components.

During the after-event review, both the Federal Energy Regulatory Commission (FERC) and the North American Electric Reliability Corporation (NERC) reviewed their own Reliability Standards for potential updates to address weaknesses found in the system during this winter storm event. These multiple updates to Reliability Standards are a continuing effort by the agencies, with the most recent Order from FERC on February 22, 2024[209] noting their approval of updates to EOP-011-4 and TOP-002-5. These updates will necessitate both electric and gas utilities to take actions to harden and weatherize their systems for cold weather measures.

The cold weather Oklahoma experienced in February 2021 is historically rare, but the Southwest U.S. has seen weather events similar to the February 2021 polar vortex. For instance, the 2011 Southwest cold weather event caused rolling outages due to cold-related natural gas failures within Texas's ERCOT system. As reported by FERC and NERC in their after-action report and analysis,

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specific effects included frozen sensing lines, frozen equipment, frozen valves, and low temperature equipment cutoff limits, among other effects.[210] Given that natural gas infrastructure has historically been significantly impacted in Oklahoma and surrounding areas due to extended low temperatures, these experiences provide important case studies for future planning needs.

CRUDE OIL/PETROLEUM: CUSHING EARTHQUAKE

Oklahoma experienced its largest recorded earthquake on September 3rd, 2016, a M5.8 earthquake located in Pawnee, approximately 25 miles north of Cushing. More information on Oklahoma seismicity vulnerabilities can be found in the "Seismicity Profile for Oklahoma" chapter of this report. Cushing is a critical location for Oklahoma seismic vulnerabilities as it serves as the major crude oil trading hub connecting the Gulf Coast to the rest of the United States and Canada. The U.S. Geological Survey (USGS) places portions of Oklahoma, including the area surrounding Cushing, in the mid-range risk category for earthquakes.[211]

Should an earthquake equal to or greater in magnitude than the Pawnee earthquake occur with its epicenter directly at Cushing, the effects could be felt nationwide due to the potential for infrastructure damage disrupting the flow of oil in and out of the Cushing facility. During a major earthquake (magnitude 6.0 or higher), USGS indicates that damage would be "considerable in specially designed structures"[212] and specific oil and gas infrastructure damage could include: broken pipe connections, damage to tank walls and foundations, elephant foot buckling, and sloshing. More information on these hazards can be found in the "Seismicity Profile for Oklahoma" chapter. Historical evidence from other large earthquakes validates the predictions that petroleum and crude oil storage facilities may be critically impacted. For example, during the 1983 Coalinga M6.5 earthquake in California, severe damage to above-ground crude oil storage tanks occurred.[213] Damage that occurred during the 1983 Coalinga earthquake can be used to simulate a high consequence scenario at Oklahoma's Cushing facility.

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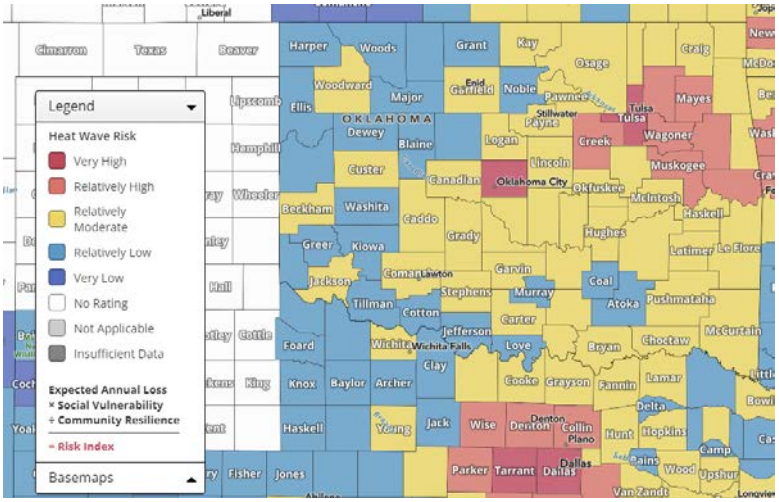
MULTI-SECTOR: EXTREME HEAT

While the preceding scenarios share some commonality in that they are marked by relatively rapid onset, a change to background conditions, and are easily recognizable as the event is occurring, extreme heat poses a different challenge due to its slow moving and slow building nature. Similarly, the impacts and effects from heat are not as easily recognizable – either to humans or to the power infrastructure. Oklahoma is no stranger to extreme heat. As recently as 2011, Oklahoma set records for the hottest average temperature for the year, along with heat records for July and August.[214] Portions of southwestern Oklahoma saw over 100 days of greater than 100-degree temperatures. As shown in Figure 29, FEMA's National Risk Index notes that portions of Oklahoma range in their risk of impacts from Heat Waves from "Relatively Low" to "Very High," with the most at-risk locations being the Oklahoma City and Tulsa metropolitan areas.[215]

Figure 29: FEMA National Risk Index map for heat waves in Oklahoma.



Extreme heat stressors the energy sector in multiple ways. Extended high temperatures can weaken or damage infrastructure both above and below ground, leading to an increase in failure rates. Consumer demand during peak and off-peak hours can rise to levels rivaling or exceeding the most severe winter time conditions. And the cumulative effect of heat stress on workers fulfilling outdoor duties can create personnel shortages or cause disruptions to regular maintenance activities.

Perhaps most troubling with extreme heat is the disproportionate impact it can have on human populations.[216] Annual deaths attributable to heat rival or surpass other weather hazardous. Typically, these deaths occur in extreme cases of outdoor activities or in populations with high social or physical vulnerabilities. However, the impacts of an extreme heat event coupled with a disruption to the energy sector, particularly power for home cooling, could have catastrophic consequences. As such, this scenario needs to be considered as a low probability, high impact type of event.

ADDITIONAL SCENARIOS

It should be noted that the scenarios presented above are not the only hazard types considered, nor do they represent the entirety of Oklahoma's planning efforts across various hazards classes. Future iterations of scenarios for both planning and exercising purposes will likely include hazards

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such as severe convective weather (i.e. thunderstorms and tornadoes), wildfires, cyber-attacks, intentional physical attacks, and drought.

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CYBERSECURITY PLANNING

In Oklahoma today, energy generation, production, and control systems are in most cases digitally automated. Innovations such as the SmartGrid in the electric sector and remote meter reading, service connections, and cutoffs in the natural gas industry allow utilities to increase speed of response, allow more customer choice, and reduce costs. Despite these significant advantages, these "smarter" systems also present new challenges. As energy generation and control systems become more digitally automated, their critical electronic systems, including communications systems, sensors, and controls become increasingly vulnerable to outside attack or inadvertent disruption from accidents or natural causes (weather). In the past, when interrupting the production and flow of energy required physical damage, today the same or even greater effects can be achieved either through physical damage that affects electronic networks or by electronically intercepting and altering electronic signals and information.

Today, cyber-attacks occur daily across industries. These attacks can include numerous types of malware, ransomware, denial-of-service attacks, phishing, and many other intrusions. These attacks can range from small scale to large. The SolarWinds malware attack, known as the largest cyberattack to date, affected over 100 private sector entities and a dozen government agencies. This attack used a routine software update to insert malicious code into SolarWinds' popular Orion software program.[217] Critical energy infrastructure was also victim to a ransomware attack when the Colonial Pipeline, a primary gasoline and jet fuel pipeline serving the East Coast, was taken offline as a result of a ransomware attack.[218] Service was interrupted for days, leading to consumers hoarding gasoline, causing major gasoline shortages across that region, and causing airlines to change flight routes in order to fulfill fueling needs.[219]

To respond to increasing cyber threats, many industry standards, processes, and guidelines have been developed to help energy providers address issues of cybersecurity. Below are numerous authorities, reference points, and guidelines for best practice in cybersecurity planning and response for the energy sector.

Nearly twenty years ago, the Energy Policy Act of 2005 created mandatory cybersecurity standards, which were developed by the North American Electric Reliability Corporation (NERC), however these enforceable standards only apply to the electric and nuclear industries. In time, as the issue of cybersecurity has become ever more critical, the federal government has created additional resources to ensure that both public and private entities across all sectors are ready to meet the challenges of a digital age. For instance, in February 2013, President Obama signed an Executive Order focusing on improving critical infrastructure cybersecurity requiring the National Institute of Standards and Technology (NIST) to develop a Cybersecurity Framework that includes standards, methodologies, procedures, and processes that align policy, business, and technological approaches to address cyber risks. The Executive Order also created a Voluntary Critical Infrastructure Cybersecurity Program for utilities, transportation, and telecommunications firms to adopt the cybersecurity standards outlined in the Cybersecurity Framework.[220] A year later, the

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Cybersecurity Enhancement Act of 2014 reinforced NIST's role in developing the Framework. The most current version of the Framework was released in February 2024, Version 2.0.[221]

Section 9 of President's Obama original 2013 Executive Order also prompted the Department of Homeland Security and Department of Energy to jointly undertake an assessment of electricity disruption incident response capabilities. Issued in 2017, the report found that "the U.S. is, in general, well prepared to manage most electricity disruptions, though there are particular areas where catastrophic considerations and emerging threats reveal capability gaps against cyberattacks."[222]

Next, the Cybersecurity Information Sharing Act of 2015 (Public Law 114-113)[223] required the federal government to develop processes to collect, evaluate, and share information about cyber threats. A major purpose of this legislation was to encourage information sharing by addressing the challenge of liability and public disclosure for corporate entities that may have been victims of a cyber-attack. Often, if an entity has a cybersecurity breach, it is reluctant to share that information with federal partners if it might expose them to a competitive disadvantage or criminal liability. This legislation allows companies to share information without opening them up to freedom of information inquiries and offers liability protection when information about cyber threats is shared with DHS.

Several years later, in 2017, President Trump furthered the federal government's role in preparing the nation to address issues of cybersecurity when he issued Executive Order (EO) 13800: Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure, which directed federal agencies to assess their capabilities to support cyber risk management for critical infrastructure owners and operators, and also to partner with the nation's energy sector to assess the grid's capabilities during prolonged power outages resulting from cyber-attacks.[224] Then, in 2019, President Trump issued Executive Order 13873 that tasked the U.S. Department of Energy and Department of Homeland Security to secure U.S. energy infrastructure by assessing any foreign hardware, software, or services that could present vulnerabilities for the U.S.[225]

In addition, in response to the Colonial Pipeline ransomware attack, President Biden issued Executive Order 14028, which outlines new response mechanisms for U.S. cybersecurity.[226] This EO is intended to remove barriers to information sharing, implement stronger cybersecurity standards in the federal government, standardize responses to cyber incidents, improve detection, and improve remediation capabilities.[227]

HIGHLIGHTED FEDERAL AGENCIES SUPPORTING CYBER PLANNING

Although cybersecurity planning crosses many federal agencies, this section will highlight three major federal players in coordinating the nation's cybersecurity planning. First, the U.S. Department of Energy is the Sector-Specific Agency for the energy sector, coordinating response under ESF-12 in the National Response Framework. A second major federal partner in

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cybersecurity is the U.S. Department of Homeland Security (DHS), and a third is the Cybersecurity and Infrastructure Security Agency (CISA).

U.S. DOE: CESER
Established in 2018, the U.S. Department of Energy's Office of Cybersecurity, Energy Security, and Emergency Response (CESER) exists to provide

> *"capabilities and support to energy sector partners to advance critical energy infrastructure security and resilience from all-hazards and manages key DOE authorities and responsibilities. These include serving as the Sector-Specific Agency (SSA) for the energy sector, as the coordinating agency for Emergency Support Function (ESF) #12-Energy under the National Response Framework."*

In January 2021, CESER released its Blueprint,[228] which outlines five goals and multiple objectives that will guide its response to pressing security issues nationwide. The goals that will direct CESER's activities are:

1. Advance cyber discovery, vulnerability assessment, and rapid risk mitigation.
2. Pursue game-changing R&D and technology transition.
3. Build capacity in the energy sector to understand risks, assess priorities, and identify cost effective security and resilience improvements.
4. Enhance sector-wide situational awareness to inform decision-making in the energy sector.
5. Coordinate effective and efficient emergency response and recovery efforts.

DHS: NCCIC
The U.S. Department of Homeland Security operates one of the key resources for cybersecurity planning and defense, the National Cybersecurity and Communications Integration Center (NCCIC). Under PPD-41, referenced in the Legal Authorities section of this Plan, the NCCIC is the lead office for asset response after cyber incidents.[229] Although the NCCIC has six functional branches, stakeholders may be the most familiar with the Industrial Control Systems Cyber Emergency Response Team (ICS-CERT), which provides expertise to incident response efforts and synthesizes information to alert and warning products. An overview of all the activities that fall under the NCCIC is encapsulated in the presentation referenced in the footnote.[230]

CISA
In 2018, President Trump signed the Cybersecurity and Infrastructure Security Agency (CISA) Act of 2018 into law, establishing CISA.[231] The CISA is tasked to receive, evaluate, and provide information about U.S. critical infrastructure vulnerabilities and to develop and execute plans to increase readiness to prevent and respond to cyber and physical threats to U.S. critical infrastructure. As a result, CISA offers a wide range of services and tools for risk assessment, trainings, and communication of information specifically focused on cyber but also physical security of critical infrastructure. Oklahoma is in CISA Region 6. Among many, one of CISA's

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activities is to assist partners in utilizing NIST's Cybersecurity Framework to better manage their cyber risks.[232]

HIGHLIGHTED STATE AGENCIES SUPPORTING CYBER PLANNING

Oklahoma Counter Terrorism Intelligence Center (OCTIC), Oklahoma's Fusion Center
Oklahoma has an Information Fusion Center, housed at the State Department of Safety.[233] The Fusion Center, recently renamed the Counter Terrorism Intelligence Center (OCTIC), serves as the data collection site for the state and can analyze crimes for trends and understand threats. While the Fusion Center is not dedicated solely to cyber threats, it serves as an intelligence clearinghouse for public and private sector partners and has a stated focus to protect critical infrastructure.

Finally, OEMHS participates in the Risk Assessment Program under which a CISA Protective Service Advisor has been assigned to the state and offers every public and private agency a free risk assessment on how to respond to disaster. During the assessment, entities can discuss needs, including cyber needs, and after the full assessment, entities receive a confidential report.

Oklahoma Office of Management and Enterprise Services (OMES)
OMES is the state's lead agency responsible for protecting networks and the state's digital assets. OMES also provides cybersecurity for all state agencies through the state's Cyber Command, which conducts annual information security assessments, the results from which are reported to the Governor and Legislature. [234] Finally, OMES operates the Oklahoma Information Sharing and Analysis Center (OK-ISAC). OK-ISAC exists to provide real-time monitoring, vulnerability identification, incident response, and threat intelligence to its members. Membership includes multiple Oklahoma organizations, business leaders, and cybersecurity professionals. [235]

Oklahoma's lead agencies for cybersecurity receive information through a variety of sources, including the Federal Bureau of Investigation (FBI), E-ISAC and MS-ISAC, membership organizations, and critical infrastructure owners and operators.

REPORTS AND BEST PRACTICE RESOURCES FOR CYBER PLANNING

Over time, and as standards and regulations continue to develop, there have been a number of additional resources developed for use within the critical infrastructure and energy sectors. Oklahoma energy producers, owners, distributors, and stakeholders should familiarize themselves with these resources and, if they do not already utilize planning and assessment tools in planning processes, evaluate if adding these capabilities could strengthen their organization's preparation for cyber events.

For cybersecurity, Oklahoma will continue to pursue a focus on energy infrastructure security from a perspective of sharing and evaluating new resources related to cybersecurity. First, Oklahoma will document new resources released since the last OESP update, including:

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- the U.S. Department of Homeland Security's Cybersecurity Performance Goals (CPG) Report[236]
- the U.S. Department of Homeland Security's 2023 National Cybersecurity Strategy[237]
- Cybersecurity Baselines for Electric Distribution Systems and Distributed Energy Resources (DER).[238]

Key findings will be used throughout Oklahoma's 5-year strategic planning process to inform possible topics for tabletop exercises and more extensive documentation of stakeholder practices.

The U.S. Department of Energy has created a cybersecurity capability maturity model (C2M2**),** available for download,[239] which allows stakeholders across the energy industry to assess their cybersecurity capabilities and prioritize their actions and investments to improve cybersecurity. The C2M2 combines elements from existing cybersecurity efforts into a common tool that can be used consistently across the industry. It was developed as part of a White House initiative led by the Department of Energy in partnership with the Department of Homeland Security (DHS) and involved close collaboration with industry, other Federal agencies, and other stakeholders. . The most recent update of Version 2.1 of the C2M2 incorporates guidance from energy sector cybersecurity practitioners to address the updated challenges for cybersecurity in the electric and energy industries along with including updated internationally recognized cyber standards and best practices. There are also specific C2M2 models available for the electric[240] and oil and natural gas[241] sectors. Oklahoma entities may benefit from utilizing the C2M2 process as a resource as they seek to strengthen their cybersecurity protocols and readiness.

Other resources currently available to the energy industry to help with cybersecurity planning include:

- The U.S. DOE-issued Electricity Subsector Cybersecurity Risk Management Process (RMP) Guideline.[242] This helps utilities better understand their cybersecurity risks, assess severity, and allocate resources more efficiently to manage those risks.
- The 2018-published U.S. DOE Multiyear Plan for Energy Sector Cybersecurity which outlines DOE's partnerships in cyber and its goals for addressing cybersecurity.[243]
- The National Governors Association white paper on State Strategies for Enhancing Cybersecurity in the Electric Sector.[244] This white paper outlines seven actions Governors can take to enhance electric infrastructure security, protect information, and provides additional resources.
- The National Governors Association Resource Center for State Cybersecurity.[245]
- The National Association of Regulatory Utility Commissioners (NARUC) Cybersecurity Manual containing five main components including a strategy development guide, questions for utilities,[246] a preparedness evaluation tool,[247] a tabletop exercise guide,[248] and a glossary.[249]
- The Department of Homeland Security's Cybersecurity Resources Roadmap which is targeted to assist small and midsize businesses.[250]

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COMMUNICATION AND INFORMATION SHARING IN CYBERSECURITY

Effective cyber defense and response require significant communication and information sharing, as well as best practice implementation, and numerous initiatives exist that aim to increasing bi-directional information flows. This section is intended to ensure that Oklahoma energy stakeholders are aware of the breadth of initiatives targeted at information sharing such that they can avail themselves of the maximum resources to assist them in cyber planning and response. While the initiatives below are not an exhaustive list, they constitute some of the major efforts to increase communication between the public and private sectors and increase national readiness to combat cyber threats.

A primary information sharing initiative for governmental agencies is the Multi-State Information Sharing and Analysis Center (MS-ISAC) run by the Cybersecurity and Infrastructure Security Agency (CISA). The MS-ISAC offers government entities real time monitoring of cyber events and is a "central resource for gathering information on cyber threats to critical infrastructure and two-way sharing of information between and among public and private sectors in order to identify, protect, detect, respond and recover from attacks on public and private critical Infrastructure." Numerous Oklahoma agencies are members of MS-ISAC including the Office of Secretary of State, Health Care Authority, Information Fusion Center, State Election Board, State Senate, and Tax Commission. There are also a large number of local governments, tribal governments, educational entities, and school districts in the state with MS-ISAC membership.[251] Any state, local or tribal government, or non-profit supporting state, local, or tribal governments, can apply for MS-ISAC membership.

CISA also offers Automated Indicator Sharing (AIS), which provides real-time exchange of machine-readable cyber threat indicators and defensive measures to help protect participants of the AIS community. Private sector entities; federal departments and agencies; state, local, and tribal governments; information sharing and analysis centers (ISACs); and others are all members of the AIS community. Participants can share cyber threat and response measures with others to limit impacts from cyber events and recover more quickly. Information about joining AIS as a participant can be found at https://www.cisa.gov/ais.

Private sector entities also operate Information Sharing and Analysis Centers (ISACs) which are private, sector specific organizations designed to collect, analyze, and disseminate information about sector-specific cyber threats; these organizations also interact with CISA. Particular ISACs of interest for Oklahoma's energy sector include the following:

- Electricity (E-ISAC): www.eisac.com
- Oil and Natural Gas (ONG-ISAC): www.ongisac.org/
- Downstream Natural Gas (DNG-ISAC): www.dngisac.com/

There is also a National Council of ISACs that provides information on cross-sector collaborations for information sharing. More information is available at www.nationalisacs.org.

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Cyber incidents are becoming increasingly common across the electric and energy industries. Developed at the direction of the Electricity Subsector coordinating Council (ESCC), the Cyber Mutual Assistance (CMA) Program[252] is an industry framework available to the Oklahoma electricity and natural gas sectors. The CMA Program is composed of industry cyber experts who can provide voluntary assistance to other participating entities in advance of, or in the event of, a disruption of electric or natural gas service, systems, and/or IT infrastructure due to a cyber emergency. Participation in the program also establishes a voluntary information sharing agreement between CMA participants to improve the cybersecurity posture of all participants. In the event of a cyber emergency, any participating entity may make a direct request for assistance from other participating entities including services, personnel, and/or equipment. Entities representing electric and natural gas investor-owned companies, public power utilities, electric cooperatives, Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs), and Canadian energy companies, participate in the CMA Program.[253]

As the purpose of the Cyber Mutual Assistance Program is to facilitate communication between executive level participants, future efforts by the SESP planning team will incorporate this Program into future exercises and SESP documents.

CYBERSECURITY MEASURES IN OKLAHOMA'S ELECTRIC SECTOR

Oklahoma's major electric and gas utilities are devoting significant resources to planning for and implementing cybersecurity strategies and are integrating these strategies as central in their corporate policies.

Oklahoma Gas & Electric Company
Oklahoma Gas & Electric (OG&E), the state's largest electric utility, has an overall cybersecurity plan in place which is layered and based on industry standards (NERC CIP, NIST, ISO). The utility has an internal Corporate Security Team, Cyber Security Team, and Physical Security Team that regularly test the utility's physical and cyber defense strategies, and also conduct security assessments at least annually to ensure that if a cyber-attack did occur that the utility could restore operations.

The standing security teams in place have identified OG&E's most critical substations for keeping electricity on and their focus is on protecting these assets both physically and from a cybersecurity standpoint. To prevent incidents, the teams monitor proactively for potential threat conditions, including working with the U.S. Department of Energy, and perform threat and vulnerability analyses to evaluate different standards and select the appropriate controls.

As an example of its commitment to cybersecurity issues, OG&E has developed a Critical Operations Protection (COP) program, which is a cybersecurity protection safeguard specifically for smart grid deployment. The COP program protects the inner workings of the smart grid systems to ensure that hackers are unable to disturb the national electric grid by simultaneously

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turning off power to many customers. This plan has been reviewed by the U.S. Department of Energy.

Finally, OG&E works with an electric utility smart grid consortium to discuss common industry security issues, and to direct third-party vendors on what new cybersecurity measures to implement and to review annual 3rd party security testing of the layering approach.

If a cyber event were to occur, as a part of OG&E's compliance with NERC Critical Infrastructure Protection Reliability Standards, OG&E notifies NERC, applicable Governmental Agencies, and other potentially impacted electric entities. These requirements are incorporated in OG&E's policies and Incident Response Plans. OG&E also has Business Recovery and Business Continuance plans to address the potential loss of systems, facilities, and the availability of people to run its critical systems. Additionally, OG&E has Privacy and Confidentiality policies and practices associated with the exfiltration of sensitive information including data that has been designated as protected customer information.

Public Service Company of Oklahoma
Public Service Company of Oklahoma (PSO), a division of the national corporation American Electric Power (AEP), utilizes AEP-wide policies in its approach to cybersecurity. AEP's cybersecurity approach is based on a philosophy that every information asset within the organization must be reviewed and secured in accordance with its criticality and impact to the corporation's overall operations. AEP policies are built around national and international standards (NIST, ISO) and utilize a layered approach to security. AEP maintains a dynamic cybersecurity testing program which tests systems against cyber threats. AEP also emphasizes company-wide staff training with annually required cybersecurity training for all employees as well as quarterly events on timely topics. The company reviews its policies and procedures to ensure that they are up to date and protect its assets against ever-evolving threats.

AEP approaches cybersecurity from both an engineering and operations approach. First, engineering staff reviews all technologies before production and with each new version to determine the appropriate balance of security is within business requirements, and then design solutions based on these assessments. Operations staff monitors and controls security once a technology is in production, including log management, day-to-day monitoring, intrusion detection/prevention, and proactive analysis of malcode to reduce the risk of threats affecting AEP assets.

AEP also hosts a Cybersecurity Operations Center—a joint operation between AEP and Lockheed Martin—to identify and evaluate risks across utilities and report these so that others can take preventative actions. Finally, AEP contributes as a member of a cybersecurity consortium consisting of 6 major utilities that work with third-party vendors to help identify new cybersecurity procedures and techniques.

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In the event of a cybersecurity incident, AEP has a mature, documented, and tested Cyber Incident Response process, which includes personal contacts with federal agencies such as the Department of Homeland Security, Department of Energy, FBI, ES-ISAC, and others. AEP is also required to notify its customers if it believes that customer data has been accessed as part of the cyber incident.

Western Farmers Electric Cooperative
Cooperative electric providers are also emphasizing cybersecurity protocols. At Western Farmers Electric Cooperative (WFEC), a dedicated security operations team, which includes a cybersecurity group, monitors WFEC systems and prevents intrusions using the cooperative's written security policy. These protocols are fully compliant with NERC Critical Infrastructure Protection Reliability Standards. The cooperative also uses third-party vendors to conduct annual cyber vulnerability assessments and participates in Department of Homeland Security and FBI briefings to assist it in monitoring for potential threats.

Further, the cooperative has initiated an information protection program, which identifies, marks, and stores separately that information classified as sensitive and confidential. Access is limited, and any employee with access receives annual training on appropriate handling of critical information.

In addition to these preventative measures, WFEC has written a Cyber Emergency Response Plan, which is tested annually. This plan ensures that should a cyber-attack occur, the cooperative could recover and ensure reliability of service for its member customers.

Grand River Dam Authority
Publicly owned utilities are also making investments in cybersecurity. The Grand River Dam Authority has cyber and physical security policies in place to protect the reliability of the services it provides and the equipment it uses to provide them. Because GRDA manages a part of the *Bulk Electric System*, these systems that support reliability of the grid must be protected against physical and cyber damage. To do this, GRDA incorporates industry best practices as well as NERC CIP (Critical Infrastructure Protection) reliability standard requirements into its security and reliability processes. Its policies address steps taken for protection, support, and disaster recovery for its critical cyber systems.

GRDA completes frequent reviews to identify its critical locations and equipment and applies enhanced physical and cybersecurity controls to these assets to protect them from physical or cyber-attacks, corruption, or loss. GRDA's cybersecurity teams continuously receive training on current cybersecurity issues and techniques and participates in federal cybersecurity information and alerting systems hosted by NERC, the U.S. DOE, and the FBI.

GRDA physical and cybersecurity teams test security controls on a regular basis, always looking for ways to better protect the utility's systems. Backup systems and incident response plans are tested, and improved upon, when possible, to streamline their responses to problems when they occur. As the cyber threat matrix changes, GRDA makes changes to how it defends against and

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responds to both physical and cybersecurity risks. This "continuous improvement" approach to both physical and cybersecurity is always evolving to meet the emerging threats to reliability.

Finally, GRDA participates in industry cybersecurity conferences, working groups, and peer sharing events to stay informed of security risks. These knowledge sharing opportunities ensure the utility can incorporate industry reliability and security best practices as they develop.

Southwest Power Pool (SPP)
As discussed in the "Energy Profile for Oklahoma" chapter, Regional Transmission Organizations (RTOs) now play a critical role in electricity delivery; in Oklahoma this function is performed by the Southwest Power Pool for its 14-state membership. SPP sets the cybersecurity protocol for the multi-state system under FERC supervision. Within SPP, the Security Advisory Group is tasked with advancing both physical and cyber security for systems under the SPP footprint and membership is comprised of representatives from member companies. Under its charter, this group provides expertise and best practice, as well as incident reporting and information dissemination, to SPP and serves as a liaison between SPP and national oversight groups such as FERC and other regulatory bodies.[254] SPP recognizes the growing risks in cyber and physical security to the electric industry. In 2024, SPP welcomed a new staff executive with extensive experience and a history working at NERC to provide SPP the expertise to address cyber and physical threats.[255]

CYBERSECURITY MEASURES IN THE NATURAL GAS SECTOR

Oklahoma Natural Gas Company (ONG)
On the natural gas side, Oklahoma Natural Gas Company, a division of ONE Gas has had a cybersecurity plan in place for several years using national standards (NIST, ISO) to create a security framework that includes a dozen security domains. These domains include areas such as risk management, information and asset management, and threat and vulnerability management. The plan formulates specific responses for various escalating scenarios that employees can implement should a cyber event occur.

As part of its cybersecurity planning, ONG has conducted risk assessments on its electronic assets and, if necessary, has put additional physical security in place to protect these assets. The utility also emphasizes a layering approach for electronic security and utilizes this approach when storing, encrypting, and accessing data.

Finally, ONG also participates in the American Gas Association and the Interstate Natural Gas Association of America, both of which have security working groups.

CenterPoint Energy
CenterPoint Energy has an established cybersecurity policy and a set of practices that include customer data protection. The utility also maintains a dedicated corporate staff with primary responsibility for cybersecurity and requires additional professional certifications for those staff assigned to critical infrastructure assets. CenterPoint's cybersecurity strategy relies on strategic


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layering and redundancy approaches to ensure protection against attack and continuity of service should a cyber-attack occur.

The development of CenterPoint's practices involved extensive collaboration with its suppliers, industry associations, regulatory groups, and various branches of the federal government. Examples of these are the American Gas Association (AGA), the Interstate Natural Gas Association of America (INGAA), the National Institute of Standards and Technology (NIST), the U.S. Department of Energy, the FBI, the Department of Homeland Security, and various national laboratories. In addition, the U.S. Department of Energy has reviewed and approved CenterPoint's cybersecurity strategy.

Since cyber security threats are constantly changing and evolving, CenterPoint has also partnered with third-party vendors to provide outside expertise that improves the company's cybersecurity incident response capabilities. As part of these efforts, third-party vendors have conducted penetration testing on CenterPoint's system.

CenterPoint places a particular emphasis on staff training as a deterrent to cyber incidents. Within 30 days of employment, and as an annual education requirement, employees complete and are tested on a Security Awareness Course covering both physical and cybersecurity. The utility also conducts Simulated Phishing Tests periodically in conjunction with annual IT Security Audits.

In the event of a cyber incident, CenterPoint has detailed response plans in place. If the event involves a service interruption, the utility will utilize its operational response plans, which include communications between local, state, and federal jurisdictions, to restore service. This includes notification to the Department of Homeland Security, Department of Energy, Transportation Security Administration, AGA, INGAA, and Edison Electric Institute. If computer systems were compromised, the utility has the capability to operate its system manually until electronic systems are restored. In addition, if customer data were compromised, the utility would notify its customers through its cybersecurity insurance policy provider and would also notify local, state, and federal consumer-focused agencies.

The service restoration process would differ depending on the type of cyber incident but could require isolation of the computer systems from the impacted physical asset(s) via termination of communications and/or isolation of the system. The service restoration would involve manual operation efforts until the recovery of the computer systems. The computer systems restoration would involve a restore from CenterPoint's back-up and recovery procedures; however, an extremely sophisticated compromise from an advanced persistent threat may require assistance from ICS-CERT as well as highly specialized resources from the computer software provider and other specialized cyber resources provided by consultant experts.

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RESPONSE AND COMMUNICATIONS AFTER CYBER EVENTS

A full discussion of the response mechanisms and communications channels for all types of energy emergencies can be found in the Energy Emergencies Communications Procedures and Mitigating, Tracking, and Responding to Energy Emergencies sections of this plan. It is, however, important to recognize that in the aftermath of a cyber event many electronic communications channels between a utility and emergency planners and responders may be compromised or severed. Due to this, alternative methods of communication should be identified as part of each organization's planning process. It is important to note that all the major electric and natural gas providers in Oklahoma are registered to use the Government Emergency Telecommunications Service (GETS).[256] Participation in this service will help utilities maintain communications channels in the event of an emergency. Cyber events also increase the potential for automated controls to be compromised and therefore restoration may be delayed if manual controls must be utilized to respond to the effects of a cyber event.

In addition, to be fully prepared to respond to a potential cyber event, it is advisable for state emergency planners and utility regulators to meet at least annually with energy providers to ensure that updates to their cyber security plans are captured and that newly released recommendations or regulations are included in these plans.

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ENERGY EMERGENCY RESPONSIBILITIES

PUBLIC SECTOR STAKEHOLDERS

This section of the plan identifies the principal governmental agencies and their assigned roles in responding to an energy emergency. These roles, jurisdictions, and responsibilities are derived from both federal and state emergency response frameworks. At the federal level, *Emergency Support Function* (ESF-12-Energy) under the *National Response Framework* (NRF) delineates the relevant actors and their responsibilities.[257] In the state of Oklahoma, these responsibilities are spelled out in the *Energy Annex* (ESF-12) of the *Oklahoma Emergency Operations Plan*.[258]

Although not listed as an ESF-12 agency with formal responsibilities during energy emergencies, the Oklahoma Secretary of Energy and Environment (SOEE), and the Oklahoma State Energy Office (SEO) both play coordinating roles across sub-sectors of the energy industry. Importantly, the SOEE has ESF-12 responding agencies within their cabinet jurisdiction. Both SOEE and SEO have opportunities to convene public and private stakeholders together to do comprehensive planning and exercises in support of energy emergency planning and preparation in particular. By directing federal State Energy Program and related dollars towards high-priority areas, the SOEE and SEO offer critical avenues for statewide and regional planning and preparation. Risk mitigation strategies and risk assessment approaches outlined throughout this plan and in other key documents such as the State Hazard Mitigation plan will inform these high-priority funding areas beginning in 2024 and moving forward into future planning years.

Further, Oklahoma's energy security planning team anticipates that through participation in the newly-formed Department of Energy working group cohorts on risk assessments and risk mitigation strategies, the State Energy Office will have an opportunity to more actively share technical assistance and expectations communicated from federal partners, and create a collaborative space to capture current practice and encourage further activity. In Summer 2024, Oklahoma's team will be contacting each named entity listed under ESF-12 in the Oklahoma EOP, to invite their active participation in strategic planning meetings and future tabletop exercises planned, ensuring an opportunity for these entities to communicate updated information on their practices related to reliability and fuel supply.

Further, any technical assistance shared, or work created, through the Risk Mitigation Strategies working group will be embedded into stakeholder outreach efforts to begin aligning the vulnerabilities outlined in this plan's *Energy Vulnerability Assessments* section with current and future energy sector practices to reduce these vulnerabilities.

Lastly, in 2024, the State Energy Office and Oklahoma Secretary of Energy and Environment will plan and/or attend a series of stakeholder-focused events, to engage with public and private sector stakeholders in a 5-year strategic planning process, revitalize emergency planning connections that are specifically focused on energy emergency events, document updated practices related to fuel

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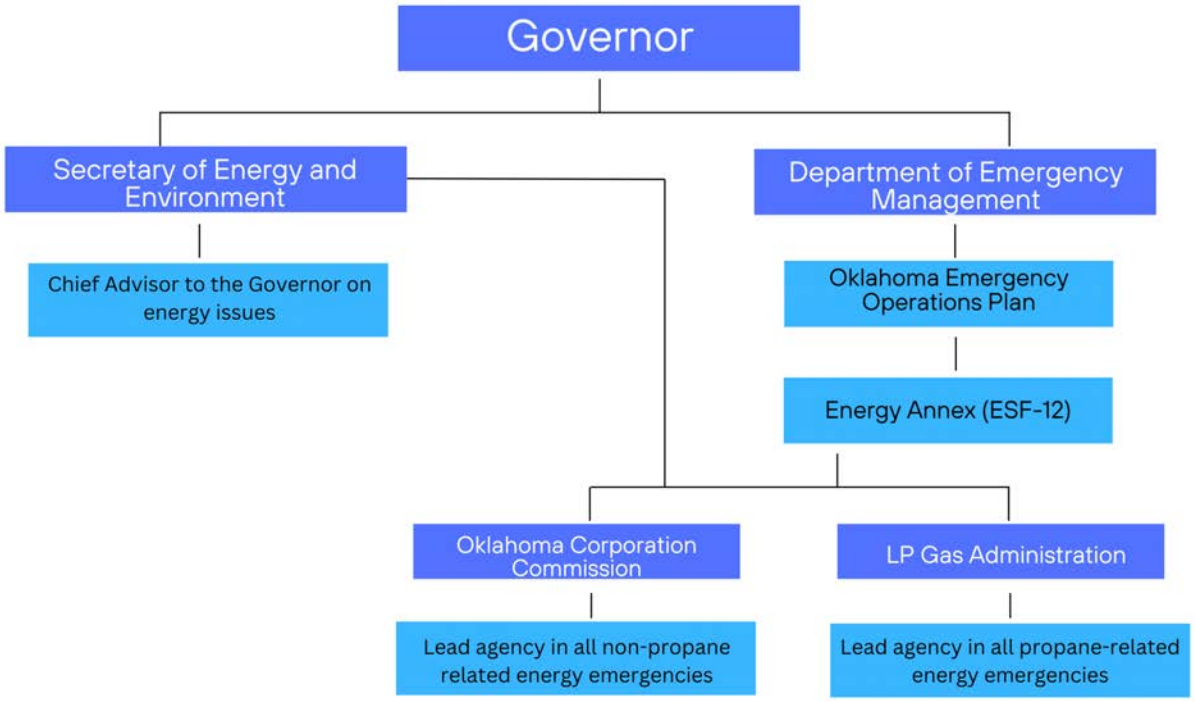
supply assurance and reliability efforts, and finally to assess the possibility for common metrics that might increase cohesiveness in setting priorities for investments which maximize electric reliability and fuel supply.

State Agencies

There are a number of state agencies which have responsibilities for preventing and responding to energy emergencies. Figure 30 depicts the flow of responsibility, and the section below outlines the specific roles of each agency.

Figure 30: Responsibility for Energy Emergency Response in Oklahoma



Governor's Office

As is the case in all states, the Governor, and the Governor's office, is ultimately responsible for ensuring the health, safety, and general welfare of Oklahoma residents. This responsibility includes responding to energy emergencies. The involvement of the Governor in energy security will vary depending on the severity of the emergency. If an energy emergency poses an imminent threat (Level 3 or Level 4) to the residents of Oklahoma, the Governor will become directly involved in the emergency response. The actions of the Governor will also vary on a case-by-case basis.

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During less severe disruptions, the Governor may simply want to remain informed about events as they unfold. In more severe emergencies, the Governor can activate the Oklahoma Emergency Operations Plan (EOP) and declare a State of Emergency (which frees up state assets and allows for the temporary suspension of energy laws/regulations that may impede an effective emergency response). The Governor may also elect to coordinate a cross-state response with other Governors, should the emergency impact citizens across state lines. Additionally, the Governor can ask the President to declare a State of Emergency[259] which can provide state agencies with access to federal resources. Regarding the Phases of Energy Emergency Management (Figure 30), most of the Governor's involvement will come in Phase III, the response phase.

Oklahoma Department of Emergency Management (OEM)
As specified in the state's EOP, OEM is the primary emergency response agency in the state of Oklahoma. Accordingly, OEM is intimately involved in responding to all types of energy emergencies that occur within the state's borders. In particular, the Director of OEM serves as the Governor's Authorized Representative which enables him/her to act on behalf of the Governor when coordinating (as necessary) with the Department of Homeland Security and FEMA for all federal assistance requirements. Likewise, OEM organizes and manages the state Emergency Operations Center (EOC) which is a centralized facility to be utilized by the government for direction, control, and coordination in an emergency. Finally, OEM is responsible for communicating and coordinating with city and local governments in the event of an energy emergency. With regard to the Phases of Energy Emergency Management (Figure 30), OEM's involvement will cut across each phase, but will be most prominent during Phase III, the response phase.

Training is an ongoing activity coordinated through OEM, sometimes held in conjunction with federal agencies such as FEMA and the Department of Homeland Security. Training is often requested by local emergency planning organizations or first responder groups, through OEM, as a result of after-action reviews following incidents or exercises. Conversely, some training is routinely delivered on a rotating basis and is prescribed by FEMA, DHS, or OEM for certain emergency response positions. In either case, training is typically open to public sector audiences, although in some cases joint specialized training may be made available with private industry support or participation – such as through petroleum pipeline companies.

Through the use of tabletop (discussion based), functional, and full-scale exercises, OEM and its coordinating agencies demonstrate the ability to activate and staff the Emergency Operations Center (EOC), identify and implement the appropriate response to the emergency situation, and provide information to the public through the Emergency Alert System and public inquiry hotline. Local or regional emergency management agencies, under their local jurisdictional authorities, also frequently host or participate in these same types of exercises. The state EOC also can coordinate incident management with field-incident command utilizing a virtual environment through WebEOC. WebEOC allows for more efficient communication and situational awareness, particularly in the space of requesting and tracking incident related resources.

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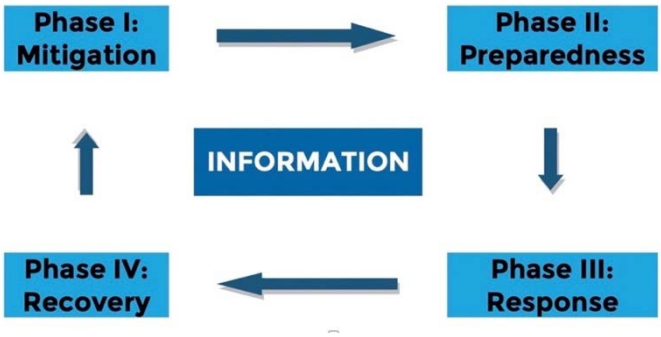
Governmental agencies at all levels and spokespersons for the involved industries coordinate responses and develop effective public information messages. Management of response activities for emergencies follow procedures outlined in the National Response Framework under the National Incident Management System (NIMS); field-level management of events utilizes the Incident Command System (ICS) to assure continuity across response and incident support partners. These activities are coordinated through the activation and staffing of a Joint Information Center (JIC), where multi-agency public information offices (PIOs) can coordinate incident-specific messaging. Private industry PIOs can also be included in the coordination of public messaging through a Multi-Agency Coordination Center (MACC).

Oklahoma Corporation Commission

As specified in the Oklahoma EOP (ESF-12) and represented in Figure 30, the Oklahoma Corporation Commission (OCC), which is responsible for regulating public service companies (businesses whose services are considered essential to public welfare), is the lead (or coordinating) agency for all energy emergencies except those incidents related to Liquefied Petroleum Gas (also known as LP Gas or propane). As the lead agency for most energy emergencies, the OCC is involved in all four Phases of Emergency Management, represented in Figure 31.

Figure 31: The Four Phases of Energy Emergency Management



Oklahoma is unique in that the OCC regulates the widest breadth of industries of any public utility commission in the nation. The OCC regulates public service companies in the electric and natural gas industries as well as pipeline safety, oil and gas exploration and production, railroad crossing safety, and aspects of both telecommunications and trucking. Because of its wide purview and the interconnected relationships between these industries, the OCC is singularly qualified to serve as the lead in responding to energy emergencies and coordinating with OEM, and all energy-related stakeholders, to restore normal energy operations to the state. As the state agency most involved with energy regulation, the Commission has a permanent seat at the table within the EOC from where it may communicate directly with the state's public utilities, operators of fuel supply outlets, and oil and natural gas companies.

- *Phase I: Mitigation*
  - During Phase I of emergency management, which the Oklahoma EOP identifies as the *Mitigation* phase, and which corresponds closely to the NASEO *Monitor and Alert* phase of guidelines for energy security, the OCC monitors the flow of energy throughout the state. This task is divided into two different schemes—one for monitoring service interruptions and one for monitoring the supply and demand dynamics that interact to generate supply shortages. Regarding the monitoring of

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interruptions, the OCC is in constant contact with energy companies that are legally required to notify the OCC of unplanned service interruptions (OAC 165:35-19-4 for electric utilities; OAC 165:45-21 for natural gas utilities; OAC 165: 65-9-2(1) for water utilities; and OAC 165:55-25 for telecommunications). If an energy company does not report an outage, the OCC can instead receive information from OEM, which receives information about service interruptions from local emergency managers.

  - Also, during Phase I, OCC acts as the lead agency to develop and update any energy emergency plans and procedures; maintain or update energy transportation pipeline maps; maintain a directory of energy suppliers' emergency liaison personnel; and maintain restoration of service plans for regulated electric, natural gas, phone, and water.

- *Phase II: Preparedness*
  - Having noticed early signs of what might become an energy emergency, the OCC intensifies its data and information collection efforts in Phase II, which aligns with NASEO's *Assess and Determine Action* phase of guidelines for energy security. With regard to service interruptions, this involves communication with additional sources and potentially sending local agents to the field in an attempt to collect more information. This information is then communicated to the governmental agencies following the channels listed in Energy Emergency Communications Procedures section of this plan.
  - The Oklahoma EOP enumerates required Phase II activities to include organizing and training personnel into emergency response teams (located at both the state Emergency Operations Center and incident locations); training designated personnel under emergency procedures; participating in state and local emergency preparedness exercises; and ensuring that procedures are in place to document actions taken and costs incurred during emergency operations.
- *Phase III: Response*
  - If an energy emergency is severe enough to warrant government action, Phase III of Emergency Management is initiated, where the governmental agencies begin response measures. This phase aligns with the *Actions and Feedback* phase of NASEO's energy security guidelines. Specifically, the OCC acts as the lead agency to coordinate the following responsibilities (specified in ESF-12 of the Oklahoma EOP):
    - Establish contact with disaster scenes and have designated personnel report to the state Emergency Operations Center and incident site. The OCC liaison reports to the state EOC. The Oklahoma Association of Electric Cooperatives also sends a liaison to the EOC.
    - Survey the disaster area, evaluate the situation, and submit a report to the EOC that includes the damage to immediate and long-term energy needs.
    - Coordinate public and private utility companies to determine if repair efforts will be adequate or whether assistance from federal or state resources will be required. OAEC will respond to an energy emergency according to

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its March 2016 Mutual Aid Plan. The three largest Oklahoma electric providers are governed by state law and each file a disaster response plan with OCC.
        - Initiate necessary actions to request state or federal assistance, if required.

- *Phase IV: Recovery*
    - During the Recovery Phase, the state EOP asks OCC to serve as the lead to coordinate public, private, and volunteer activities for repairs to area utility activities. The agency will also coordinate the determination of long-term energy requirements for the affected area and initiate long-term recovery plans. This EOP phase is closely aligned with NASEO's *Review Lessons Learned* phase of its guidelines for energy security. At this point, OCC reviews its reports of the damaged utilities, the requests for damage repair assistance, the repairs completed, and the extent to which their responses facilitated or inhibited the alleviation of the emergency. Then, the OCC participates in an "After Action Report Meeting", which is organized by OEM to review the emergency as a whole, and initiates needed changes or improvements to emergency operations plans.
    - During emergencies involving LP Gas and propane, the LP Gas Administration will become the lead agency.

Additional Supporting Agencies and Organizations

Due to the inherent complexity associated with energy emergencies, a number of other state agencies and non-governmental organizations play an essential supporting role in each of the four emergency phases.

With regard to the response itself (Phase III), the EOP (ESF-12) lists the following supporting groups and the type of assistance provided by each identified agency:

- American Red Cross (ARC)
    - Provide support as necessary to victims during response and recovery phases, including setting up shelters in areas where utility service has been interrupted
- Department of Environmental Quality (DEQ)
    - Provide guidance and support to the response and recovery of material associated with hazardous material incidents (except as provided by the OCC) in accordance with state regulations
- Department of Health (OSDH)
    - Provide damage assessment assistance to the state, county, and local jurisdictions with respect to health care facilities and their energy needs. The OSDH will also provide support as necessary to ARC and other voluntary organizations for immediate needs of victims (i.e., those on life support systems) and continue long-term support of victims during recovery efforts.

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- Department of Human Services (OKDHS)
    - Provide support as necessary to ARC, and other voluntary organizations for immediate needs of victims (i.e., those on life support systems) and continue long-term support of victims during recovery efforts
- Department of Public Safety (DPS)
    - Provide support as required
- Department of Transportation (ODOT)
    - Provide support as required
- LP Gas Administration
    - Will become the lead agency for energy emergencies involving liquefied petroleum. Additionally, the LP Gas Administration will assist with rerouting and redistribution of LP gas resources as requested
- Oklahoma Military Department
    - Utilize its forces to assist ODOT in making emergency repairs to roads, bridges, public buildings, or other public facilities in disaster areas which are essential to the health, safety, and welfare of the public and the transportation of energy-related materials
- Oklahoma Office of Homeland Security (OKOHS)
    - Provide support as required; see reference above to August 2020 restructuring under OEM
- Oklahoma State Bureau of Investigation (OSBI)
    - Provide support as requested
- Oklahoma Water Resources Board (OWRB)
    - Gather information on damage to dams and associated power generation plants throughout the affected area. The OWRB will also gather information on damage to structures that are within the regulatory floodplains in the affected areas
- Oklahoma Association of Electric Cooperatives
    - Provide support as required
- Oklahoma Telephone Association
    - Provide support as required
- Oklahoma Municipal Alliance (formerly the Municipal Electric Systems of Oklahoma)
    - Provide support as required.
- Regulated Investor-owned Utilities
    - Provide support as required

Oklahoma Department of Mines

It is important to also note that, although it is not listed with formal responsibilities in the state's Emergency Operations Plan, the Oklahoma Department of Mines holds responsibility for overseeing the state's coal industry, including receiving reports of mine accidents or supply interruptions.

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Other Sheltering Agencies
Additionally, outside of formal ESF-12 responsibilities, yet still a vital component, many other social service agencies hold responsibilities for response during energy emergencies. If the energy emergency requires sheltering for victims, many nonprofits and faith-based organizations offer food and shelter. In times of need, Oklahoma Emergency Management coordinates with Oklahoma Voluntary Organizations Active in Disasters (OK VOAD)[260], which is an umbrella agency whose purpose is to bring together organizations to foster more effective response to the people of Oklahoma in times of disaster. OK VOAD agencies are The American Red Cross, The Salvation Army, Food banks, volunteer centers, and most of the faith-based groups who have disaster work as part of their mission.

Local Agencies

As of this writing, by law, all incorporated jurisdictions in Oklahoma are required to develop an emergency management program and each county is required to have a qualified emergency management director. The Oklahoma Emergency Management Association is made up of Emergency Managers from across the state with a mission to minimize the effects of an attack, mitigate technological and natural disasters, and to coordinate emergency response and disaster recovery operations. The emergency managers for each county are also in regular contact with the state's OEM.

It is expected that, in most cases, the initial recognition of a significant event will be made at a local level, will be coordinated under local jurisdictional authority, and that initial response activities will be made by local first responders. Once local resources are exhausted, or when incident complexity reaches a point that local authorities recognize a need for higher level support, local emergency managers can request state support, generally by contacting either their regional coordinator from OEM or by directly calling the on-call duty officer at the state EOC.

It is imperative that local emergency management agencies, as the holder and maintainer of a local emergency operations plan (EOP), develop contact lists for energy sector owners and operators in their jurisdiction. This may include peer departments that are staffed by employees of county or city agencies, or private industry operating within or through the jurisdiction. In either case, the local emergency management agency should coordinate communication expectations with these representatives and work to include these individuals or companies into local planning, training, and exercising activities.

Federal Agencies

The U.S. Department of Energy is the lead federal agency when Department of Homeland Security DHS/FEMA activates ESF-12 in the National Response Framework at the federal level. As specified in ESF-12, the DOE is responsible for:

- Serving as the focal point for issues and policy decisions relating to energy response and restoration efforts

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- Assessing energy system damage and monitoring repair work
- Collecting, assessing, and providing information on energy supply, demand, and market impacts
- Contributing to situation and after-action reports
- Identifying supporting resources needed to restore energy systems
- Deploying DOE response teams as needed to affected area(s) to assist in response and restoration efforts
- Reviewing and sponsoring the energy industry's requests for Telecommunications Service Priority (TSP) assignments to provision new services.

Likewise, DOE maintains the following capabilities to meet ESF requirements:

- Collects, and reports to Congress, information filed by electric energy generators, transmitters, and distributors on loss of firm load, system voltage reductions or public appeals, bulk system operational actions, and fuel supply emergencies
- Assists in the development of state and local energy recovery priorities
- Assists affected energy stakeholders in dealing with the FEMA by coordinating with publicly owned electric, gas, and lifeline utilities in applying for FEMA cost sharing for repairs
- Assists affected energy stakeholders in obtaining repair crews and materials from outside the affected areas
- Acts as an ombudsman in conjunction with state energy and emergency agencies to obtain electric power
- Gives restoration priority to communications, public works (water, sewage), and ancillary energy facilities (e.g., fuel transportation/distribution systems, pipeline pump stations, refineries)
- Handles requests for unique department assets to support an energy emergency response
- Maintains the DOE Emergency Operations Center (EOC), which is open twenty-four hours a day, seven days a week. The EOC can be reached by telephone Voice: (202) 586-8100, FAX: (202) 586-8485, or by E-mail at hqdoe@oem.doe.gov.

In support of DOE, a number of other federal agencies are authorized by the NRF to provide assistance during an energy emergency. These agencies include:

- Department of Agriculture (USDA)
- Department of Commerce (DOC)
- Department of Defense (DOD)
- Department of Homeland Security (DHS)
- Department of the Interior (DOI)
- Department of Justice (DOJ)
- Department of Labor (DOL)
- Department of State (DOS)
- Department of Transportation (DOT)
- Environmental Protection Agency (EPA)
- Nuclear Regulatory Commission (NRC)
- Tennessee Valley Authority (TVA)

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In general, these agencies are responsible for supporting both the DOE and state governments in responding to energy emergencies. For example:

- USDA provides technical support and damage assessments/restoration information on electric generation, transmission, and distribution pertaining to Rural Development (RD) systems, as well as assessing overall impacts and needs of these systems. Also facilitates identifying federally subsidized housing available to house response personnel during emergencies.
- DOC provides data that assists in understanding emergency threats and monitoring the international flow of oil. The National Oceanic and Atmospheric Administration (NOAA) is part of DOC. NOAA provides up-to-the-minute tracking for hurricanes, wildfires, winter storms, and other weather-related emergencies including weather-related warnings and messaging systems.
- EPA may need to be contacted if waivers are sought for fuels that do not meet national and local air quality requirements. A fuel waiver can be issued only when the criteria specified in the Clean Air Act Section 211(c)(4)(C) have been met. In general, these criteria allow a fuels waiver only to address a temporary emergency fuel supply shortage that exists throughout a state or region that was caused by an unusual situation such as a natural disaster, and that could not have been avoided by prudent planning. EPA also assists with identifying critical water and wastewater systems that may require priority power restoration in an emergency.
- DOT has several sub-agencies that may relate to an energy emergency, including:
  - Pipeline and Hazardous Materials Safety Administration (PHMSA)
  - Federal Highway Administration (FHWA)
  - Federal Maritime Administration
  - Federal Motor Carrier Safety Administration
  - Federal Aviation Administration (FAA)

In addition, new requirements have recently been added instructing the Federal Communications Commission (FCC) to give priority to certain restoration activities, such as those conducted by FEMA.

Tribal Nations

Oklahoma is home to 39 tribal nations across the state. The borders of these sovereign nations do not align clearly with current political sub-boundaries in the state and can range in size from only a few square miles up to a multiple county jurisdiction. While not uniform in their governance structure, many of the tribal nations maintain their own emergency management personnel for internal planning, training, and exercising purposes – along with holding significant resources of both personnel and equipment for emergency response purposes. In many locations across the state, tribal and non-tribal emergency management agencies work closely together, across all phases of the disaster cycle, supporting one another regularly. As such, future planning for energy emergencies across all levels of government should intentionally include tribal nation

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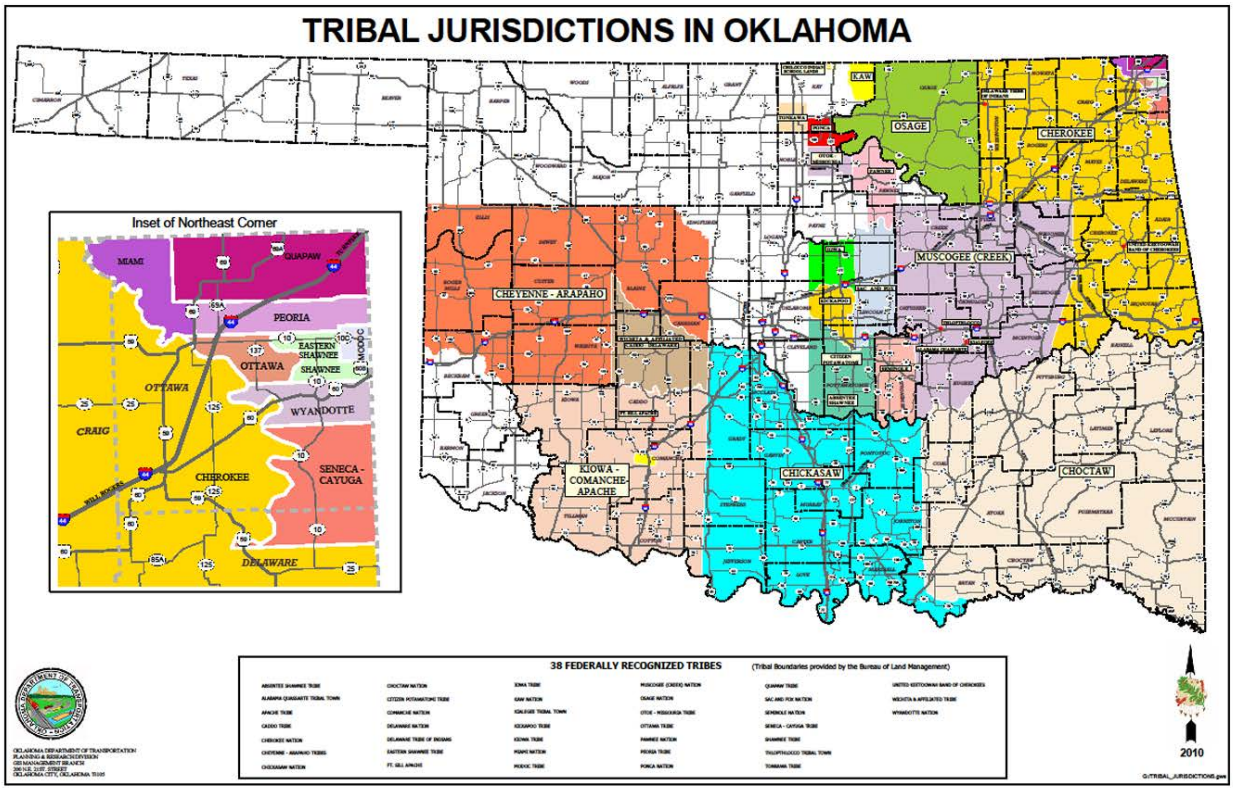
representatives for effective representation of both the needs and resources of Oklahomans. Appendix G provides a reference of compiled resources for energy security planners as they intentionally seek to respectfully engage with tribal nations. Figure 32 provides a map of Oklahoma Tribal Jurisdictions.

Figure 32: Tribal Jurisdictions in Oklahoma. Oklahoma State Standard Hazard Mitigation Plan. Section 1.1., page 6).



Oklahoma Tribal Nations

Absentee-Shawnee Tribe of Oklahoma
Alabama-Quassarte Tribal Town
Apache Tribe of Oklahoma
Caddo Nation of Oklahoma
Cherokee Nation
Cheyenne-Arapaho Tribes of Oklahoma
Chickasaw Nation
Choctaw Nation of Oklahoma
Citizen Potawatomi Nation
Comanche Nation
Delaware Nation of Oklahoma
Delaware Tribe of Indians
Eastern Shawnee Tribe of Oklahoma

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Fort Sill Apache Tribe of Oklahoma
Iowa Tribe of Oklahoma
Kaw Nation
Kialegee Tribal Town
Kickapoo Tribe of Oklahoma
Kiowa Indian Tribe of Oklahoma
Miami Tribe of Oklahoma
Modoc Nation
Muscogee (Creek) Nation
Osage Nation
Otoe-Missouri Tribe of Indians
Ottawa Tribe of Oklahoma
Pawnee Nation of Oklahoma
Peoria Tribe of Indians of Oklahoma
Ponca Tribe of Indians of Oklahoma
Prairie Band of Potawatomi Nation
Quapaw Nation
Sac and Fox Nation of Oklahoma
Seminole Nation of Oklahoma
Seneca-Cayuga Nation
Shawnee Tribe
Thlopthlocco Tribal Town
Tonkawa Tribe of Oklahoma
United Keetoowah Band of Cherokee Indians in Oklahoma
Wichita and Affiliated Tribes
Wyandotte Nation

Currently, tribal emergency planners utilize the Inter-Tribal Emergency Management Coalition (ITEM-C) as a primary resource for energy emergency planning resources. This professional organization was created in 2004 with the explicit goal of increasing collaboration between tribal emergency managers, planners, and response partners across the state of Oklahoma. Twenty-two tribes in Oklahoma participate in this organization. ITEM-C representatives meet monthly at a centralized location in Oklahoma to provide members with programmatic updates related to emergency management activities. Throughout the year, tribal nations that participate in ITEM-C support each other through shared planning resources, response mutual aid and resource sharing, and in the short-and long-term recovery process following an incident. ITEM-C also hosts an annual conference where tribal representatives and response partners can gain access to shared training activities, updates on larger local, regional, and national initiatives, and can directly interact with representatives from FEMA on topics such as mitigation planning and BRIC (Building Resilient Infrastructure and Communities) grants.

Starting in 2024, Oklahoma energy security planning team members has worked with members of the ITEM-C Board of Directors to further familiarize this group with the Oklahoma Energy

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Security Plan, and has identified collaboration opportunities for local, regional, or statewide projects that facilitate and encourage state and tribal participation in future energy security activities. Specifically, the team hosted a session at the ITEM-C Annual Conference in August 2024, which enabled planners to meet with ITEM-C members and gather their feedback related to desired strategic planning activities for Oklahoma's 5-year energy security strategic plan, as well as further integrate tribal perspectives into statewide energy security planning activities. Attendees from tribal, local, and private sector partners attended the session and the team gained valuable feedback and perspectives relating to vulnerabilities that exist in energy security and what kinds of projects the State of Oklahoma should prioritize. In addition, many attendees shared contact information with planners, and follow up conversations are planned with these tribal partners.

INDUSTRY STAKEHOLDERS

The state's EOP ESF-12 names four energy industry support groups for energy emergency situations: regulated investor-owned utilities; the Oklahoma Association of Electric Cooperatives (OAEC); the Oklahoma Telephone Association; and the Municipal Electric Systems of Oklahoma (MESO). The section below outlines their respective roles.

During major, widespread outage events, affected electricity and natural gas or petroleum companies may require additional resources to expedite service restoration given the scale and severity of infrastructure damage. These industry stakeholders address these resource constraints by using mutual assistance programs — voluntary partnerships among utilities to provide personnel, equipment, and materials to expedite restoration during emergencies. Mutual assistance programs are designed to be scalable, with the ability to respond to resource demands from a localized event or a large regional disaster. These programs provide a formal yet flexible process for the sector to request assistance from one another, including the sharing and deployment of:

- Electricity line worker crews and bucket trucks;
- Gas utility crews with appropriate equipment for inspection and restoration activities;
- Distribution and transmission equipment, including electric transformers and substations; and
- Cybersecurity technical assistance.

Mutual assistance programs typically involve standing agreements between utilities that define the roles and reimbursement rates. These agreements can differ in content and format – some are contracts and others are memorandums of understanding (MOU) between utilities.

The section below outlines the respective roles of Oklahoma's industry stakeholders, as well as mutual aid activities.

Regulated Investor-Owned Utilities
All regulated investor-owned utilities in Oklahoma are legally required to notify the OCC of unplanned service interruptions (OAC 165:35-19-4). In addition, each utility must file a

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Restoration of Service Plan with OCC. A detailed discussion of these measures can be found in the Energy Emergency Communications Procedures section of this plan.

In an energy emergency, further responsibilities for utilities include active communication with the OCC in terms of status updates on outages, damage reports, and damage repair assistance to other utilities as requested by the OCC.

Oklahoma Association of Electric Cooperatives
The Oklahoma Association of Electric Cooperatives (OAEC) is a statewide association of local electric distribution and generation/transmission cooperatives. OAEC has 30 members, 27 of which are based in Oklahoma and three of which are based out-of-state (Arkansas Valley, Ozarks Electric, and Golden Spread) but with Oklahoma membership and/or service components. Of the total 30 members, three are generation and transmission (G&T) cooperatives, and the remainder are distribution cooperatives. OAEC allows its members to collectively perform services which would not be practical or economical for each individual cooperative to perform alone, such as providing safety and loss control programs and coordinating mutual aid disaster planning.

In an energy emergency, OAEC leadership will serve as a liaison group and communicate with OCC and OEM to provide information about its members' outages, restoration of service updates, and any mutual aid activities.

Oklahoma Telephone Association
The Oklahoma Telephone Association represents local exchange carriers around the state. The Telephone Association's main support role as it pertains to energy emergencies is to provide information regarding its members' telephone outages to the OCC and OEM, and to coordinate mutual aid activities between member companies that may be experiencing outages. Non-member companies may report this information independently.

Municipal Electric Systems of Oklahoma
Municipal Electric Systems of Oklahoma (MESO) is a statewide trade association for Oklahoma's 63 municipally owned electric distribution utilities which serve over 400,000 Oklahoma residents. Like the other support groups, OMA coordinates mutual aid services and agreements for its member utilities and, in the event of an energy emergency, serves as a contact organization for state officials to provide information on member outages and restoration updates.

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ENERGY EMERGENCY COMMUNICATIONS PROCEDURES

To withstand the potential for multi-pronged and complex events that engage multiple partners in effective response, resilient energy emergency communications procedures should be designed around the concept of a communications ecosystem (see Figure 33).

Figure 33: Emergency Communications Ecosystem

As defined by the National Emergency Communications Plan, an emergency communications ecosystem is comprised of four key elements: Reporting and Requests for Assistance; Incident Coordination and Response; Alerts, Warnings, and Notifications; and Public Interaction.[261] The graphic to the right illustrates this concept and captures the interactive relationships between the multitude of emergency response stakeholders and the overlapping incidence of the four key elements. Oklahoma's energy emergency communication procedures follow this four-pronged structure.

REPORTING AND REQUESTS FOR ASSISTANCE

Reporting of timely and accurate information, as well as well-defined paths for assistance requests, are critical parts of energy security in Oklahoma. As displayed in Figure 34, which depicts the typical flow of information in an energy emergency, most of the information about energy disruptions and emergencies is reported to state officials by energy companies and/or local emergency managers and responders. Within the state government, there are two hubs that receive this reported information or requests for assistance—either the OCC (in non-propane emergencies) or LP Gas Administration (propane/liquefied petroleum emergencies only), and OEM.

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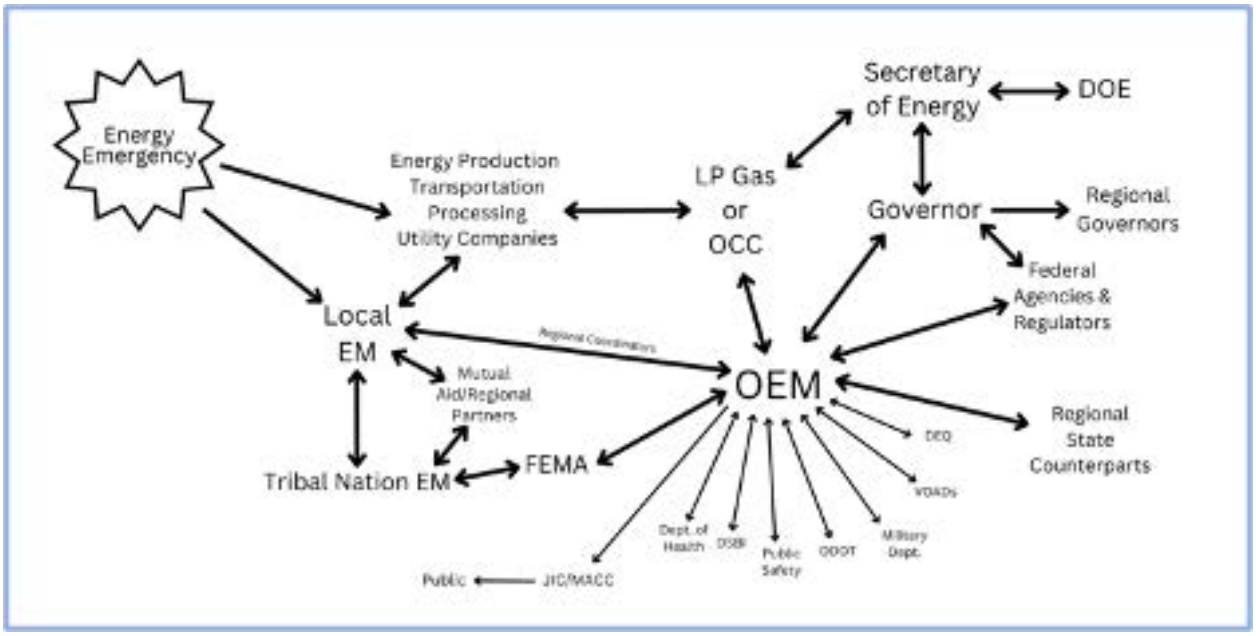
Figure 34: The Flow of Information During an Energy Emergency in Oklahoma



First, regulated energy providers in Oklahoma are required by the Oklahoma Administrative Code (OAC 165:35-19-4 Restoration of Service (Electric) /165:45-9-2.1 (Gas)) to provide Restoration of Service plans annually to the Director of the Corporation Commission's Consumer Services Division; these plans must outline detailed steps for responding to outages and must include detailed contact lists for each regulated company including a minimum of two 24-hour-a-day contacts. Once each company's plan is received, the Public Information Officer of the Corporation Commission maintains these plans and acts as the point of contact for utilities that are required to report unplanned outages. Upon receiving any report of outage or emergency from an energy provider, the OCC's Public Information Officer (PIO) is responsible for contacting any state and local agencies that might be affected. Further coordination is enabled because the OCC PIO has access to proprietary databases used by utilities that indicate electric outages. These proprietary databases show more granulated information than what is available on the public-facing outage maps hosted on electric utility websites.

For emergencies with potential environmental impacts, OCC field inspectors keep the PIO informed. For example, if an oil well blowout should occur, an OCC field inspector will also contact the OCC PIO who will coordinate with the regulatory team in addition to a representative from the energy producer.

In addition to tracking electric and gas outages, it is important to track the flow of energy via pipelines throughout the state of Oklahoma. Accordingly, the OCC has created an additional set of rules to govern the actions to be taken by energy providers in the event of a pipeline incident. OAC 165:20-5-1 requires telephonic notice to the OCC Pipeline Safety Department no more than

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two hours following any pipeline incident that involves release of gas from a pipeline and either a death, personal injury requiring hospitalization, damage of $5,000 or more, or any other event that is significant in the judgment of the operator.

However, as mentioned in previous chapters, not all energy providers in Oklahoma are regulated and therefore some are not required to report outages or incidents. In these cases, communication depends heavily on relationships; the OCC PIO maintains a strong network, particularly with electric cooperatives and municipal electric providers, to coordinate and get needed data to effectively manage energy emergencies. The importance of strong professional networks in Oklahoma cannot be overstated and is a key factor in the state's previous success in managing energy incidents.

As shown in Appendix A, all state agencies with lead or support roles in ESF-12 under the state's Emergency Operations Plan also maintain public contact numbers that any member of the public can use to report energy emergencies to authorities or request assistance from the agency.

Finally, Oklahoma has two individuals who serve as Energy Emergency Assurance Coordinators—these individuals, who each have planning and/or response responsibilities during energy emergencies—are registered on a password-protected ISERnet website hosted by the U.S. Department of Energy, which allows Oklahoma's key energy emergency planners to receive energy updates from federal agencies and communicate information to other states and the federal government when authorized by the Governor, Director of OEM, or other key state decision makers. These two individuals are the Public Information Officer at the Corporation Commission and the Director of Programs-Planning at the state Energy Office.

INCIDENT COORDINATION AND RESPONSE

Once OCC receives information about any energy incident, the agency is responsible for relaying the appropriate information about electric outages, pipeline incidents, or other energy emergencies to OEM, to other energy companies, and to a list of potentially affected state agencies/organizations. OEM, when it receives information from local emergency managers, communicates it to the OCC, the Governor's office, and back to the local governments that are affected. Should the energy emergency warrant federal involvement, the Governor's office (or the Director of OEM) is responsible for communication with the federal government.

After being notified that an emergency has occurred, OEM will activate the Emergency Operations Center (EOC) and Joint Information Center (JIC). In the past, all coordination occurred in a physically secure bunker or field office location, but OEM has recently begun providing a webEOC which has been tested during the COVID-19 pandemic. Although the physical locations will remain a primary mechanism of incident coordination and response, the webEOC provides a new opportunity and needed redundancy for individuals assigned to the EOC to assist with incident coordination without always requiring their physical presence in the bunker.

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The resource requirements for incident coordination, which include staff, equipment, office supplies, and facilities, should be tailored to the type and magnitude of the emergency prompting the response. Depending on the nature of the emergency, all or some of the listed resources may be required. To determine the resource requirements, the *State of Oklahoma Joint Center Operations Guide* will provide JIC logistics, job descriptions, and training requirements for each function outlined in the guide.

To ensure the correct individuals are included in the incident response team, contact information, including personal email addresses, work, home, and cell phone numbers, for each of the entities with support functions under ESF-12 can be found in the Oklahoma Energy Emergency Contact list. This list is maintained and updated by the OCC Public Information Officer/Liaison to OEM. As new energy incidents present themselves, all of the people/entities who are contacted during the event are added to the contact list. The list is updated every year by the OCC to ensure that the content is accurate.

For incident coordination and response to be successful during an energy emergency, it is critical that utilities maintain contact between their on-the-ground crews, the utility offices, and state and local officials. To assist in this, all major utilities in Oklahoma, including energy utilities, have registered to use the Government Emergency Telecommunications Service (GETS).

GETS provides emergency access and priority processing in the local and long-distance landline networks during times of emergency when the system is congested and the probability of completing a call over normal means has significantly decreased. GETS allows users to communicate over existing paths with a high likelihood of call completion during the most severe conditions of high-traffic congestion and disruption. The service that is accessed through a universal access number and Personal Identification Number (PIN) card verification methodology.[262] GETS has a companion service for wireless calls from cellular phones, the Wireless Priority Service (WPS), which offers similar priorities as GETS does but for calls placed on wireless networks. There is a separate registration requirement for WPS, and it functions as a free add-on to a subscriber's wireless account.[263] For any Oklahoma entities needing additional training or assistance in utilizing these services, training videos[264] are available at www.cisa.gov/pts-videos.

This plan describes many existing regional mutual assistance efforts conducted through private/industry stakeholders, but the state is also participating in multiple regional coordination mechanisms to enhance energy security. In addition to the EMAC, Oklahoma has begun planning through the Central Region Collaborative, which will focus on shared hazards and vulnerabilities, and explore regional exercise opportunities for the future. Much of the regional planning and information sharing efforts rest upon foundations of trusted relationships; therefore, Oklahoma will spend time initially focused on relationship building, outreach, creating regional critical contacts list, and beginning additional information sharing with emergency management communities and State Energy Offices, to build a foundation towards mutual planning activities in future years.

ALERTS, WARNINGS, AND NOTIFICATIONS

As part of incident management and response, redundant and diverse alert and warning systems will ensure that as wide an audience as possible receives time-sensitive notifications related to the energy emergency including evacuation notices, weather warnings, and more. This portion of the emergency communications ecosystem is tightly entwined with public interaction; in many cases these aspects are underway simultaneously and have overlapping roles. However, this aspect of the ecosystem is intended to specifically address instructional messages that direct protective action.[265]

One method Oklahoma emergency responders utilize to distribute warnings and other messages for protective action is the Integrated Public Alert and Warning System (IPAWS).[266] Local jurisdictions have the opportunity to access and utilize the IPAWS system after completing a planning and training process through FEMA, being granted authority by FEMA, and by owning IPAWS compliant alerting software (such as Everbridge or CodeRed). Jurisdictions that do not have IPAWS access can coordinate message construction and dissemination through the state EOC.

Finally, Oklahoma Wireless Information Network is a forty-three site public safety radio communications network that provides coverage to 70 percent of Oklahoma's population and includes more than 520 agencies and 40,000 radios.[267]

In addition to specific platforms that push out alerts and warnings, emergency response professionals at all levels utilize broadcast and social media to disseminate protective warnings. Emergency planners should be particularly cognizant when issuing warnings and protective alerts that these warnings and protective alerts may need to be broadcast to Limited English Proficient (LEP) speakers, and planners and responders should consider bi-lingual risk communication, with a particular emphasis on Spanish speakers. Emerging research suggests that not only are broadcasts in Spanish within Oklahoma needed to help LEP populations take correct protective actions during emergencies, but that there is also a need to ensure that translated warnings are correctly understood.[268]

PUBLIC INTERACTION

ESF-15 of the Oklahoma Emergency Operations Plan provides the framework for Oklahoma's public information program protocol to be followed during all types of emergencies[269] and designates OEM as the state coordinating agency with support from all state agencies, boards, commissions, and voluntary organizations.

The primary purpose of the public information function is to provide and maintain operational consistency throughout the state of Oklahoma in the form of emergency information by providing accurate information to legislative and congressional delegations and through community

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relations. Uniform information coordination with these groups will help Public Information Officers (PIOs) for State, County, and Municipal entities to provide information to the citizens in a responsive, well-managed manner during emergencies and disasters. Each of the PIOs is responsible for speaking about their agency's involvement in managing an energy emergency.

First, as an ongoing measure to stay prepared for emergency communications, PIOs and key operations officials typically meet monthly to share information and OEM staff have served as instructors in basic FEMA communications courses, providing them wide and frequent networking and communications exposure statewide. During the COVID-19 pandemic, state agencies have maintained communications opportunities, pivoting to a virtual environment. In lieu of monthly PIO meetings, OEM has hosted weekly calls with emergency management stakeholders, and maintains a SharePoint site that includes discussion boards and resources where professionals can post questions and interact. This site provides a platform to address and correct misinformation, distribute social media graphics templates to other agencies, and provides a virtual platform to maintain communication and interaction when in-person meetings are more challenging. Additionally, state agency communications professionals have been aided by the Lt. Governor's state branding rollout process, which established a Microsoft Teams group that has resulted in another avenue for agency communications officials to interact and stay in touch on a variety of topics.
During an emergency, in order to ensure the continued flow of information, the OCC's Public Information Officer remains in contact with the applicable state agencies and utilities during energy outages and, based upon these updates, will periodically release reports on the status of the outage.

During statewide emergency operations, OEM has the primary responsibility for providing emergency public information and general information, with the Director of OEM responsible for all educational and informational programs conducted to exercise energy emergency responses. To accomplish this responsibility, the Director of the OEM will appoint or designate a state Emergency Information Officer to direct these activities. It is the responsibility of this Officer to prepare and release emergency information as provided by the OEM Director and/or the Governor, as the Governor's Office serves as the focal point of communication with the public. Accordingly, the OEM PIO will work closely with the Governor's Press Secretary to assure that the Governor has timely access to accurate information. Status reports are released daily, or whenever a significant change in the condition of the outage occurs, which means multiple reports could be released in a single 24-hour period. The OCC's Public Information Officer, when appropriate, will provide updates to the media (social, print, television, and radio) so that the general public is informed as to the status of the outages and the progress of restoration efforts.

The state Emergency Information Officer will prepare a broad scope of information to be provided to the OEM Director and/or Governor. The state Emergency Information Officer will also prepare a broad scope of information for use by the news media. The pertinent information and situation reports will be prepared, with the OEM Director's approval, for the Governor, the Emergency Alert System, or other news media as appropriate. In close coordination with the Governor's Press

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Secretary and involved agency PIOs, this group will approve, coordinate, and release all emergency information from state agencies and serve as the focal point for all inquiries by the media.

It is the state Emergency Information Officer's responsibility to provide the public, via the news media, accurate and timely information about emergency and disaster response and recovery operations. This will reduce or eliminate inaccurate information that may arise and ensure vital emergency and disaster information is delivered to the citizens of the state of Oklahoma.

Relevant agency PIOs should be present at any and every event that might attract media attention or that would serve as an opportunity to get information to disaster victims and to publicize the local and state emergency or disaster message. The early activation and deployment of a PIO, along with other key response personnel, as part of emergency operations field deployments or as part of the preliminary damage assessment team and other pre-declaration activities, is vital to effectively alleviate concerns about local and state government responsiveness and to provide individuals with accurate information during every step of the process.

If a Presidential Declaration has been made, the JIC will be expanded to include Federal resources such as FEMA and the U.S. Army Corps of Engineers. With an expanding JIC established, field PIOs must continue their visibility in the affected communities, especially where Disaster Service Centers have been established. The JIC then becomes the central point for media access to the latest developments and emergency information for all participating agencies. The JIC supports field PIO operations by providing updated information about current policies and issues regarding response and recovery operations.

PIOs in the JIC work closely with elected officials, response agencies, and emergency managers. JIC PIOs are responsible for establishing daily news briefings for key disaster officials; writing and disseminating news releases to appropriate media outlets; monitoring and analyzing television, radio, and newspaper disaster-news coverage and providing this information to the JIS; and providing multilingual media support operations for the disaster as appropriate to the community need.

Private entities in Oklahoma's energy sector also maintain their own protocols through Incident Command Systems for alerts and notifications to both emergency responders and customers. Most electric and natural gas utilities offer public-facing outage maps on their websites, and use social media, including Twitter, Facebook, Instagram, LinkedIn and/or NextDoor, to disseminate information. Post topics on social media could include:

- Weather updates/How to prepare for a storm
- How to report outages/contact us
- Damage assessments
- Safety information (avoid downed lines, generator information, etc.)
- Estimated restoration times (once available)
- Updates on crew work and work processes

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- Answers to common outage questions

Private entities typically employ an external affairs officer that communicates information and alerts to emergency managers and state officials as well as coordinating the private entity's external response.

Additional discussion of specific actions taken within the energy sector during response to energy emergencies can be found in the "Preparing for, Mitigating, and Responding to Energy Emergencies" chapter of this Plan.

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PREPARING FOR, MITIGATING, AND RESPONDING TO ENERGY EMERGENCIES

Oklahoma energy security requires a two-pronged approach: preparative and preventative measures that help ensure a stable energy supply and avoid incidents and emergencies, but also mitigation and response strategies to manage energy demand and restore energy flows quickly if and when disruptions occur. As already described in earlier sections of this plan, the energy landscape in Oklahoma includes multiple sectors and myriad stakeholders, and each sector and energy emergency is unique. Creating an exhaustive list of preventative measures and response strategies would be nearly impossible. However, after conducting an historical analysis of Oklahoma's vulnerabilities (see chapter titled "Energy Vulnerability Assessments"), a literature review of best practices in emergency preparation and response, and after extensive engagement with dozens of Oklahoma energy stakeholders, a multitude of evidence exists of the types of scenarios most likely to affect our state.

Despite multiple plan chapters that discuss vulnerabilities, preparation and mitigation strategies, the energy security planning environment is ever evolving, this plan will, whenever possible, update documentation of Oklahoma's efforts in reliability and resilience that are responding to changing conditions. This chapter describes the current plans, activities, requirements, and protocols Oklahoma energy stakeholders have in place to prevent and mitigate risk from, as well as respond to, emergency situations. Appendix E provides additional information about implementation for a variety of response options to possible Oklahoma scenarios. This appendix should be treated like a "menu" of response options from which to select and implement, rather than a list of standard operating procedures. The list is divided into sector-specific response options. Within each sector, there are two types of response options: the first type of response is designed to manage the supply of energy; the second type of response is designed to manage the demand for energy. Some responses may be appropriate for more than one energy sector; those instances are noted.

As with all emergencies, it is critical to treat every energy emergency as a unique circumstance. A high level of resilience requires that officials tailor their actions to prepare for and respond to the incident at hand rather than selecting a generic action plan that may have worked in the past under different circumstances. When deciding which preventative and response options should be employed, government officials and energy stakeholders must examine the potential for, severity, scope, and duration of the emergency as well as the resources available to officials based on situational and often complex interdependencies.

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ELECTRICITY

> *"Resilience is not just about lessening the likelihood that…outages will occur. It is also about limiting the scope and impact of outages when they do occur, restoring power rapidly afterwards, and learning from these experiences to better deal with events in the future."*[270]

A fundamental component of any energy security plan is how to prevent *and* recover from electric interruptions, damage, or emergencies. In Oklahoma's electric sector, investor-owned utilities, electric cooperatives, and municipal and government-owned electric providers have designed and implemented detailed plans to address prevention and recovery while also working closely with state agencies and regional groups that regulate and oversee a variety of inspection, maintenance, and response programs. When implemented correctly, these regulations, plans, and programs can prevent outages or—when they do occur— lessen the area affected and/or time needed for restoration of service.

Preparation and Preventative Measures

To thoroughly plan for and prevent energy emergencies, reliability remains the key metric both for preventing and minimizing disruptions. Reliability planning occurs at the generation, transmission, and distribution levels, within investor-owned utilities, cooperatives, municipal utilities, and within regional organizations. This planning includes activities as diverse as assuring resource adequacy, system hardening, vegetation management, equipment upgrades, and training.

At the regional level, the Southwest Power Pool (SPP) acts as a reliability coordinator for transmission operators, generator operators, and balancing authorities in its 14-state territory, acting as a controller overseeing the interconnected operations of the power grid. SPP ensures reliable delivery of electricity to consumers by maintaining a wide-area view of the grid's current state and future conditions. Continuous coordinated operation of the bulk electric system is essential to maintain reliable electric service to all customers, and SPP has established reliability coordination procedures for around-the-clock coordination of normal and emergency operating conditions.[271] As an additional reliability and preventative measure against impacts, SPP maintains, allocates, and supplies operating reserves within its Reserve Sharing Group to hedge against emergency situations and contingencies. The continuous operation of the bulk power system requires electric reserves be kept online and available to use to provide protection against contingencies. Operating reserves can be used to regulate load changes and prevent the need to shed firm load or curtail firm power sales. Through this proactive reserve sharing group, SPP ensures that it is prepared in advance for potential disruptions.[272]

Within our state, Oklahoma's State Standard Hazard Mitigation Plan (SHMP), this plan, and other related reports should be used as resources to identify, assess and prioritize the various natural and man-made hazards that pose a risk to energy security within the state, across multiple geographic and jurisdictional lenses. For example, the SHMP also identifies broad areas of vulnerability that

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the state faces as it relates to these hazards. Because the risk assessments conducted for SHMP and SESP were done independently, cross-walking across the two documents provides further verification of key hazards, as well as points towards high-priority hazard reduction efforts specific to the state's energy sector. This includes both identification of physical and cyber mitigation activities directly targeting energy security, as well as broader areas of capacity building through the identification and implementation of training and exercise activities of relevant stakeholder groups that play a role in the state's preparedness, response, and recovery phases of incidents that have an energy component. Future Oklahoma energy security planning efforts will also look to facilitate greater communication between state agencies to identify further opportunities to access programs to assist with risk mitigation efforts across the state. More information about resources to assess risk can be found within the Risk Mitigation Approach description in the Purpose of the Plan and Energy Vulnerability Chapter of this plan.

The risks identified by crosswalking the SHMP and OESP documents will serve Oklahoma's SEO as it seeks to utilize two new resources made available under the Bipartisan Infrastructure Law (BIL) for enhancing grid resilience amongst extreme weather and events, the Grid Resilience Formula Grant Program (GRID) and the Grid Resilience and Innovation Partnerships (GRIP) program. The highest risk areas identified in both the SHMP and SESP can be utilized to prioritize areas for the SEO to consider in the metrics identified in the GRID program such as hardening of power lines and facilities, weatherization, and/or monitoring and control technologies. The Oklahoma SEO is continuing its work to develop measurement metrics for identifying priority areas for electric utility hazard mitigation efforts and will consider those high-risk hazards identified in the SHMP. Stakeholder input meetings, in conjunction with collaborative input from the OCC as the agency tasked with utility oversight, will also be done in 2024 to further hone primary risk areas to address specific Oklahoma hazards and needs. A key work task will be to ensure the SEO prioritizes those hazard mitigation areas that are currently not being addressed by Oklahoma electric utilities under their OCC approved reliability plans – further discussed below. More specific information as to how the SEO might utilize the GRID and GRIP funds in conjunction with the SESP will be an ongoing process through the end of 2024 and into 2025. The SEO is looking ahead already to addressing some hazard mitigation measures through an application submitted to the GRIP program early in 2024. The SEO hopes to hear by the end of 2024 the result of the application submission.

All Oklahoma electricity providers also engage in reliability planning. Under the authority of OAC 165:35-25-14, the Oklahoma Corporation Commission maintains information about each regulated electric provider's reliability plan. This section of the administrative code requires regulated utilities to design and maintain a program to limit the frequency and duration of electric service interruptions.[273] As excerpted from the Commission's Rules:

> "This program must address all the factors that impact the reliability of the distribution system, including, but not limited to:
>
> 1) The age, distribution, and location of equipment on each circuit;
> 2) The number, density, and location of customers on each circuit;
> 3) The location and density of trees on the system;

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4) An annual vegetation management plan;
5) The impacts on distribution system reliability of animals, wind, storms, ice, and automobile accidents."

As an example, Oklahoma historically has experienced electric outages due to ice accumulation and tree limbs pulling down lines. When a segment of lines sags toward or drops on the ground due to the weight of ice or tree limbs, the weight of the fallen lines causes the utility poles on both sides of that strand to pull inward and possibly snap. This causes the next segment of line to pull down, affecting the next poles and thereby creating a cascading effect. Understanding this common scenario, Oklahoma Gas & Electric (OG&E), Public Service Company of Oklahoma (PSO), and Liberty-Empire's approved reliability plans include a vegetation management program to trim the right-of-way along one-fourth of their distribution systems each year. Working with arborists, the companies have designed a program to clear potentially problematic vegetation so that it will take four years or longer to grow back into an area where they may become entangled with the electric lines. Further, all distribution lines are inspected on a 5-year cycle, with some lines inspected more frequently, in compliance the reliability plans mandated under OAC 165:35-25-14. Additionally, using a combination of the System Average Interruption Duration Index (SAIDI) and the System Average Interruption Frequency Index (SAIFI) scores, the utilities identify their worst performing circuits, the cause of poor performance, and determine if action is required to mitigate problems.

Regulated utilities submit an annual reliability report to the OCC under OAC 165:35-25-20.[274] In response, OCC's Public Utility Division (PUD) issues an annual reliability scorecard for each entity that analyzes how many outages each customer had (SAEFI) and the duration (SAIDI). As of this writing, the 2024 Reliability Scorecard is available at: https://oklahoma.gov/content/dam/ok/en/occ/documents/pu/pud-reports-page/2024-reliability-report-5-1-2024.pdf

Oklahoma's electric providers are also addressing reliability concerns by making updates to their Integrated Resource Plans, in response to updated generation capacity requirements set forth by the regional transmission organization (RTO) serving as the balancing authority, the Southwest Power Pool (SPP). Recently, SPP has updated its Planning Reserve Margin (PRM) requirements,[275] the measure used by SPP to ensure adequate generation capacity to meet electricity demand, to reflect the growing electricity demand in the region. SPP increased the PRM utilities are required to have, effective the Summer 2023 season, increasing the margin from 12% to 15% to ensure its member companies can reliably serve load. In addition, SPP is taking action to recognize the increasing need to ensure enough resources to meet rising winter load demand as greater electrification takes place across the region. In conjunction with increasing of the PRM for the summer season, SPP is also currently taking action to develop and institute a winter season PRM to ensure SPP can meet the noted increase in winter electricity demand.[276] These actions by SPP are examples of how Oklahoma utilities must also follow requirements set forth by the RTO they are a member of to ensure electricity reliability.

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Oklahoma state statute, OAC 165:35-33-5(f), also requires electric utilities to develop and keep updated a Homeland Security and Critical Infrastructure Plan, which designates physical assets and computer software that the utility considers to be critical infrastructure and outlines the utility's measures to secure those facilities from extended service interruptions. Pursuant to OAC 165:35-33-7, utilities keep these plans in a confidential location on-site, but are required to notify the Corporation Commission each year that the Plan is updated.[277] By understanding the precise location of critical infrastructure and planning to keep these secured, utilities can lessen the possibility of widespread outages resulting from damage to or outages at key facilities. More information on cybersecurity and critical infrastructure is discussed in the chapter of this plan titled "Cybersecurity Planning".

Electric cooperatives' and municipal and government-owned utilities' reliability planning activities are not regulated by the Oklahoma Corporation Commission. However, these entities track reliability data internally and ensure adherence to high reliability standards through coordination and compliance with standards from regional and national organizations including the North American Electric Reliability Corporation (NERC)[278], the SERC Reliability Corporation's Reliability Assessment and Performance Analysis (RAPA) program[279], the U.S. Rural Utilities Services (RUS) standards,[280] and the Southwest Power Pool (SPP). In addition to the vegetation management programs implemented at most cooperatives, reliability planning occurs through equipment replacement and upgrades as well.

In combination, efforts such as vegetation management, periodic system and equipment upgrades, and other more periodic efforts such as system hardening, reinforcement, and undergrounding programs can reduce exposure to common Oklahoma hazards such as high winds, lightning strikes, and ice thereby preventing many outages from ever occurring.

An additional key component of preparation and prevention activities is training. Training for personnel is a critical component of all electric providers' preparation strategy in advance of outage and emergency situations so that when situations do arise, personnel are prepared and practiced in their responses. Such trainings include apprenticeship programs to ensure complete skill sets, individual trainings related to specific technical skills, and desktop and tabletop exercises to simulate emergency responses. Most of Oklahoma's investor-owned utilities offer internal apprenticeship programs, while cooperatives and municipal utilities often participate in apprenticeship programs provided through statewide associations such as the Oklahoma Association of Electric Cooperatives (OAEC) and the Municipal Electrical Systems of Oklahoma (MESO). For instance, MESO offers a four-year, U.S. Department of Labor-certified apprenticeship program for member utilities, as well as additional trainings offered annually on technical skills. The Federal Emergency Management Agency (FEMA) also provides myriad training opportunities for Oklahoma electric providers and support agencies for energy emergencies, particularly in the areas of emergency response and management.[281] To provide just one example, OG&E's Transmission and Distribution System Restoration Plan, provided annually to the Oklahoma Corporation Commission, incorporates an Incident Command System that includes FEMA course requirements for incident commanders and all key personnel.[282]

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Finally, to prevent accidental disruptions, as part of the Oklahoma Underground Damage Prevention Act,[283] the Oklahoma One Call System, known as Okie811, requires companies and private citizens to call one number before digging on their property; by calling in the location of the proposed dig, the utilities can come out and mark their lines to avoid damage to underground electric infrastructure.[284]

Mitigation Measures and Restoration of Electric Power After Interruptions

When outages do occur, electric utilities must take action to repair system damage and restore service as quickly as possible. There are several short-term and long-term actions specific to Oklahoma that help utilities effectively respond to, and therefore mitigate the impact from, events and/or shorten the duration of outages after incidents and emergencies.

A short-term action electric providers can take prior to an event, presuming that the event can be predicted (such as severe weather), is pre-positioning equipment at points expected to be the most impacted. This helps electric providers avoid uncertainty due to possible transportation delays and guarantees availability of the equipment close to the potentially impacted sites, thereby reducing restoration times. National Weather Service forecasts and decision support tools are available for all types of potential severe weather, falling under different issuing agencies based on the hazard type (see Appendix F for a list of relevant decision support tools from official sources). Different forecast tools are relevant at different times scales (from weeks ahead of a temperature anomaly to hours ahead of a severe wind event) and at different levels of certainty. As additional forecast tools and techniques are developed by NOAA and NWS researchers and scientists, it will be critical for both government and industry leaders to learn how to assimilate this data into planning, monitoring, and response efforts.

For instance, to optimize the placement of equipment prior to an ice storm, Oklahoma gains particular benefit from the availability of the Oklahoma-developed Sperry-Piltz Ice Accumulation (SPIA) Index[285] (see Appendix F and www.spia-index.com). Using experiences from previous ice storms, the SPIA Index uses an ice accumulation algorithm and subsequent utility damage index to predict both the location and severity of ice accumulations three to four days in advance of potentially damaging events while also enabling classification of potential electric utility system damage on a scale. Providing early warnings of major events such as ice storms to electric utilities and other emergency responders affords appropriate rapid response and recovery. The National Weather Service has a signed license agreement to use the SPIA Index at local weather forecasting offices (WFO). Forecasts 24 hours in advance are free to the public to use and can be used in conjunction with NWS forecasts on the website NationalOutages.com.[286]

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Usage of the SPIA Index is particularly pertinent to the community lifelines referenced in the National Response Framework[287], as the ability to predict weather impacts can also allow energy emergency support agencies to coordinate supplies, purchases, deliveries, and inventories ahead of time, in concert with County Commissioners, Emergency Managers, and state Emergency Management officials, as well as with mutual aid entities, sheltering agencies, and contractors from across the state or multi-state region.

An additional tool now available to assist with winter storm potential mitigation is the Winter Storm Severity Index (WSSI) by the National Weather Service.[288] The WSSI is a communication tool that works to convey the complexities and hazards associated with winter storms as they relate to potential societal impacts. The WSSI provides a classification of the overall expected severity of winter weather using the terminology of: "Minor," "Moderate," "Major," and "Extreme." The "Winter Weather Area" pertains to areas where winter weather conditions are expected, but are not anticipated to impact daily life.

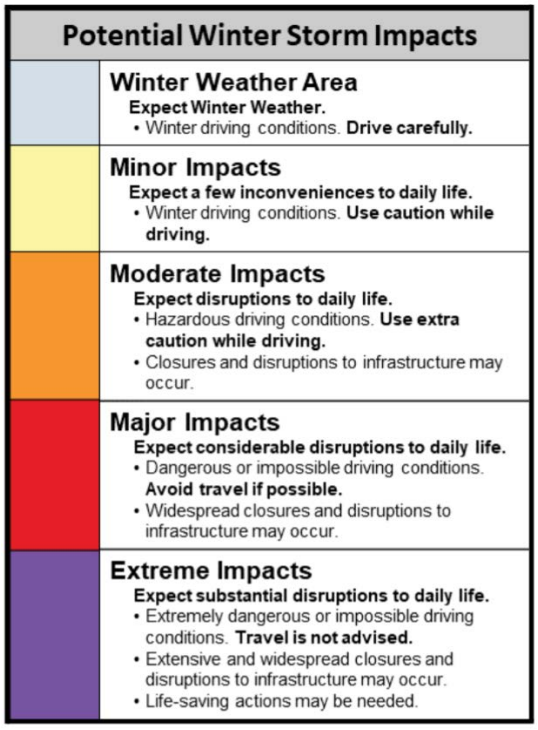

Figure 35: Winter Storm Severity Index Impact Definitions.

A longer-term mitigation strategy is the deployment of Advanced Metering Infrastructure (AMI), which includes smart meters, data management systems, and communication networks. Deployment of AMI has proven to lower outage costs and allow faster outage restoration through more efficient outage identification, allowing repair crews to be precisely dispatched to the specific outage location. Over the past decade, Oklahoma has been a leader in deployment of smart meter technology; as of 2019, Oklahoma electric providers had nearly 1.8 million advanced meters deployed statewide.[289]

As they respond to energy emergencies, regional and state-level electric providers follow Emergency or Restoration of Service plans. Regionally, SPP recently updated its Emergency Operating Plan, which is reviewed annually.[290] At the state level, regulated utilities' Restoration of Service Plans are updated and filed annually with the Corporation Commission under OAC 165:35-19-4. After an outage, a utility must communicate its progress in restoring service and must use the following guidelines when developing and implementing their Plans:[291]

(1) Assessment of the extent of the service interruption and what resources (equipment, materials, and labor) will be required to restore service. The utility should also attempt to determine the number of customers affected and the geographic extent of the service interruption.

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(2) Determinations as to whether service restoration can be accomplished through the use of in-house personnel only or if contractors (personnel obtained from other utilities or third-party entities) will be required. The objective is to have service restored as soon as possible.
(3) Identification of priorities for service restoration, based upon emergency needs and upon ease of restoration for the greatest use of money, time, and effort. Priority shall be given to any life-threatening situations known or discovered during restoration of service.
(4) Once electricity to installations affected with the interest of public health and safety has been restored (such as hospitals, fire and police departments, and 911 centers), service shall be restored to schools as quickly as feasible, during such time of the year that school is in session.
(5) Attempted notification of high-priority customers or major electric consuming facilities that are affected by the service outage, when possible. Radio and/or television should be utilized to notify larger numbers of customers as to the type of service outage, extent of the service outage, and the expected time to restore service. Other means of notification may also be utilized so long as the result is mass notification on an efficient, effective, and timely basis.
(6) Commission notification through the CSD Director and the Commission's Emergency Liaison to implement the process outlined in paragraphs A through C below. The Commission notification process to the designated CSD individual(s) and the Commission's Emergency Liaison may be accomplished by one or more of the following methods: business telephone and/or e-mail during the business hours of 8:00 a.m. through 4:30 p.m. Monday through Friday, or emergency cellular telephone number after normal business hours, weekends, and holidays. The notification shall consist of the following:

(A) An initial contact to notify Staff of outages which involve a major utility substation or facility; or which may cause a high degree of public interest or concern; or which have a duration of 4 hours or more and involve 1% or fifty (50) customers or more, whichever is greater, of the utility's meter count.

(B) Intermediate contact to provide status reports, as deemed necessary by the utility, or as may be requested by Commission and CSD Staff.

(C) A conclusory contact detailing the results and completion of the restoration of service plan implementation.

Although non-regulated utilities such as cooperatives and municipal electric providers are not required to submit restoration of service plans to the OCC, each of these types of electric providers also have these plans in place, and work with their statewide associations such as the Oklahoma Association of Electric Cooperatives using outage management software to monitor outages and speed restoration.

After incidents or disruptions, the focus turns to repairing damage and restoring service. In these events, which in Oklahoma most commonly occur after severe weather, electric providers can restore service more quickly by requesting assistance from mutual aid organizations in which they

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hold membership. Under mutual aid, member utilities outside of the impacted area send crews and equipment to the affected location to assist with restoration efforts. All types of electric providers in Oklahoma participate in mutual aid programs.

For example, PSO is a member of the EEI Mutual Assistance Program, the Southeastern Electric Exchange (SEE), and various Regional Mutual Assistance Groups.[292] EEI members have expanded their mutual assistance networks to form Regional Mutual Assistance Groups (RMAGs) as power systems have become more interconnected and emergencies have become broader in scale. RMAGs are groups of utilities in a state or region that have agreements to offer mutual assistance when a request is made (see Figure 36). RMAGs facilitate the process of identifying available restoration workers and help utilities coordinate logistics and personnel to assist with restoration efforts when the affected area is regional in scope. Oklahoma is part of the Texas Mutual Assistance Group (TXMAG).

Figure 36: Mutual Assistance Groups; Source: Edison Electric Institute

OG&E is a member of three regional mutual assistance groups: the Southeastern Electric Exchange (SEE), Midwest Mutual Assistance Group (MMAG), and the aforementioned Texas Mutual Assistance Group (TXMAG).[293]

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Among smaller providers, statewide associations play a key role in assisting their memberships in securing and coordinating mutual aid. For example, the Oklahoma Association of Electric Cooperatives (OAEC) coordinates mutual aid responses for its members using a standardized agreement in place across the membership. OAEC works with FEMA and obtains information from affected members about how much assistance and equipment is needed, as well as coordinates logistics when possible. Oklahoma electric cooperatives can also coordinate their mutual aid through the National Outages and Mutual Aid website,[294] which not only provides outage data but also allows cooperatives to submit and fulfill mutual aid requests for equipment and/or crews.[295] Municipal electric utilities which purchase their power from the Oklahoma Municipal Power Authority (OMPA) or purchase power from the Grand River Dam Authority all have signed mutual aid agreements have mutual aid agreements through the Municipal Electric Systems of Oklahoma, Inc. (MESO).[296]

The National Rural Electric Cooperative Association (NRECA) member statewide organizations ("Statewides") provide traditional mutual assistance coordination for electric cooperatives during incidents that impact the physical infrastructure of a cooperative's system. Statewides manage the coordination between states and cooperatives in need of assistance and states and cooperatives providing personnel and equipment. NRECA makes available a model mutual assistance agreement, serves as a repository for signed agreements, and maintains a list of signatories. The Statewide Storm Coordinators are responsible for administering mutual assistance for physical incidents and hold an annual mutual assistance meeting that discusses issues in mutual assistance and plans prior to storm season.

During the 2020 October Winter Storm, twelve of OMPA's 42 member cities requested and received mutual aid. It is important to note that because voltages and construction of the lines and circuitry tend to differ between cooperative, investor-owned, and municipal electric providers, it can create safety issues in providing mutual aid across provider types. Therefore, mutual aid across provider types would be limited to logistical or transportation assistance rather than technical aid. If the Governor declares an emergency or disaster that authorizes funds for response and recovery, and activates it, a state may also utilize the Emergency Management Assistance Compact (EMAC). The EMAC is an all-hazards/all-disciplines national disaster mutual assistance compact that facilitates the sharing of resources, personnel, and equipment across state lines. The EMAC was enacted into federal law in 1996 and establishes a firm legal foundation for sharing resources between states. The EMAC legislation solves the problems of liability and responsibilities of cost, and allows for credentials, licenses, and certifications to be honored across state lines. All fifty states, the District of Columbia, Guam, Puerto Rico, the U.S. Virgin Islands, and the Commonwealth of the Northern Mariana Islands have enacted legislation to become EMAC members. To accelerate the mutual assistance process, the EMAC uses Mission Ready Packages (MRPs) that clearly identify all the elements needed to conduct a mission (personnel, equipment, commodities, travel, lodging, meals and more) outside the home jurisdiction for a set period, including the associated costs. Resource providers develop and maintain their MRPs in the Mutual Aid Support System (MASS), which is a GIS-based inventory of MRPs. National Emergency Management Association (NEMA) administers EMAC, and the Office of Emergency

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Management (OEM) implements the framework within Oklahoma on behalf of the Governor. Currently, Oklahoma electric providers are within the Texas Mutual Assistance Group (TXMAG).[297]

To ensure that electric providers have access to best practices in outage response, at the federal level, emergency response agencies provide guidance through the Federal Interagency Operational Plan (FIOP) regarding minimizing the time of electric outages. The FIOP *Power Outage Incident Annex* specifies the need for a tiered response at the lowest jurisdictional level within those areas with the greatest chance of rapid restoration and recommends a coordinated effort among government jurisdictions at all levels and with business and industry.[298]

This objective is further addressed in a report from The President's National Infrastructure Advisory Council (NIAC) which sets forth recommendations for surviving catastrophic power outages.[299] Specifically, the NIAC recommends the following ongoing actions:

(1) Continue to coordinate efforts between government and industry through Emergency Support Function 12 (ESF 12) to prioritize rapid stabilization of the lifeline including working with Grid Security Emergency stakeholders.
(2) Engaging the National Institute of Standards and Technology (NIST) and National Risk Management Center (NRMC) to promote infrastructure resilience and develop informed decision-making strategies through cross-sector management for assuring protection of critical infrastructure with a focus on lifeline functionality.
(3) Draw on information from FEMA's 2018-2022 strategic plan emphasizing a whole-community approach for disaster response that includes inculcating a culture of preparedness that encourages incentivizing risk mitigation through innovation.
(4) Calls upon utilities to develop plans for reducing load while ensuring critical areas have power during grid emergencies or catastrophic power outages; also recognizes energy security is a national security issue thereby requiring liability protections be put in place as they are not provided under the Federal Power Act.
(5) Continue to model and develop best practices for assessing impacts on infrastructure from catastrophic events causing outages to identify vulnerabilities and devise strategies for mitigation.
(6) Integrating collaborative activities between Cybersecurity and Infrastructure Security Agency (CISA); Transportation Security Administration (TSA); DOE's Office of Cybersecurity, Energy Security, And Emergency Response (CESER); and industry partners in support of pipeline cyber and physical security.
(7) Assuring efforts by the Energy Subsector Coordinating Council (ESCC) focus on updating and modernization of voice and data telecommunications systems important to grid operations; such efforts include removing critical system components from private control to improve real-time coordinated and backup communications capabilities in the aftermath of disasters.

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In sum, the list below provides a variety of specific options and best practices to manage supply and demand available to Oklahoma's electric sector during energy emergencies. Additional details regarding each of these options can be found in Appendix E.

Managing Supply

- Participate in regional planning and transmission organizations (Southwest Power Pool)[300]
- Temporarily increase levels of coal stockpiling by electric utility companies
- Temporarily substitute Oklahoma coal for Wyoming coal in coal-fired power plants
- Utilize buy-back rates that pay customers to sell excess self-generated electricity back to the grid for utility credit
- Reduce voltage in the system
- Utilize large backup generation when mobile units are available
- Use locomotive generators for electricity generation in selected locations

Managing Demand

- Activate interruptible rates/curtailment programs
- Implement system-wide rolling blackouts
- Enact voluntary or mandatory curtailment of public building energy use
- Employ and/or expand time-of-use rates for residential and/or industrial users
- Utilize the co-generation or fuel switching capacity of university and industrial customers when available
- Conduct a public information program that promotes home energy assessments
- Conduct a public information program or enact an incentive program to purchase more efficient appliances, add insulation, or change lighting
- Conduct a public information campaign calling for electricity conservation
- Increase rates to customers of self-regulated cooperatives or municipal utilities
- Encourage or direct government facilities to improve energy efficiency
- Encourage or direct regulated utility providers to increase and/or provide additional programs to their customers that focus on energy efficiency.
- Utilize buy-back rates that pay customers to sell excess self-generated electricity back to the grid for utility credit
- Encourage the use of alternative fuels such as natural gas, propane, diesel, or wood as the fuel source for home heating

CRUDE OIL AND PETROLEUM PRODUCTS

> *"The oil and natural gas industry has long maintained and been acknowledged for its serious commitment to the safety of infrastructure, workers and processes. Disruptive events, whether manmade or natural, should be approached with the same commitment to safety, resilience and the needs of the community."*[301]

Although the crude oil and petroleum sector has many unique attributes, just as in the electric sector, it takes actors from all parts of the industry to design, implement, and enforce the

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regulations, trainings, plans, and programs that are designed to prevent incidents or disruptions and—when they do occur—to lessen the incident severity and/or time needed for recovery.

Preparation and Preventative Measures

Just as in the electric sector, the state of Oklahoma and the oil and petroleum industry have preventative programs in place to avoid oil and petroleum-related accidents or incidents and ensure a safe and reliable supply for consumers.

To set the standard for safety and prevention, both federal and state agencies are actively involved in regulating the various segments of the oil and petroleum industries. At the federal level, much of the regulation occurs through the U.S. Environmental Protection Agency (EPA). At the state level, both the Oklahoma Corporation Commission (OCC) and the Department of Environmental Quality (DEQ) provide regulatory oversight.

The Oklahoma Corporation Commission has inspection and regulatory responsibilities for exploration and production activities on oil and gas lease sites to ensure protection of public health and safety and the environment, for safe transport of hazardous materials, and for safe storage of petroleum-based fuel. Within the exploration and production segment, the OCC's Oil and Gas Conservation Division regulates crude oil well sites in the state, utilizing four regional offices to conduct administrative and on-site activities. Each district office is comprised of a manager, an environmental quality expert, and field inspectors.[302] Regulation of the oil industry at the drilling site is structured by Chapter 10 of the OCC Rules.[303] Chapter 10 includes technical rules on safe well drilling, use of proper equipment, and protecting groundwater as well as reporting requirements for any site incidents. Inspectors visit well sites and issue field citations to ensure compliance with Chapter 10. Each well site is inspected at least once every five years, but high risk and high-capacity wells are inspected much more frequently—often several times per year. These sites include those that utilize commercial disposal pits and those that have large on-site disposal pits. In addition to conducting field inspections and ensuring regulatory compliance, the inspectors also coordinate with county emergency managers to minimize the potential for impacts or emergencies to occur.

Within industry, Oklahoma production companies emphasize training as a key preventative strategy. For example, Devon Energy follows the U.S. Department of Homeland Security Exercise and Evaluation program to train not only employees but community partners, and also provides in-house trainings for employees on FEMA's National Incident Management System's Incident Command System (ICS) in advance of events.[304] Another major Oklahoma producer, Continental Resources, also utilizes a best practice ICS structure in its organizational Emergency Response Plan and includes environmental training as a core requirement for employees and contractors. Embedding training as a key component within emergency preparation plans expands employee and contractor knowledge and awareness and enhances compliance with environmental laws and regulations. Finally, producers can engage with local planners to keep them abreast of exploration and production activities, including health and safety briefings where local emergency

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management and regional Commission employees are in attendance. This ongoing dialogue prepares local officials to better respond in case of an incident at a wellsite.

Despite detailed safety requirements as well as a fully trained workforce, spills, accidents, or other drill site emergencies may still occur. Therefore, Oklahoma production companies are engaging in new programming to further reduce the possibility of supply disruptions while simultaneously increasing their potential to maintain normal operations under a variety of circumstances.

For example, although incidents occurring at individual pad sites are unlikely to impact wider supply, in cases of interruption of power to sites or to disposal wells, production impacts could be more widespread. Electrical outages have the potential to impact wider operations as the pumps to dispose of produced water are electric. One preventative strategy against these impacts, currently employed at Continental Resources[305] and ConocoPhillips,[306] is produced water recycling, which reduces the quantity of water needing disposal while reducing the company's freshwater use. With a smaller volume of water needing disposal, a production company can more easily move to an alternate disposal well, or store water at recycling facilities temporarily and continue oil and gas operations until electricity is restored. In addition, system flexibility or redundancies, such as the ability to switch from transporting produced water via pipeline to transporting via truck, gives a producer the ability to maintain operations if one system is disrupted.

Within the transportation segment, the Commission's Pipeline Safety Department inspects and regulates all intrastate petroleum transmission and distribution pipelines, whether gas or liquid. Under state statute, all operators of hazardous liquid transportation systems must submit their plans annually to the Commission that include their operational and maintenance information for safety.[307] The Pipeline Safety Office within the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration regulates interstate lines.[308] These inspection and maintenance programs ensure a safe baseline of operation for pipeline facilities and significantly lessen the likelihood of a fuel supply interruption. More detail on pipeline inspections appears below in the section on natural gas.

Within the refining, fuel, and storage segment, the Oklahoma DEQ is responsible for monitoring safe practices at oil refinery sites, primarily from an air[309] and water quality[310] standpoint. The Department offers a 24-Hour Emergency Response & Environmental Complaints Hotline (1-800-522-0206) and an online complaint form[311] that both state officials and the general public can utilize. The DEQ Hotline is continuously staffed by knowledgeable employees who can both answer questions and refer to appropriate division contacts as needed. The division contact list is not publicized, but division experts can be reliably reached via the Hotline.

To limit fire and explosion dangers, once crude oil is refined and processed into petroleum, OCC once again assumes regulatory authority over the safe operation of storage tank systems in Oklahoma to prevent and contain pollution caused by leaking underground storage tank systems and to reduce the hazards of fire and explosion. Chapters 25, 26 and 29 of the OCC rules (OAC 165:25-26, 29) outline the Commission's authority in ensuring safe petroleum storage for any

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aboveground, below-ground, or petroleum storage tanks over 110 gallons. These rules are based on industry standards from the American Petroleum Institute[312] and National Fire Protection Association.[313,314] The Commission's Petroleum Storage Tank Division (PSTD) ensures compliance with these standards, which cover antifreeze, motor oil, motor fuel, gasoline, kerosene, diesel, and aviation fuel. The division employs inspectors who annually check testing records at refilling stations as well as test the corrosion protection system on the fuel storage tanks. Inspectors have the authority to lock down tanks and request an investigation if non-compliance is discovered. In addition, to hasten the ability to remediate any spills and mitigate spill impacts, new stations must file blueprints of underground tanks and lines with the OCC PSTD.

The U.S. Environmental Protection Agency (EPA) also has a role in incident prevention as it is also involved with inspecting petroleum storage tanks. Under 40 CFR Part 280,[315] EPA inspectors conduct periodic inspections of storage tanks and, if violations are found, EPA works collaboratively with the OCC staff to lockdown the tank and remediate the violation. The provisions of 40 CFR Part 280 were strengthened in 2015 to include additional training and operation requirements, as well as standardization provisions, which should help ensure fewer releases or spills in the future.

Mitigation Measures and Restoration of Supply After Interruptions

In the event of a spill, explosion, or other well site emergency within the exploration and production sector, impacts can best be mitigated through a swift response. To ensure a quick response to incidents, under OAC 165:10-17, well owners are required to post emergency contact information on a placard at each site and report to the OCC any site incident, explosions, or fires as soon as possible. Chapter 10 requires well owners to report these incidents to the relevant OCC field office which then coordinates with the OCC Public Information Officer. In addition, an OCC Oil and Gas Conservation Division manager always carries a division emergency phone for notification of incidents. Finally, if a reportable incident does occur, well owners must file a remediation plan with the OCC. If a well is abandoned and an incident occurs, OCC can order this well plugged by using a state fund capitalized by oil well operators. In emergency situations, OCC can utilize a Governor's letter and an emergency hearing before the Commission to plug a well in a matter of days or less.

At the federal level, the U.S. EPA is also involved in regulating various aspects of the oil industry in Oklahoma in such a way that there is proactive communication between exploration and production companies and first responders. Advance knowledge of the details surrounding well sites gives first responders the ability to more quickly respond when an emergency occurs. First, under Superfund Amendments and Reauthorization Act (SARA), Title III (The Emergency Planning and Community-Right-To-Know Act)—which is enforced by the EPA—requires operators to notify local first responders if chemicals are stored at the well site.[316] Key reporting criteria include providing critical hazardous materials information for developing emergency plans for incidents and accidents to the state and local emergency responders and Material Safety Data Sheets (MSDSs) for any hazardous chemicals according to hazard category. This information must

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be provided to the State Emergency Response Commission (SERC), Local Emergency Planning Committee (LEPC), and local fire departments. Finally, any oil storage facility must file a Spill Prevention, Control, and Countermeasure Plan (SPCC) with the EPA.

In Oklahoma, the Department of Environmental Quality (DEQ) serves as the administrative arm of the SERC. DEQ outlines the specific provisions required for reporting under OAC 252:20-1-4 and makes this information available to LEPCs and local fire departments. This provision helps responders be prepared to adequately take precautions and respond more quickly to mitigate damage. Oklahoma has five refineries, all of which hold permits both through the Resource Conservation and Recovery Act and air permits that are issued by DEQ. The refineries are required to submit reports of unpermitted hazardous waste releases to the environment or excess emissions to the air directly to DEQ.

In addition to reports required to be submitted to DEQ or OCC, any CERCLA hazardous substance release in a quantity that equals or exceeds the Reportable Quantity for that substance, or a discharge of oil to a waterbody, must be reported to the National Response Center at (800) 424-8802.

Quick notification is also a key measure for storage facilities and in the retail segment. As an example, within this segment, if an incident does occur, station operators must report any release or any spill within 24 hours to the OCC PSTD at either its regular contact number (405) 521-4683 or 24-hour emergency number (405) 823-0994.

Overall, communication is the key aspect in swift response to oil and petroleum emergencies. More detail surrounding the emergency communication in this sector appears in the chapter "Energy Emergency Communications Procedures."

When an outage or incident does occur, it is critical that responders have a variety of options available to them to manage supply and demand for oil and petroleum. Therefore, as mentioned above, the list below outlines a variety of specific options officials and energy emergency responders may choose to take when responding to oil or petroleum accidents, incidents, or other disruptions. Additional details regarding each of these options can be found in Appendix E.

Managing Supply

- State of Oklahoma assumes control of fuel prioritization
- Temporarily lift Federal Motor Carrier Safety Regulations (FMCSR) for over the road transport trucks
- Top off fuel storage tanks in anticipation of an event that will impact gasoline transportation
- Encourage or require longer refill cycles for tanks, or wait until tank is completely depleted before the tank is refilled
- Request waivers from the U.S. Environmental Protection Agency (EPA) for the import of gasoline that does not meet local air quality requirements

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- Request waivers from EPA to allow for high sulfur diesel products to be used for highway consumption
- Petition the EPA to allow refineries to sell gasoline out of season or to suspend the Reid Vapor Pressure Standard (RVP) for gasoline
- Petition the U.S. Department of Energy or President for an exchange or release of crude oil from the U.S. Strategic Petroleum Reserve

Managing Demand

- Conduct a public information campaign designed to encourage ridesharing.
- Conduct a public information campaign designed to encourage fuel-efficient driving practices.
- Trigger the Oklahoma Emergency Price Stabilization Act
- Offer discounted rates or incentives for utilizing any public transit options
- Increase the number or frequency of bus routes
- Reduce speed limits on roadways and/or increase the enforcement of either lowered or existing speed limits
- Conduct a public information campaign encouraging private sector telecommuting or teleworking
- Enact or support a telework or telecommuting policy for public employees
- Encourage staggered commute times for public and/or private employers and/or staggered school start times
- Curtail use of marine and off-road recreational vehicles
- Encourage the use of alternative fuels such as CNG, biofuels, or diesel

NATURAL GAS

In Oklahoma's natural gas sector, there are several key components to energy resilience. In this sector, physical security and redundancies are key components of reliability, as well as appropriately implemented operations, training, and regulatory compliance. In addition, this sector includes varying contract terms for customers that contribute to the industry's ability to maintain a safe and stable supply of energy.

Preparation and Preventative Measures

Significantly, the natural gas sector benefits from natural resiliency due to the primarily underground nature of its infrastructure. Although this offers significant protection from the many weather events that impact Oklahoma, there are still a number of key mechanisms used by government agencies, associations, and the natural gas industry to prepare for and prevent natural gas-related accidents or incidents and ensure a safe and reliable supply for consumers.

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First, just as the oil and petroleum industries are, the various segments of the natural gas industry in Oklahoma are also regulated by the state and federal entities to help ensure physical security and safety.

The preparation and preventative measures taken within the natural gas production segment is very similar to the oil and petroleum sector; drilling and wellsite protections and regulations outlined in the above section are applicable.

In the gathering, processing, and transportation segments, similar to the regulatory framework for oil and petroleum pipelines, the Pipeline Safety Division within the OCC is responsible under OAC Chapter 20 for ensuring that *intrastate* natural gas and hazardous pipeline operators comply with state and federal pipeline safety regulations. Federal requirements mandate that pipeline operators determine the integrity of their pipelines through testing for appropriate pressure and for physical weakness or threats, as well as keeping logs of this testing. Pipeline Safety's field supervisors and field inspectors inspect the records and field operations of operators statewide, as well as perform site inspections.[317] It is important to note that pipelines located between the wells and the gathering lines are not subject to state inspection or regulation except for reporting of major incidents; gathering lines located in rural areas (approximately 80% of the state) are also not subject to state regulation.

Interstate pipeline operators transport natural gas across state lines. These operators are subject to safety regulations enforced by the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA),[318] however PHMSA is in daily email contact with the OCC to inform staff of any interstate incidents or accidents. U.S. DOT also provides Pipeline Security Guidelines for interstate pipeline operators that include detailed procedures for conducting risk analysis and implementing security procedures.[319] More about these guidelines are discussed in the cybersecurity section of this plan.

In addition, under 49 CFR Part 192:615, natural gas pipeline operators must have written plans in place to minimize the risk from gas pipeline emergencies; these plans include an emergency response plan.[320]

Complementary to the regulatory requirements, Oklahoma's natural gas companies have also made commitments to and investments in preventative measures within the gathering, processing, and transportation segment. For instance, ONEOK undertakes external leak detection using aerial patrols and on-site inspections and internal leak detection using pressure flow and computational pipeline monitoring, as well as its current initiative (nearing completion) to build a remote monitoring network for its cathodic protection system, which assists in reducing pipeline corrosion and increases system knowledge. This organization also requires all employees to undertake Emergency Response Action Plan training at least once every 12 months to ensure a workforce ready to respond quickly in case of an incident and thereby reduce impacts. To ensure readiness to coordinate with emergency response authorities, beginning in 2019, ONEOK also conducted

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nearly a dozen emergency response drills that involved law enforcement, fire and emergency medical providers.[321]

Also, within the transportation and storage segment, the interstate pipeline firms that serve Oklahoma customers increase resilience through the variety of contracts offered. These options, which include "firm," "interruptible," and "no-notice," allow the largest natural gas customers to ensure that they can meet their obligations.[322]

Within the storage segment, Oklahoma natural gas storage provides supply stability, as gas can be stored when demand is low and withdrawn during shortages or periods of high demand. Gas storage in Oklahoma occurs primarily in depleted oil and gas reservoirs, although a very small amount of storage occurs in aquifers.[323]

In the distribution segment of the industry, Oklahoma's major distribution utilities, CenterPoint Energy Oklahoma and ONEGAS (whose Oklahoma division is Oklahoma Natural Gas Company), have maintained their own preventative measures. CenterPoint remains responsible for the maintenance of its pipeline distribution system and engages in annual cathodic protection test point reads that determine if the protection is still what it needs to be to prevent corrosion. In addition, CenterPoint conducts a leak survey once a year for business customers and once every 3 years for residential customers. Oklahoma Natural Gas Company (ONG) similarly operates both Distribution and Pipeline Integrity Management Programs that not only maintain and inspect the distribution and pipeline infrastructure systems, but also focus on high consequence areas in particular. This plan incorporates the American Petroleum Institute Pipeline Safety Management guidelines referenced more in depth later in this section.

Additionally, the industry is now pivoting toward a higher focus on emergency management. In Oklahoma, ONG is embracing this strategy to work more closely with emergency management professionals, partners, and agencies due to the frequency of more isolated incidents.

As an additional and widely utilized resource, associations such as the American Petroleum Institute (API) make resources available to all Oklahoma companies that outline best practice in preparation for (and response to) emergencies related to the oil and natural gas sector. API's 2016 publication, *Oil and Gas Industry Preparedness Handbook* offers a chapter dedicated specifically to state and local preparation.[324] Its 2015 publication *ANSI/API Recommended Practice 1173: Pipeline Safety Management Systems*[325] has now been adopted by companies such as ONG within their company-wide plans. Industry members can also review evaluative reports such as the Natural Gas Council's 2017 *Natural Gas Systems: Reliable and Resilient* report, which summarizes the industry's actions and activities surrounding stable energy supply.[326]

Finally, and similarly to the electric sector, to prevent accidental disruptions, the Oklahoma One Call System, known as Okie811, requires companies and private citizens to call one number before digging on their property—by calling in the location of the proposed dig, natural gas utilities can come out and mark their lines to avoid damage to underground facilities.

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Mitigation Measures and Restoration of Supply After Interruptions

Despite the overall reliability of the natural gas sector, accidents and incidents do occur.

To ensure oversight of the response to incidents that occur within the transportation segment, all pipeline operators subject to federal regulation 49 CFR Parts 192 (natural gas) and 195 (liquids) have reporting requirements and must report incidents or accidents of a certain magnitude both to the PHMSA and OCC's Pipeline Safety Section.[327] Reports of code violations go to the pipeline operator for correction. If the violation is serious or the operator repeatedly violates regulations, Pipeline Safety will recommend an enforcement action to be filed. In the case of an accident with environmental consequences, OCC and the Department of Environmental Quality have a Memorandum of Understanding that oversees cleanup of crude oil or condensates from gas. Federal requirements also apply through standards issued by the U.S. EPA.

In the distribution segment, in the case of a supply interruption or shortage, regulated natural gas companies will inform the OCC under the following circumstances:

- The outage involves a major regulator station or facility
- The outage may involve a high degree of public interest or concern
- The outage will have a duration of 4 hours or more and involve 1% or 50 customers or more, whichever is greater, of the company's total meter count

As the collection point for reports of pipeline emergencies, OCC's Pipeline Safety section maintains an on-call employee (rotates weekly) who is available in emergency situations that can be contacted 24/7. Pipeline Safety personnel are not first responders, but they play an important role as evaluators of information. Pipeline Safety personnel may call operators to substantiate information or send inspectors to commence an investigation. Operators are required to conduct failure investigations and the Pipeline Safety Section audits the operators to make sure such investigations are carried out.

Just as in the electric sector, regulated natural gas utilities are required by the OCC to plan for supply interruptions and, under the Oklahoma Administrative Code (OAC 165:45-9-2), an updated Restoration of Service Plan must be filed with the Commission each year. After an outage, the utility must communicate its progress in restoring service and must use the following guidelines when developing and implementing their plans:

(1) Assessment of the extent of the service interruption and what resources (equipment, materials, and labor) will be required to restore service. The utility should also attempt to determine the number of customers affected and the geographic extent of the service interruption.

(2) Determinations as to whether service restoration can be accomplished through the use of in-house personnel only or if contractors (personnel obtained from other utilities or third-party entities) will be required. The objective is to have service restored as soon as possible.

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(3) Identification of priorities for service restoration based upon emergency needs and upon ease of restoration for the greatest use of money, time, and effort. Priority shall be given to any life-threatening situations known or discovered during restoration of service.

An excerpt from CenterPoint Oklahoma's 2020 restoration of service plan follows. This excerpt is representative of restoration of service plans across the natural gas sector:

> CenterPoint has identified a primary and secondary emergency contact and has provided full contact information for these individuals to the OCC's Public Information Officer as part of its Restoration of Service Plan. An outline of the CenterPoint Oklahoma's Emergency Operations Plan as it relates to restoration of service is as follows:
>
> A. Determine the geographic area of the Outage, Near Outage or Other disaster.
> B. Determine the cause and the time needed to restore gas service to the impacted area.
> C. Determine how many meters are involved and the manpower required for turn off and turn on operation.
> D. Notify proper management, civil authorities, etc., if necessary.
> E. Request the needed number of completely equipped service persons for the turn-off operation.
> F. Request the scrolls, route cards, address lists and/or maps be printed.
> G. Isolated the affected area by turning off valves, regulator stations, or other pressure control devices.
> H. Identify those responsible for conducting field operations.
> I. Implement turn-off procedures (without blind plates).
> J. Request supplemental completely equipped service persons for the turn on operation.
>
> i. Restore service to system.
> ii. Purge system at identified purge points.
> iii. Turn on customers, identify and give special attention to priority customer – (tag door of any customer that cannot be turned on at this time). Request supplemental completely equipped service persons for the turn-on operation.

Finally, just as in the electric sector, natural gas utilities maintain mutual assistance agreements to help speed the recovery process when major incidents happen.

Each segment of the natural gas industry approaches emergency preparedness and response/recovery differently. For example, natural gas distribution companies generally participate in mutual assistance programs with other gas utilities and contractors, while upstream natural gas production and transmission companies have assistance programs which are more contractor-based, taking into consideration different business models and antitrust laws.

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Depending upon the segment of the value chain, the policies and practices may differ to best match the needs of, and regulatory restrictions on, the segment of interest.

In September 2020, several major national gas associations announced that beginning in January 2021, their existing mutual aid agreements (of which Oklahoma utilities are a part) would be combined into a new, expanded National Mutual Aid Program. Participating associations include the American Gas Association (AGA), American Public Gas Association (APGA), Northeast Gas Association (NGA), Southern Gas Association (SGA), and the MEA Energy Association (MEA).[328]

The American Gas Association (AGA) offers a voluntary, no-fee mutual assistance program designed to suit the wide variation of needs of its member companies across the United States and Canada. The program is based on a coalition of AGA member companies who agree to a set of baseline provisions that govern mutual assistance and populate/maintain the AGA Mutual Assistance Database with company-specific emergency contact information, field capabilities, and other key resources available for mutual assistance. The purpose of the program is to supplement local, state, and regional mutual assistance programs and is intended for those unprecedented man-made or natural disasters requiring the dedication of response, recovery, and restoration resources outside the limits of existing mutual aid programs.

Natural gas distribution mutual assistance depends upon the extent of damage to the distribution system. If response and recovery can be managed using regional resources, the natural gas association in the region where the crisis occurs takes the lead to help coordinate activities of neighboring utilities. AGA monitors response and recovery efforts and offers a channel of communication to the federal government (e.g., requesting waivers for Operator Qualification requirements to be instituted) as appropriate. If needs exceed the capacity of regional resources, the regional association may call on AGA for additional mutual assistance support.

When an event does occur, even as the industry works to limit the time of disruption, it is critical that responders have a variety of options available to them to manage supply and demand for natural gas while the interruption is occurring. Therefore, the list below outlines a variety of specific options officials and energy emergency responders may choose to take when responding to natural gas shortages. Additional details regarding each of these options can be found in Appendix E.

Managing Supply

- Activate interruptible rates/curtailment programs
- Temporarily lift wellhead restrictions on the production of natural gas to allow companies to pump as much as possible
- Allow pipeline pack to increase reserve supplies available
- Local gas distribution companies (LDC) can purchase additional gas to meet demand
- Gas companies that are drawing gas from storage facilities can increase the rate of withdrawal to meet increased short-term demand

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- Encourage or require gas companies, when technically feasible, to access and utilize other sources of gas, such as LNG, propane air stations, and/or synthetic natural gas

Managing Demand

- Encourage or require a temporary reduction in natural gas usage in state facilities or by industrial users
- Request that large commercial and industrial customers reduce gas use by adjusting their thermostat settings or reducing gas-consuming industrial processes
- Encourage residential customers to lower thermostats and water heating settings, reduce hot water demand, and defer using gas appliances
- Curtail or shut off gas supply to customers, regardless of interruptible agreements in place.
- Increase retail rates to consumers
- Conduct a public information campaign and/or offer incentives that provide information, energy estimates, or discounts for the purchase and installation of more efficient natural gas appliances
- Encourage large industrial customers to participate in a gas buy-back program

PROPANE

Preparation and Preventative Measures

To ensure safety and minimize risk of accidents and incidents within the propane industry, Oklahoma's regulatory body, the LP Gas Administration, mandates safety compliance in storage, distribution, dispensing, transporting, and utilization of Liquefied Petroleum Gas (LPG), also known as propane gas. The LP Gas Administration also oversees safety in the manufacture, fabrication, assembly, sale, installation, or use in this state of LPG systems, containers, apparatus, or appliances.[329] The LP Gas Administration ensures a high level of safety by adopting national safety codes of the National Fire Protection Association (NFPA 58 and 54) and Oklahoma rules and enforces compliance through administrative penalties. Oklahoma Administrative code 420:10-1 provides the LP Gas Administration with the authority to set permitting, training, and safety requirements for the industry.[330] Oklahoma has some of the most stringent requirements in the nation.

Statewide associations also provide the industry with training opportunities to ensure a high level of confidence in safety. The Oklahoma Propane Gas Association (OPGA) (affiliated with the National Propane Gas Association) represents approximately one-third of companies in Oklahoma as its members. As a key effort in propane tank safety, OPGA, alongside its sister organization, the LP Gas Research, Marketing and Safety Commission (LP Gas Commission), provides consumer safety programs that give rebates for upgrades to consumer propane regulators.[331] The OPGA and LP Gas Commission also facilitate required trainings for propane company employees covering topics such as changes in national safety code, proper install of infrastructure upgrades, and changes to Oklahoma's administrative rules.[332] Finally, these groups do consumer outreach

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and education, providing consumers with educational materials on topics such as how to read a propane gauge, familiarity with the smell of propane, and overall propane safety.

Mitigation Measures and Restoration of Supply After Interruptions

As with the other energy sectors, quick response is key in mitigating impacts after propane incidents. In the case of accident or fire at any location where a propane system or equipment is involved, or any accident involving propane systems or equipment, the dealer that owns, operates, services, or installs the equipment is required to notify the LP Gas Administrator as soon as is feasibly possible. The LP Gas Administration then conducts an investigation following the incident.[333]

In the event of a supply disruption, the statewide associations can work with the Oklahoma Secretary of Energy and Governor's Office to get a time-of-service waiver for commercial drivers to more quickly allow propane to be delivered and restore supply faster.

The list below outlines a variety of specific options officials and energy emergency responders may choose to take when responding to propane gas events. Additional details regarding each of these options can be found in Appendix E.

Managing Supply

- Seek CDL Time of Service waiver to increase ability to deliver supply faster
- Top off storage tanks if supply disruption can be predicted in advance

Managing Demand

- Refill tanks at a slower rate, allowing tanks to get emptier before refill
- Encourage use of alternative fuels such as wood for home heating until propane supply can be restored

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EMERGING ISSUES IN 21st CENTURY ENERGY SECURITY PLANNING

The section below highlights a diverse group of key issues that warrant special consideration from Oklahoma energy emergency planners and responders as they evaluate the robustness and completeness of emergency plans and response protocols that must address a changing landscape in the early 21st century.

GLOBAL PANDEMICS

The Severe Acute Respiratory Syndrome Coronavirus 2(SARS-CoV-2), commonly known as the 2019 Novel Coronavirus or COVID-19 and has recently caused a global pandemic that affected Oklahoma beginning in early 2020, brings to bear new considerations for both reliability planning for continuity of operations as well as emergency planning. All Oklahoma entities with a role in energy production, generation, and delivery have faced new challenges with workforce disruptions, supply chain disruptions, new equipment and supply needs for personal protective equipment (PPE), necessitated workflow alterations, increased uncertainty regarding demand for energy, and increased cyber risks due to distributed and remote work.

In addition, as energy emergencies have occurred during the pandemic such as the February 2021 Polar Vortex event, mutual aid response, and emergency sheltering have all implemented new procedures due to social distancing requirements for virus mitigation.

Many entities have already built new pandemic modules into their organization's emergency response plans but should evaluate whether their planning incorporates six key recommendations as excerpted from the North American Energy Reliability Corporation (NERC) Coronavirus Disease (COVID-19) Pandemic Contingency Planning Alert:[334]

- Recommendation #1: Develop and maintain suitable situational awareness of the current status of the spread of COVID-19 and credible future estimates of its spread and impacts. Incorporate the CDC's most current travel advisories into event planning and travel arrangements and consider practices to increase awareness of employees' personal travel plans to areas with active advisories.
- Recommendation #2: Reinforce good personal hygiene practices across the workforce. Consider measures to increase the frequency and extent of cleaning and disinfecting surfaces and equipment that comes into routine contact with multiple people, particularly in business-critical spaces or confined spaces that may be more conducive to disease communicability. Such areas may include control rooms, shared vehicles, conference rooms, and break areas. Consider implementing additional access restrictions such as limiting visitors or nonessential meetings within these spaces and segregation of crews on shift work schedules.

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- Recommendation #3: Review and update existing business continuity plans to ensure they are adequate to mitigate the direct impacts of a pandemic outbreak in the organization's footprint that creates staffing constraints for reliability and business functions. Recognize that a pandemic outbreak affecting the organization will also have similar effects on third-party contractors and supporting resources in the same footprint. Validate or develop thresholds and triggers for implementing increased flexible workforce arrangements and for more disruptive mitigations, and ensure these mitigations are harmonious with guidance from the CDC or Public Health Agency of Canada (PHAC) and local health agencies. Consider testing or exercising business continuity plans against a pandemic scenario.
- Recommendation #4: Assess the organization's resilience against disruption to the availability of critical components, materials, and support resources with supply chains originating or traversing significantly impacted regions globally. At the present time, this includes China and nearby Southeast Asian nations, so the most likely impact is expected to be to electronics, personal protective equipment and sanitation supplies, chemicals, and raw materials that are eventually transformed into goods directly purchased and used by North American asset owners and operators. Global transportation disruptions will also have ripple effects on the availability of these goods, particularly for "just-in-time" logistics systems. Organizations should work with their suppliers to understand current inventories of critical components throughout the supply chain, as well as their anticipated use and resupply rates, and identify changed risks to routine, planned, and contingency operations to prioritize efforts appropriately.
- Recommendation #5: Assess the need to adjust planned construction and maintenance activity schedules to prioritize the most important projects. Consider third-party support requirements and facility outage windows and understand consumption rates of spare parts and supplies required for both planned and contingency work. Adjust plans as needed to maintain safe and reliable operations through potential workforce availability or supply chain disruptions.
- Recommendation #6: Anticipate and prepare for coronavirus-themed opportunistic social engineering attacks. Spearphishing, watering hole, and other disinformation tactics are commonly used to exploit public interest in significant events. Take steps to ensure continued visibility and maintenance of cyber assets in the event of staffing disruptions. Ensure information and communications technology resources are appropriate to accommodate increased use of remote work arrangements consistent with business continuity plans without compromising security. Consider conducting planned stress tests for these arrangements.

As information will continue to develop and evolve, organizations and agencies are also encouraged to keep abreast of changing guidance and public health recommendations that may update the guidance listed above. The U.S. Department of Energy has provided a listing of sector-specific websites that provide specific updates on the current COVID-19 pandemic;[335] in the event

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of future pandemics, Oklahoma organizations should look to these organizations to publish guidance specific to those incidents:

- American Public Power Association (APPA): www.publicpower.org
- American Gas Association (AGA): www.aga.org
- American Petroleum Institute (API): API Pandemic Resources page
- American Fuel and Petrochemical Manufacturers (AFPM): AFPMA COVID-19 page
- American Public Gas Association (APGA): APGA Coronavirus Resources page
- Edison Electric Institute (EEI): vwww.eei.org
- Electric Power Research Institute (EPRI): EPRI COVID-19 Page
- Electricity Subsector Coordinating Council (ESCC): www.electricitysubsector.org
- International Association of Drilling Contractors (IADC): https://www.iadc.org/covid19-update/ www.iadc.org
- International Liquid Terminals Association (ILTA): ILTA Pandemic Resources page
- Interstate Natural Gas Association of America (INGAA): www.ingaa.org
- National Propane Gas Association (NPGA): Hours of Service Waivers page
- National Rural Electric Cooperatives (NRECA): NRECA COVID-19 page
- Petroleum Marketers Association of America (PMAA): PMAA Coronavirus Resources page
- Offshore Operators Committee: COVID-19 Mitigations page

DIVERSIFICATION OF THE TRANSPORTATION SECTOR

Over the past decade, Oklahoma has seen significant diversification of its transportation sector. Having fleet, emergency, and public transportation vehicles, as well as private vehicles that utilize diverse fuel sources could provide additional reliability; that is, in the event of an electrical outage or one type of fuel shortage, at least a portion of an organization's fleet or response vehicles may still operate.

Oklahoma has fueling infrastructure to support the increasing number of alternative fuel vehicles in the state. Both public and private fueling stations are available around the state. As of this writing, Oklahoma offers 79 public and 18 private CNG fueling stations, 105 public and 2 private ethanol (E85) fueling stations, 1,658 public and 89 private electric vehicle (EV) charging ports, and 148 public and 15 private propane (LPG) fueling stations.[336] More complete location and contact information for these stations can be found at https://afdc.energy.gov/states/ok.

Additionally, the National Alternative Fuels Training Consortium[337] offers trainings nationwide to first responders across sectors and can serve as a resource for Oklahoma entities wishing to understand, implement, or operate additional alternative fuel vehicles within their organizations.

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RENEWABLE ENERGY, ENERGY STORAGE, AND DISTRIBUTED GENERATION

One emerging tool in reliability planning that is increasingly commonly paired with renewable energy resources is energy storage, primarily focusing on battery technology. Energy storage is one option to address intermittency issues inherent with renewables, with the batteries providing short term stability in the event of outages or fluctuations.

Understandably, adding storage to any energy installation also adds cost; although battery technology is improving in efficacy and battery costs continue to fall, planners should utilize valuation models to better assess the cost-benefit tradeoffs.[338]

Another emerging tool that Oklahoma energy security planners should remain aware of as a resiliency enhancement, which can assist with longer term outages due to high-impact, low probability events such as extreme weather, is utilization of distributed energy resources (DER). A DER is:

> *"a resource sited close to customers that can provide all or some of their immediate electric and power needs and can also be used by the system to either reduce demand (such as energy efficiency) or provide supply to satisfy the energy, capacity, or ancillary service needs of the distribution grid. The resources, if providing electricity or thermal energy, are small in scale, connected to the distribution system, and close to load."*[339]

DER can take many forms, but key emerging formats that may be particularly relevant for Oklahoma resiliency include resilient solar, combined heat and power (CHP), and/or microgrid systems.

For property owners interested in onsite energy generation at residential, small commercial, and critical facility locations, distributed generation options can include diesel generators or rooftop solar with battery or diesel generation backups. Both options are distributed energy resources that can operate during electrical outages or provide emergency power to critical facilities.[340] Planners interested to explore solar generation with battery backup will want to explore the detailed techicla specifications necessary; one resource available is Chapter 5.9 of the National Renewable Energy Laboratory report *Best Practices for Operation and Maintenance of Photovoltaic and Energy Storage Systems; 3rd Edition* at https://www.nrel.gov/docs/fy19osti/73822.pdf.

Some essential facilities around the nation have begun exploring CHP systems (also known as cogeneration systems) to stay operational for critical functions such as patient care during more extended electric outages that could occur more frequently if the existing trend of more frequent severe, extreme weather events leads to blackouts.[341] A CHP system typically uses waste heat from electrical generation to create energy for heating and cooling needs, reducing the facility's load profile during times of normal energy delivery. However these systems can also be designed specifically to provide power for essential functions separate from the grid during emergency

situations and serve as a backup generation system, if the system is configured to do so as part of the design.[342, 343] Today, most CHP systems use natural gas as the primary fuel source, but interest is growing in hybrid systems that incorporate renewable energy and use CHP generation as a foundation for the microgrid systems that are beginning to operate around the United States.[344,345] Oklahoma energy security planners interested in additional resilience should remain abreast of developments related to deployment of microgrids.

As all technologies mentioned above carry additional costs and technical requirements, careful considerations must be undertaken as any Oklahoma entity considers upgrading for reliability or resiliency. For those wishing additional resources, the U.S. Energy Information Administration offers specific evaluations of cost and feasibility of many of the above systems in its 2020 report *Distributed Generation, Battery Storage, and Combined Heat and Power System Characteristics and Costs in the Buildings and Industrial Sectors.*[346] However, Oklahoma must remain aware of and involved with meeting the modern challenges of energy reliability, resilience, and assurance and thus should not overlook market and technological developments that could aid in the state's preparedness for energy disruptions.

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CONCLUSION

Oklahoma's energy landscape is one-of-a-kind. In conjunction with the state's main emergency planning document—the Oklahoma Emergency Operations Plan—this Energy Security Plan represents a detailed picture of the energy industries of our state, outlines the history and potential for likely causes of energy emergencies, and presents policy and strategy options for decision makers to utilize when mitigating and responding to energy emergencies. It is intended as an additional "tool in the toolbox" for government and private sector partners to utilize in a way that will minimize the impact of future energy emergencies.

The importance of fostering an ongoing dialogue regarding energy security cannot be overstated. Therefore, it is Oklahoma's intent to regularly revisit the content of this Plan to ensure its accuracy, and to continue the conversation with government partners, energy providers, and other stakeholders to ensure that this Energy Security Plan continues to best provide information and direction to energy planners and responders for many years into the future.

At any time, questions and comments regarding the Energy Security Plan may be directed to Secretary of Energy and Environment, Jeff Starling, at (405) 522-7099 or jeff.starling@ee.ok.gov.

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APPENDIX A:
QUICK REFERENCE CONTACT LIST

Agency	Contact Number
American Red Cross	(405) 228-9500
	(800) 733-2767
Grand River Dam Authority	(918) 256-5545
	(918) 256-0911
Oklahoma Association of Electric Coops	(405) 478-1455
Oklahoma Corporation Commission	(405) 521-2211
Oklahoma Dept. of Environmental Quality	(405) 702-0100
	(800) 522-0206
Oklahoma Dept. of Human Services	(877) 751-2972
Oklahoma Dept. of Public Safety/Emergency Highway Patrol	(405) 425-2424
Oklahoma Dept. of Transportation	(405) 521-6000
Oklahoma Emergency Management	(405) 521-2481
Oklahoma Homeland Security	(405) 425-7296
Oklahoma LP Gas Administration	(405) 521-2458
Oklahoma Military Department/Oklahoma National Guard	(405) 228-5000
Oklahoma Municipal Alliance	(405) 340-8313
Oklahoma Municipal Power Authority	(405) 340-5047
	(580) 763-8047
Oklahoma Petroleum Marketers & Convenience Store Association	(405) 842-6625
	(703) 351-8000
Oklahoma Propane Gas Association	(405) 424-1775
Oklahoma Secretary of Energy & Environment	(405) 522-7099
Oklahoma State Bureau of Investigation	(405) 848-6724
Oklahoma State Dept. of Health	(405) 271-0900
Oklahoma State Energy Office (in partnership with OSEE)	(800) 879-6552
	(800) 272-9741
Oklahoma Telephone Association	(405) 525-7700
Oklahoma Water Resources Board	(405) 530-8800

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APPENDIX B: INFORMATION AND RESOURCES TO MONITOR ENERGY SUPPLY AND DEMAND, BY SECTOR

General Information

U.S. Energy Information Administration (EIA)
(http://www.eia.gov)
Provides a wide range of information and data covering energy production, inventories, demand, imports, exports, and prices. The EIA also prepares analyses and special reports on topics of current interest.

Monthly Energy Review
(http://www.eia.gov/totalenergy/data/monthly/index.cfm)
A monthly publication containing recent energy statistics and information including information about total energy production, consumption, and trade; energy prices; overviews of petroleum, natural gas, coal, electricity, nuclear energy, renewable energy, and international petroleum; carbon dioxide emissions; and data unit conversion values.

NOAA
(http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/degree_days/)
The National Weather Service and National Oceanic and Atmospheric Administration (NOAA) provides data on cooling and heating degree days that can be helpful to development of forecasts of extreme weather conditions that create peak loads on the electrical generation system or increases in demand for gas for space heating.
National Weather Center

(http://www.ou.edu/nwc)
The University of Oklahoma hosts the National Weather Center, which is a unique partnership of University of Oklahoma, NOAA, and state organizations that work together to improve understanding of events in Earth's atmosphere over a wide range of time and space. The National Weather Center has played a key role in weather forecasting during previous Oklahoma emergencies and remains a valuable local resource.

Monitoring Electricity

Electric Power Monthly
(http://www.eia.gov/electricity/monthly/index.cfm)

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Monthly report on electricity sales and electricity production, by state, month, sector, and power generation fuel.

Hourly Electric Grid Monitor
(https://www.eia.gov/beta/electricity/gridmonitor/dashboard/electric_overview/US48/US48?src=email)
Hourly grid monitor that tracks generation and demand by region and energy source.

Quarterly Coal Report
(http://www.eia.gov/coal/index.cfm)
Quarterly report that lists the amount of coal consumed in each state and prices paid by each sector. It also estimates levels of fuel inventories by utility and reports the number of days of fuel supply on hand at each location for coal- and oil-fired plants.

Regional System Reliability Forecast
(http://www.nerc.com/pa/RAPA/Pages/default.aspx)
The North American Electric Reliability Corporation (NERC) publishes annual reports of regional system reliability that assess regional reserve margins by comparing net system availability with peak load projections and system-pool reserve availability.

Electric Emergency Incident and Disturbance Report
(http://www.oe.netl.doe.gov/oe417.aspx)
Provides information on electric emergency incidents and disturbances. Used by the Department of Energy to fulfill its overall national security and other energy emergency management responsibilities, as well as for analytical purposes.

Oklahoma Gas and Electric Outage Map
(https://www.oge.com/wps/portal/oge/outages/systemwatch)
OG&E offers web-based outage information that can be accessed by the public.

Public Service Company of Oklahoma Outage Map
(https://www.psoklahoma.com/outages)
PSO offers web-based outage information that can be accessed by the public.

Liberty Utilities Outage Map
(https://central.libertyutilities.com/all/residential/emergencies-outages/outages-map.html)
Liberty offers web-based outage information that can be accessed by the public.

Oklahoma's Electric Cooperatives Outage Map
(https://outages.oaec.coop/outages/maps)
OAEC offers web-based outage information that can be accessed by the public.

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Oklahoma Municipal Power Authority Outage Map
(https://ompa.com/outages/)
OMPA offers web-based outage information that can be accessed by the public.

Monitoring Natural Gas

Natural Gas Monthly
(http://www.eia.doe.gov/oil_gas/natural_gas/data_publications/natural_gas_monthly/ngm.html)
Provides data on natural gas production, supply, consumption, disposition, storage, imports, exports, and prices in the United States. The report is published by state, month, and sector.

CNGNow
(http://www.cngnow.com)
Provides nationwide information on locations and prices for Compressed Natural Gas for use as a vehicle fuel.

U.S. Department of Transportation, Pipeline & Hazardous Materials Safety Administration (PHMSA)
(http://www.phmsa.dot.gov/pipeline/library/data-stats/pipelineincidenttrends)
Provides information, by state, on pipeline incidents that may affect supply.

Monitoring Petroleum

U. S. Energy Information Administration Reports (EIA)
(http://www.eia.gov/petroleum/reports.cfm?t=214)
The EIA collects and analyzes data on petroleum prices, inventories, and demand. Reports are available on a weekly, monthly, and yearly basis.

American Petroleum Institute
(http://www.api.org/products-and-services/statistics)
The API publishes information on the average pump price for gasoline, state motor fuel tax rates, and U.S. oil and petroleum product imports by country.

Federal Highway Administration
(http://www.fhwa.dot.gov/policyinformation/quickfinddata/qffuel.cfm)
The FHA publishes data, monthly and annually, on motor fuel usage across the United States.

GasBuddy
(http://www.gasbuddy.com)
Provides information on the lowest available price of gasoline and diesel fuel by city and state.

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APPENDIX C: LEGAL AUTHORITY FOR ENERGY EMERGENCY PLANNING AND RESPONSE

The information below identifies the primary sources of legal authority that relate to energy emergencies in the state of Oklahoma. As is typical of all energy security activities, several levels of government have authorities and emergencies. Authorities listed are current as of 2020. This section is not intended to provide an exhaustive list of all energy emergency legislation, but rather the overarching authorities given to each level of government for energy emergency planning and/or response. References to sector-specific legislation are provided in the relevant Plan sections where appropriate.

State Authority

These state authorities were compiled after using a National Conference of State Legislatures (NCSL) Energy State Bill Database[347] search. The NCSL database led to identification of several House and Senate bills relevant to Oklahoma energy security activities since 2016. The bills were cross-checked during a concurrent search of the Oklahoma State Legislature Bill Search database. This effort was intended to not only verify the information identified through the NCSL query, but to also assure the bills were appropriately categorized as new or amendments to existing legislation. Importantly, this process did not identify any changes to the existing primary legal authorities previously identified, although numerous new or amended legal directives were identified that are relevant to specific activities and are referenced in relevant sections of the Plan as noted above.

Oklahoma Emergency Management Act (63 O.S. § 63-683.1-63.683.36)
This law replaced the Oklahoma Civil Defense and Emergency Resources Management Act of 1967 as the primary state law detailing emergency management in Oklahoma. It declared the policy of Oklahoma to be that all emergency management and hazard mitigation functions of the state be coordinated to the maximum extent with comparable functions of the federal government, other states and localities, and private agencies. The goal is to assure the most effective preparation and use of the available workforce, resources, and facilities for dealing with disaster and hazard mitigation. Each state agency, board, commission, department, or other state entity having responsibilities either indicated in the state Emergency Operations Plan must have written plans and procedures in place to protect individual employees, administrators, and visitors from natural and man-made disasters and emergencies occurring at their workplace. All such plans and procedures are made in concurrence with Oklahoma Department of Emergency Management (OEM), which is responsible for establishing an OEM Guidebook titled "Emergency Standard Operating Procedures." Each state agency, board, commission, department, or other state entity must provide an annual report on the status of their emergency management program to OEM.

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OEM then must compile and integrate all reports into a report to the Governor and Legislature on the status of state emergency preparedness.

Oklahoma Emergency Response Act (27A O.S. § 27A-4-1-101 – 27A-4-1-106)
The purpose of this 1993 Act is to provide a rapid, coordinated, and effective network for response to dangerous substance incidents or events necessary to protect the public health and safety of this state and to preserve property. It also seeks to provide direction and information to responders for the management of dangerous substance incidents or events and to reduce the duplication of effort between local, county, and state entities. Finally, the Act sought to organize, prepare, and coordinate all state available manpower, materials, supplies, equipment, facilities, and services necessary for dangerous substance response.

Oklahoma Emergency Price Stabilization Act (15 O.S. § 15-777.1)
In 1999, Oklahoma enacted the Oklahoma Price Stabilization Act to prevent unwarranted price increases shortly after the occurrence of a disaster in the state. Once the Governor or President has declared a state of emergency, the bill prohibits prices from rising more than 10 percent in the covered area. Violators will face up to a year in prison and a fine of up to $1,000, as well as penalties of up to $10,000 and restitution.

Oklahoma Homeland Security Act (74 O.S. § 74-51.1)
The Oklahoma Homeland Security Act was established to respond to acts of terrorism that may occur in the state. The Act created the Oklahoma Office of Homeland Security (OOHS) as well as establishing the position of Homeland Security Director to head the office. The Governor is appointed as the state's chief counterterrorism official and places administrative responsibility on the director. Among other things, OOHS is tasked with developing, coordinating, implementing, and administering a comprehensive state plan for responding to events such as acts of terrorism, public health emergencies, cyberterrorism, or incidents involving weapons of mass destruction. Likewise, the Act designates OOHS as the agency responsible for developing interoperable public safety communications planning for the state. In May 2024, the Oklahoma Homeland Security Act was amended by legislative action (SB1371) to move the Oklahoma Office of Homeland Security under the Department of Public Safety by legislative action (SB 1371). This bill also authorized the Commissioner of Public Safety to act as Homeland Security Advisor.[348]

References to agency, organization or industry-specific statutory responsibilities, mandates and programs can be found in the sector-specific sections of this Plan.

Federal Authority

A listing of key federal energy emergency authorities appears below. This section includes major federal authorities related to cybersecurity, which although not specific to energy emergencies, are important to reference given the volume of critical infrastructure that exists within the energy sector.

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Homeland Security Presidential Directive 5 (HSPD - 5)
This directive enhances the ability of the United States to manage domestic incidents by establishing a single, comprehensive National Incident Management System (NIMS). It requires all federal departments and agencies to cooperate with the Secretary of Homeland Security by providing their full and prompt cooperation, resources, and support as appropriate and consistent with their own responsibilities for protecting the nation's security. This action also directed the development of the National Response Framework (NRF) which was established to align federal coordination structures, capabilities, and resources into a unified, all-discipline, and all-hazards approach to domestic incident management. Additionally, the NRF directs that state, local, and tribal governments as well as non-governmental organizations utilize NRF-established incident reporting protocols, modify existing plans to ensure alignment with the NRF, and notify the Secretary of Homeland Security of any substantial conflicts between the NRF and state or tribal government laws or regulation.

Presidential Policy Directive 8: National Preparedness (PPD-8)
This Directive strengthens U.S. security and resilience through preparation for the threats that pose the greatest risk to the security of the nation, including acts of terrorism, cyber-attacks, pandemics, and catastrophic natural disasters. The five mission areas included in PPD-8 include Prevention, Protection, Mitigation, Response and Recovery.

National Security Memorandum on Critical Infrastructure Security and Resilience (NSM-22)
Issued in April 2024, this directive outlines a comprehensive strategy for enhancing the security and resilience of the United States' critical infrastructure, which includes essential physical and virtual systems vital to national security, economic stability, and public health. With a focus on shared responsibility, the memo emphasizes collaboration between federal, state, local, tribal, and private sector entities. It advocates for a risk-based approach to prioritize efforts, establish minimum security requirements, and ensure robust accountability mechanisms. The memo highlights the need for timely information sharing and leveraging federal expertise to support these efforts. It also underscores the importance of international cooperation to secure globally interconnected infrastructure. The modernization and strategic investment in infrastructure are seen as opportunities to build a resilient nation capable of withstanding natural hazards, supply chain disruptions, and adversarial threats. The Secretary of Homeland Security is tasked with coordinating federal activities, with Sector Risk Management Agencies playing a crucial role in sector-specific risk management. NSM-22 succeeds Presidential Policy Directive 21.

Homeland Security Policy Directive 23: Cybersecurity Policy (HSPD-23)
This directive, also known as NSPD-54, outlines the nation's cybersecurity policy, strategy, and implementation procedures. This directive is the foundational legal authority for the Comprehensive National Cybersecurity Initiative (CNCI).

Presidential Policy Directive 41: United States Cyber Incident Coordination (PPD-41)


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This directive provides the framework for the federal government's response to any cyber incident, whether involving public or private entities. It also establishes lead federal agencies for major incident response.

Robert T. Stafford Disaster Relief and Emergency Assistance Act
The Federal Emergency Management Agency (FEMA), following a presidential declaration of emergency or major disaster, provides assistance; such assistance may require support from other Federal agencies including acquiring resources and personnel to support state and local emergency and disaster assistance efforts. Requests for a presidential declaration of an emergency or major disaster must be made by the Governor of the affected state based on a finding by the Governor that the situation is of such severity and magnitude that effective response is beyond the capabilities of the state. DOE supports DHS/FEMA relief efforts by assisting federal, state, and local government and industry with their efforts to restore energy systems in disaster areas. When necessary, DOE also may deploy response staff to disaster sites. DOE is the lead agency directing Emergency Support Function-12 (Energy), which assists the restoration of energy systems and provides an initial point-of-contact for the activation and deployment of DOE resources. These activities are performed pursuant to the Stafford Act and HSPD-5 (Management of Domestic Incidents) and National Response Plan (NRP).

The Federal Power Act (FPA)
This Act is the primary federal statute governing the wholesale transmission and sale of electric power as well as the regulation of hydroelectric power. Pertinent to this plan, section 202(c) allows the Secretary of Energy discretion to initiate connections or other such efforts to best address the emergency and serve the public interest; this authority expressly emphasizes response during a war in which the United States is engaged or when emergencies exist that require a sudden increase in demand for electric energy—due to generation or transmission issues or a lack of fuel for such activities.

A thorough listing of federal acts, authorizations, and references, including sector-specific authorities, can be found in Appendix C of the State Energy Assurance Guidelines developed by the National Association of State Energy Officials (NASEO) (Version 3.1, December 2009).[349]

Local Authority

Political Subdivisions-Emergency Management Programs-Emergency Management Directors (63 O.S. § 63-683.11)
Oklahoma statutes require that all incorporated jurisdictions in the state develop emergency management programs. County jurisdictions are also required to have a qualified emergency management director. A complete list of these emergency management directors can be found on the Office of Emergency Management's website.[350] Any incorporated municipality must either have their own emergency management director or create an agreement with the county for emergency management services. These emergency management organizations must develop local emergency operations plans that include preparedness, response, recovery, and mitigation. These


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plans must be based on a hazard and risk assessment. Finally, the statute requires that localities coordinate their plans with state level officials.

Public Health and Safety-Statewide Mutual Aid System (63 O.S. § 63-695.2)
In the case that an emergency occurs which is too great for the locality to deal with unassisted, Oklahoma statute also provides for local emergency management directors to enter into mutual aid agreements for reciprocal emergency management aid and assistance. Localities may work with other public or private agencies in the state, and if granted approval by the governor, work with emergency management organizations in bordering states. States may also develop Emergency Management Assistance Compacts (EMAC) for interstate aid and assistance requests, although states are not required to provide assistance under compacts.

Tribal Authority

FEMA Tribal Policy #305-111-1(Rev. 2)
The Federal Emergency Management Agency (FEMA) has an established tribal policy that governs how the agency operates as it regards tribal nations, and guides practices related to tribal sovereignty, while upholding the federal trust responsibility.[351]

FEMA Tribal Consultation Policy 101-002-02
The Federal Emergency Management Agency maintains a distinct tribal consultation policy which guides its process for communicating and collaborating with tribal nations regarding receiving input, consideration of tribal viewpoints, and sharing information.[352]

Bureau of Indian Affairs 25 U.S.C. § 2 (2014); 25 U.S.C. § 9 (2014); 43 U.S.C. § 1457.
Federal statute gives authority to the Department of the Interior's Bureau of Indian Affairs for the "management of all Indian affairs and of all matters arising out of Indian relations." Today, the Bureau is approximately 200 years old, and fulfills its mission through grants, contracts, and compacts with federally-recognized Indian tribes.

Federal Trust Responsibility (Cherokee Nation v. Georgia, 30 U.S. (5 Pet) 1, 8 L. Ed. 25 (1831); Seminole Nation v. United States, 1942)
The Federal Trust Responsibility is a trust doctrine and legal obligation, which is in turn comprised of the moral obligations that the United States must meet in order to protect Tribal lands, assets and rights. It is considered the cornerstone principle in federal Indian law. Order 3335 from the Secretary of the Department of Interior, issued in 2014, re-affirms the scope and guiding principles that the U.S. Department of Interior will follow in alignment with related statutes and rules.

Amendment to the Robert T. Stafford Disaster Relief and Emergency Assistance Act
In 2013, The United States Congress amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. § 5121 et seq. This amendment provided authority to federally-recognized tribes to directly request presidential emergency or major disaster declarations, independent of the typical required state process.

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APPENDIX D: COOPERATIVES SERVING OKLAHOMA

Oklahoma statute 17 O.S. §158.27 allows electric cooperatives to opt out of price regulations and be self-governing with an elected board of directors accountable to their customers. Most of the cooperatives in the State have opted for the self-regulatory option. While the OCC does not directly regulate these cooperatives in terms of rates, the OCC is responsible for monitoring the status and reliability of each provider and, for those cooperatives that have not opted out of price regulation, for monitoring the accuracy and prudence of purchased power costs passed on to their Oklahoma customers through the Purchased Power Adjustment Clause.

Those distribution-only cooperatives that have not opted out of price regulation and whose service reliability and pricing is regulated by the OCC are:

- Arkansas Valley Cooperative
- Canadian Valley Electric Cooperative*
- Northeast Oklahoma Electric Cooperative**
- Rich Mountain Electric Cooperative
- Southwest Arkansas Electric Cooperative

The distribution cooperatives that have opted out of price regulation by the OCC but that are still under the Commission's regulation for service reliability are:

- Alfalfa Electric Cooperative, Inc.*
- Central Rural Electric Cooperative**
- Choctaw Electric Cooperative, Inc.*
- Cimarron Electric Cooperative, Inc.*
- CKenergy Electric Cooperative*
- Cookson Hills Electric Cooperative**
- Cotton Electric Cooperative, Inc.*
- East Central Electric Cooperative***
- Harmon Electric Association, Inc.*
- Indian Electric Cooperative**
- Kay Electric Cooperative, Inc.*
- Kiamichi Electric Cooperative, Inc.***
- Lake Region Electric Cooperative**
- Northfork Electric Cooperative, Inc.*
- Northwestern Electric Cooperative, Inc.*
- Oklahoma Electric Cooperative, Inc.*
- Ozarks Electric Cooperative**
- People's Electric Cooperative
- Red River Valley Electric Cooperative*
- Rural Electric Cooperative, Inc.*
- Southeastern Electric Cooperative, Inc.*
- Southwest Rural Electric Association, Inc.*
- Tri County Electric Cooperative*****
- Verdigris Valley Electric Cooperative

*Denotes membership in the Western Farmers Electric Cooperative (WFEC) – *Generation & Transmission*
**Denotes membership in KAMO Electric Cooperative, Inc. (KAMO Power) – *Generation & Transmission*
***Denotes membership in both WFEC and KAMO Power
*****Denotes membership in Golden Spread Electric Cooperative – *Generation & Transmission*

Three Generation and Transmission cooperatives also serve Oklahoma: these are KAMO Electric Cooperative, Western Farmers Electric Cooperative, and Golden Spread Electric Cooperative.

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APPENDIX E:
ENERGY EMERGENCY RESPONSE IMPLEMENTATION ACTION MENUS

To create the Energy Emergency Response Implementation Action Menu below the authors reviewed the following: state best practices, NASEO documents, peer state Energy security plans for all geographically and structurally similar states to Oklahoma; national and local organization reports, and governmental reports. While the information contained in this Appendix is by no means exhaustive because of the contextual nature of energy disruptions linked to different types of incidents and accidents, it provides basic operational information and parameters pertaining to best practices for responding to sectoral energy supply and demand concerns. This Appendix also does not aim to address the interconnected nature of events that can cause cascading failures. Overcoming systemic failures requires planning involving key cross-sector actors within the scope of the National Response Framework[353] under the direction of Emergency Support Function 12-Energy (ESF-12). The interconnected nature of events is discussed more in detail in this report in the chapter entitled "Preparing For, Mitigating, and Responding to Energy Emergencies."

ELECTRICITY EMERGENCY RESPONSE MENU

Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Electric	**Demand**	Utilize capacity at sites with fuel	A load shedding mechanism that can reduce electric demand on the grid.		3

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	switching or co-generation capabilities.	Utility will contact co-generation site to request that the co-generation capacity be utilized to reduce their electric demand.	4

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Electric	**Supply**	Temporarily increase levels of coal stockpiling by electric utility companies.	Allows electric utilities to plan for predicted fuel shortages. Increasing stockpiles of necessary fuel above 45 day prepares to handle the upcoming shortage.	Utilities may increase stockpiles without OCC input. Utility notifies OCC if stockpile exceeds 45 day supply and OCC regulates how much of the cost can be passed through in rate base after the fact.	2 3 4
Electric	**Supply**	Temporarily substitute Oklahoma coal for Wyoming coal in coal-fired power plants.	In the event of a WY coal shortage, Oklahoma coal could be used to keep generation constant. OK coal is not of the same type as WY coal; therefore, waivers would be needed.	Utilities would contact DEQ and U.S. EPA to request waivers to temporarily substitute one type of coal for another.	4
Electric	**Supply**	Reduction of voltage in the system.	Reduction of voltage by less than five or six percent can reduce the demands on the system, with most customers not being adversely impacted. Be aware, this short-term solution should be taken only after public notice has been given, as certain sensitive electrical equipment may be adversely affected, and would need to be protected.	Utilities would notify customers in conjunction with OCC, and then utilities would perform the voltage reduction.	4

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Electric	Supply	Utilize large backup generation when mobile units are available.	Utilities and large industrial customers can install large generators that can supply from 75 to 100 megawatts of temporary diesel generation to ease electrical shortages.	OEM will facilitate communication between customers in need of backup generation and utilities that maintain lists of priority restoration. Generator owners should be prepared to mobilize generators to appropriate locations once identified. OEM should coordinate request for backup generators with FEMA and U.S. DOE, which can often provide emergency generators for critical infrastructure or fuel sites. OEM and the National Guard also have generator staging points that can be utilized.	4
Electric	Supply	Use locomotive generators for electricity generation in selected locations.	Oklahoma has more useable freight rail lines than almost any other state. By utilizing these rail lines, locomotives can be used as emergency electricity generation sources to provide electricity for critical facilities.	OEM should facilitate communications with OK DOT and OCC to determine rail line locations and feasibility of placing locomotives near centers of need.	4

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Electric **Natural Gas**	**Demand**	Activate interruptible rates/curtail-ment programs.	A load shedding mechanism whereby industrial customers receive a lower rate in exchange for willingness to have their service interrupted in times of high system demand.	All utilities have these programs currently in place and could activate curtailments as needed without state approval. Utilities must provide notice to the individual users prior to curtailing.	1 2
Electric	**Demand**	Implement system-wide rolling blackouts.	A load shedding mechanism that allows a utility to reduce the impacts realized from extended outages.	Utility must notify customers and OCC prior to outages beginning and duration of outages must be determined by the utility. Utility must consider if any customers should be exempted from the blackouts. Coordinate with OEM and OCC to disseminate information on blackout locations and duration via media and utilize smart meters as possible to target outage locations.	4
Electric	**Demand**	Voluntary or mandatory curtailment of public building energy use.	Load shedding mechanism that could mean reduced hours of operations to curtail energy use.	Utilities would communicate with OMES/Governor's Office regarding the need for energy reductions. Governor would issue an Executive Order closing buildings or modifying access.	3 4

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Electric	**Demand**	Employ and/or expand time-of-use rates for residential and/or industrial users.	A load shedding mechanism which creates strong financial incentives for consumers to use electricity at off-peak times. Programs are most effective with smart meters in place.	Utilities with programs already in place (OG&E and PSO) can employ these programs without input from state officials.	1 2 3 4
Electric	**Supply**	Participation in regional planning and transmission organizations (Southwest Power Pool).	The Southwest Power Pool has the ability to shift power from state to state within its authorized region as a means of alleviating localized outages.	SPP can see each generating unit and transmission line and monitors these 24/7/365. OCC PUD maintains staff in active communication with SPP to update on status of shortages. Utilities can also go directly to SPP.	1 2 3 4
Electric	**Demand**	Conduct a public information program on home energy assessments.	An assessment will show the problems that can, when corrected, increase residential energy efficiency, thus reducing electricity demand.	Utilities administer these programs and are responsible for promoting them. Utilities could be encouraged by OCC to more widely publicize the programs.	1 2

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Electric	**Demand**	Implement a public information or incentive program that encourages Oklahomans to purchase more efficient appliances, add insulation, or change lighting.	A mechanism to reduce energy consumption.	Utilities currently offer these incentives. State agencies including OCC and ODOC also promote these incentives to the public. Consider increasing publicity/visibility in times of shortage.	1 2
Electric	**Demand**	Conduct public information campaign that includes a variety of electricity saving tips.	Encourages customers to reduce energy consumption.	Utilities currently offer these promotional materials. Consider using public figures such as OCC Commissioners or Governor for PSAs regarding electricity conservation in times of shortage.	1 2 3 4
Electric	**Demand**	Increase rates for customers.	Higher prices discourage consumption during shortages. This type of short-term change could only feasibly be implemented in a self-regulated co-op or municipal utility setting.	Utilities must publicize the rate increases thoroughly to realize the conservation benefits. Co-op board members or city governments must approve rate changes. The State has no authority over these changes as these are unregulated utilities.	2 3 4

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Electric	**Demand**	Encourage or direct government facilities to improve energy efficiency.	Reduces energy consumption.	61 Okla. St. § 213 mandates that new construction or substantial renovation projects in state buildings over 10,000 sq. ft. must meet a high-performance building standard. Shorter term measures could be coordinated through OMES and Governor (Executive Order in an emergency situation).	1 2 3 4
Electric	**Demand**	Encourage or direct regulated utility providers to increase and/or provide additional programs to their customers which focus on energy efficiency.	Reduces energy consumption.	OCC can encourage additional programming at any time. Directing additional programming would be accomplished through a formal rulemaking process or legislation.	1
Electric	**Demand**	Utilize buy-back rates that pay customers to sell excess self-generated electricity back to the grid for utility credit.	Reduces the need for utility generation.	The current state net metering policy already encourages customer self-generation but there are cost barriers to customers selling back to the grid.	1

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Electric Natural Gas Propane	**Demand**	Encourage the use of alternative fuels, such as natural gas, propane, diesel or wood as the fuel source for home heating.	Provides alternative heating sources in event of electrical outages.	Utilities, the Dept. of Health, Fire Marshall, and public figures should utilize PSAs and all media outlets to communicate the risks and benefits of safely using alternative fuels for home heating.	2 3 4

PETROLEUM EMERGENCY RESPONSE MENU

Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Petroleum	**Supply**	State of Oklahoma assumes control of fuel prioritization.	63 O.S.2011, Section 683.9(1), gives the Governor authority to assume regulatory control over essential resources, to determine priority of such resources and allocate such resources. Other than the statute, there are no pre-selected lists. The guiding principle is to give the flexibility needed to meet the demands of the situation.	The Governor's Office would coordinate with the Corporation Commission and OEM to determine the appropriate prioritization.	3 4

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Petroleum Propane	**Supply**	Temporarily lift Federal Motor Carrier Safety Regulations (FMCSR) restrictions for over the road transport trucks.	Temporarily removes driver hour restrictions and various other regulations to allow for extended delivery hours by transit companies of petroleum products, such as LPG, gasoline, or diesel.	A Governor's Declaration of Emergency automatically lifts FMCSR. See Appendix G. Coordinate with surrounding states to ensure smooth interstate travel of equipment or fuel.	3 4
Petroleum Propane	**Supply**	Top off fuel storage tanks in anticipation of an event that will impact fuel transportation.	Private retailers/dealers may choose to do this voluntarily to ensure available supply if a shortage is imminent. This is currently a common practice for petroleum retailers.	Retailers/dealers will monitor potential shortages and act accordingly.	1 2 3 4
Petroleum Propane	**Supply**	Encourage or require longer refill cycles or waiting until tank is completely depleted before the tank could be refilled.	Caution is needed, as distributors may have difficulty efficiently scheduling routes with less predictable schedules, as well as ensuring that this option is not utilized in times of extreme cold.	Work in conjunction with the Governor's Office. OCC PST Division would encourage or direct petroleum delivery schedules to be modified on the basis of fuel need. LPG board would have to be consulted regarding propane.	4

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Petroleum	**Supply**	Request waivers from the U.S. EPA for the import of gasoline that does not meet local air quality requirements	Request should be substantiated with fuel supply/ consumption data for both impacted and alternative fuels, and include information on specific efforts to seek alternative sources of compliant fuels.	Any waiver requests would be made by either the Office of the Secretary of Energy and Environment (OSEE) on behalf of the Governor's office, or by DEQ at the request of, or in consultation with, OSEE.	4
Petroleum	**Supply**	Request waivers from the U.S. Environmental Protection Agency to allow for high sulfur diesel products to be used for highway consumption.	Almost all diesel fuel available today is ultra-low sulfur diesel, which has significant air quality benefits over high sulfur diesel. Vehicles or equipment with new emission control technology (2007 and later) can fail if run on high sulfur diesel.	Any waiver requests would be made by either the Office of the Secretary of Energy and Environment (OSEE) on behalf of the Governor's office, or by DEQ at the request of, or in consultation with, OSEE. Refineries would have to change their process requirements for sulfur content since almost all diesel today is ultra-low sulfur diesel. See Appendix G for detailed implementation instructions.	4

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Petroleum	**Supply**	Petition the U.S. Environmental Protection Agency to allow refineries to sell gasoline out of season or to suspend the Reid Vapor Pressure Standard (RVP) standard for gasoline allowing for more gasoline to be produced from a barrel of oil.	Seasonal blend requirements for gasoline force refineries to stockpile gasoline and not be allowed to sell it until a particular date. The RVP measures gasoline volatility. Suspending the RVP allows for more gasoline to be produced from a barrel of oil.	Any waiver requests would be made by either the Office of the Secretary of Energy and Environment (OSEE) on behalf of the Governor's office, or by DEQ at the request of, or in consultation with, OSEE. See Appendix G for detailed implementation instructions.	4
Petroleum	**Supply**	Petition the U.S. Department of Energy or President for an exchange or release of crude oil from the U.S. Strategic Petroleum Reserve.	The Strategic Petroleum Reserve is an emergency response tool the President can use should the United States or individual states or regions be confronted with an economically-threatening disruption in oil supplies.	The Governor would make the petition to the U.S. DOE or President.	4

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Petroleum	**Demand**	Conduct a public information campaign to encourage ridesharing.	Has the potential to reduce vehicle fuel needs.	Governor's Office, OCC, DEQ, OSEE, and ODOT can coordinate with trade and municipal associations regarding fuel conservation.	2 3 4
Petroleum	**Demand**	Conduct a public information campaign to encourage efficient driving practices.	Consumers can be encouraged to use the correct air pressure in tires, utilizing driving practices which are targeted at improving fuel efficiency, removing wind resistant equipment such as luggage racks, and discouraging discretionary driving.	Coordinate with ODOT; coordinate with auto manufacturers.	1 2 3 4
Petroleum	**Demand**	Trigger the Oklahoma Emergency Price Stabilization Act.	This may be enacted with the declaration of an emergency, and the Act forbids price increases in excess of 10%.	The trigger is the Governor's declaration of emergency through Executive Order. Enforcement by the Attorney General.	2 3
Petroleum	**Demand**	Offer discounted rates or incentives for utilizing any public transit options.	Reducing the cost of public transit encourages citizens to utilize this option rather than driving private vehicles.	The DEQ model for ozone alert days could be utilized.	3 4
Petroleum	**Demand**	Increase the number or frequency of bus routes	See above.	See above.	3 4

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Petroleum	**Demand**	Reduce speed limits on roadways, and/or increase the enforcement of either lowered or existing speed limits.	ciency usually decreases at speeds above 50	The Oklahoma Department of Transportation regulates speed limits and their enforcement through the State Patrol. Coordinate with Governor's Office.	3 4
Petroleum	**Demand**	Create a public information campaign encouraging employers to offer telecommute or telework options.	For each day employees do not commute to the office, up to 20% of fuel can be conserved.	Issue PSAs from state leaders, authorized by the Governor.	3 4
Petroleum	**Demand**	Enact/support a telework or telecommute policy for public employees	Reduces fuel consumption by roughly 20% weekly for each day employees do not commute to the office.	The Governor could declare this policy.	3 4

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Petroleum	**Demand**	Encourage staggered commute times (commuting off-peak hours or days) for public and/or private employers and/or school start times.	Reduces the amount of transit time in congested areas, and thereby reduces the amount of fuel consumed.	Governor could allow for public employees to utilize flex time. Public officials could encourage the private sector via PSA's.	3 4
Petroleum	**Demand**	Curtail recreational marine or off-road vehicle use.	Reduces discretionary use of vehicle fuel.	The public safety department or GRDA would enforce curtailments of recreational use.	4
Petroleum	**Demand**	Encourage the use of alternative fuels such as CNG, biofuels, or diesel natural gas, especially in public and school fleets.	Converting a portion of fleets to a secondary fuel source creates a hedge against fuel shortage or emergency.	Department of Commerce SEO, OCC, private utilities, Secretary of Energy, and Governor could all be involved in promoting this initiative.	1 2 3 4

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NATURAL GAS EMERGENCY RESPONSE MENU

Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Natural Gas	**Supply**	Temporarily lift wellhead restrictions on the production of natural gas.	Allows companies to pump as much gas as possible.	OCC regulates this through rulemaking, every 6 months holding a market demand hearing which sets maximum flow for wells. This hearing can occur on an accelerated schedule if necessary (emergency rulemaking).	4
Natural Gas	**Supply**	Allow pipeline pack to increase reserve supplies available.	Allows pipeline companies to store additional natural gas in the pipelines. This is generally done in anticipation of elevated demand.	The allowable pipeline pressure increases are regulated by federal law.	1 2 3 4
Natural Gas	**Supply**	Local gas distribution companies (LDC) can purchase additional gas in order to meet demand.	Mainly a preventative measure to be used when shortages can be anticipated —there must be an adequate gas supply available to purchase additional gas. The price of this purchased gas, contract details, the availability of gas transmission capacity, and the ability of the company's system to accept additional supply may impact the amount that can be purchased.	This activity will be conducted by private gas companies; OCC should remain actively involved in understanding anticipated supply shortages.	1 2 3

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Natural Gas	**Supply**	Gas companies that are drawing gas from storage facilities can increase the rate of withdrawal.	Helps meet increased short-term demand.	No special permissions needed. Companies make these decisions independently--contractually they may go up to their maximum withdrawal rate without notifying state officials.	2
Natural Gas	**Supply**	Encourage/require gas companies when technically feasible to access and utilize other sources of gas, (LNG, propane air stations, synthetic natural gas plants).	Diversifies fuel sources, decreasing reliance on natural gas.	Would require that conversion equipment exists, and the companies would be buying gas “off system".	4
Natural Gas	**Demand**	Encourage/ require a short-term reduction in natural gas usage in state facilities or by industrial users.	Temporarily relieves demand on the natural gas system.	Governor has authority over state facilities. OEM would coordinate communication requirements or encouragement for industrial users. OCC becomes involved if curtailment issues arise.	3 4

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Natural Gas	**Demand**	Request that large commercial and industrial customers reduce gas use by decreasing their thermostat settings or reducing gas-consuming industrial processes.	See above.	OCC is involved through interruptible gas rates. Once signed up the utility has the discretion how to execute the curtailment.	1 2 3 4
Natural Gas	**Demand**	Encourage residential customers to lower thermostats and water heating settings and defer using gas appliances.	See above.	A utility or the state could issue PSA's to consumers to encourage their participation.	2 3 4
Natural Gas	**Demand**	Curtail or shut off gas supply to customers, regardless of interruptible agreements in place.	Assures reduction in natural gas use for serious shortage situations.	Utilities should use this approach with caution, as customer pilot lights must be relit following a cut off, or serious hazards such as gas accumulation within residences and business, could result.	4+

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Type of Emergency	Supply or Demand Side	Measure	What it Does	Recommended Steps	Shortage Level
Natural Gas	**Demand**	Increase retail rates to consumers.	Higher cost often reduces consumption.	Requires a statutory change and emergency rulemaking.	4+
Natural Gas	**Demand**	Conduct a public information campaign and/or offer incentives that provide information, energy estimates, or discounts for the purchase and installation of highly efficient natural gas appliances.	Encourages public use of highly efficient natural gas appliances.	Financial incentive programs are administered at the utility level but are authorized at OCC.	1 2 3 4
Natural Gas	**Demand**	Encourage large industrial natural gas customers to participate in a gas buy-back program.	Some larger industrial customers purchase gas from 3rd party suppliers and pay only a transportation fee to the utility. In a shortage situation, certain large customers may be willing to interrupt operations if the buy-back premium is high enough.	This would be a transaction in the private sector.	4

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Appendix F:
Decision Support Tools for Hazardous Weather Conditions

More complete information, forecasting tools and weather analysis can be found at the SPIA website, spia-index.com. Images displayed with permission from Sidney K. Sperry, developer of the SPIA index.

The Sperry-Piltz Ice Accumulation Index, or "SPIA Index" – Copyright, February, 2009

ICE DAMAGE INDEX	* AVERAGE NWS ICE AMOUNT (in inches) *Revised-October, 2011	WIND (mph)	DAMAGE AND IMPACT DESCRIPTIONS
0	< 0.25	< 15	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	0.10 – 0.25	15 - 25	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
	0.25 – 0.50	> 15	
2	0.10 – 0.25	25 - 35	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
	0.25 – 0.50	15 - 25	
	0.50 – 0.75	< 15	
3	0.10 – 0.25	> = 35	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
	0.25 – 0.50	25 - 35	
	0.50 – 0.75	15 - 25	
	0.75 – 1.00	< 15	
4	0.25 – 0.50	> = 35	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
	0.50 – 0.75	25 - 35	
	0.75 – 1.00	15 - 25	
	1.00 – 1.50	< 15	
5	0.50 0.75	> 35	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.
	0.75 1.00	> 25	
	1.00 1.50	> 15	
	> 1.50	Any	

(Categories of damage are based upon combinations of precipitation totals, temperatures and wind speeds/directions.)

Weather Conditions and SPIA Index Levels at a Glance:

Ice and Wind: *Average NWS Ice in Inches; Wind in MPH.	< 15 mph	15-25 mph	25-35 mph	> = 35 mph
0.10 – 0.25 inches	0	1	2	3
0.25 – 0.50 inches	1	2	3	4
0.50 – 0.75 inches	2	3	4	5
0.75 – 1.00 inches	3	4	5	5
1.00 – 1.50 inches	4	5	5	5
> 1.50 inches	5	5	5	5

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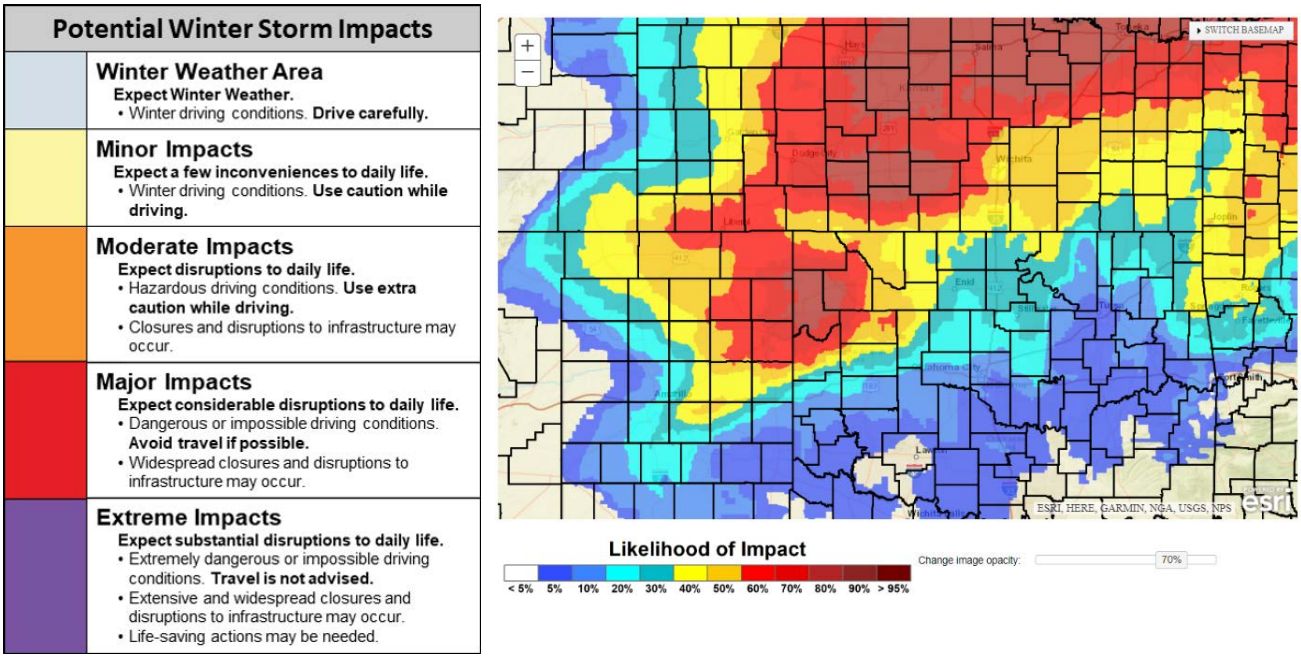
NOAA Weather Prediction Center - Winter Storm Severity Index

The Winter Storm Severity Index (WSSI) is a new tool developed and maintained by the NOAA Weather Prediction Center for use by both individual National Weather Service Forecast Offices and members of the public. The purpose of the tool is to provide greater situational awareness of the potential impacts of a winter storm by looking at a combination of different factors – both meteorological and social. The tool can be broken out into individual components of a winter storm (Snow Amount, Snow Load, Ice Accumulation, Flash Freeze, Blowing Snow, Ground Blizzard) or viewed collectively. There is also a probabilistic component to the WSSI, by which users can access the likelihood of a winter storm reaching a certain impact threshold.

The WSSI can be found on the NOAA-WPC website at:
https://wpc.ncep.noaa.gov/wwd/wssi/wssi.php.



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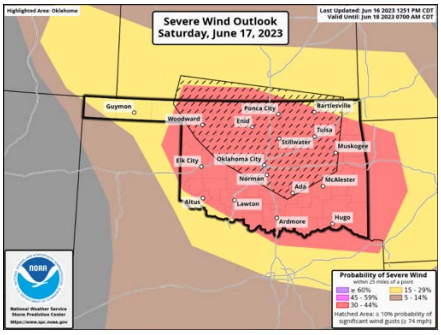
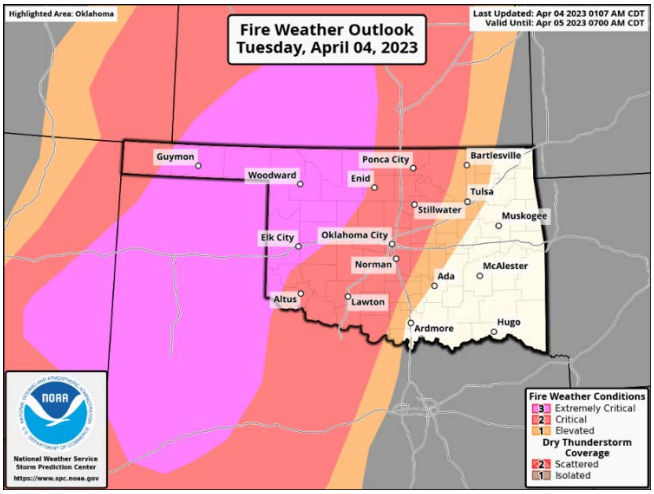
NOAA Storm Prediction Center – Convective Outlooks and Fire Weather Outlooks

The NOAA Storm Prediction Center (SPC), located in Norman on the University of Oklahoma campus, has the responsibility of forecasting severe weather for the continental United States daily. The products issued by the SPC that are most frequently accessed by users are the daily convective outlooks or through the issuance of Tornado or Severe Thunderstorm watches. Two less commonly referenced products, however, may prove especially relevant to the energy community. First, as part of the daily convective outlooks, the SPC also issues probabilistic forecasts by hazard type. This is especially relevant for widespread damaging wind events. Much like a winter storm, the ability to predict damaging winds, in both location and magnitude, in advance of a thunderstorm event can prove useful for prepositioning resources. Second, the SPC also issues fire weather forecast products up to 8 days in advance of significant fire weather conditions. Though more broad scale than forecasts issued by a local NWS Forecast Office, these SPC Fire Weather Outlooks can provide a general sense of favorable conditions for significant wildfire activity for decision making purposes.

All Storm Prediction Center forecast products can be accessed at: https://spc.noaa.gov.





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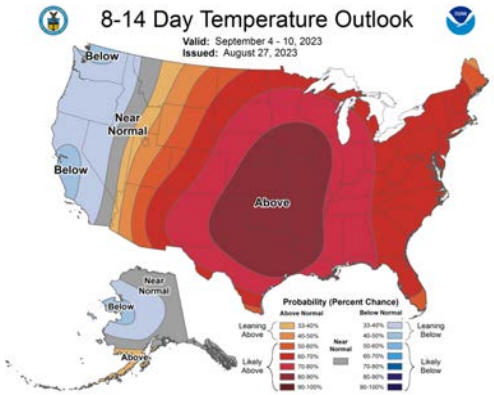
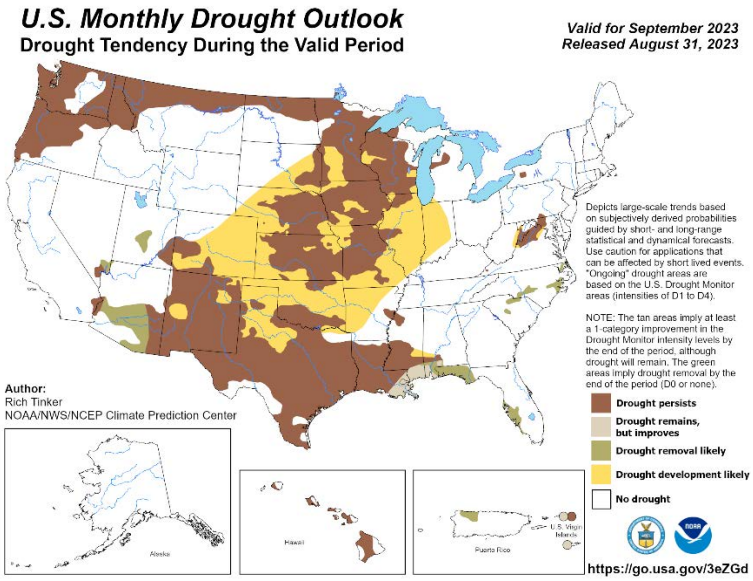
NOAA Climate Prediction Center

Not unlike its companion center the SPC, the NOAA Climate Prediction Center (CPC) issues forecasts for the United States but on a significantly different timescale. The CPC regularly issues temperature and precipitation outlooks on a 6-10 day scale, 8-14 day scale, 3-4 week scale, 1 month scale, and 3 month scale. The CPC also partners with the U.S. Drought Monitor to issue monthly and seasonal drought outlooks. Though less granular than the previously mentioned forecast tools, CPC products can be especially useful in identifying periods of extreme load on the energy infrastructure, particularly in terms of high-impact or long-lasting temperature anomalies.

All Climate Prediction Center forecasts can be accessed at: https://cpc.ncep.noaa.gov.





NOAA National Severe Storms Laboratory Warn-on-Forecast System

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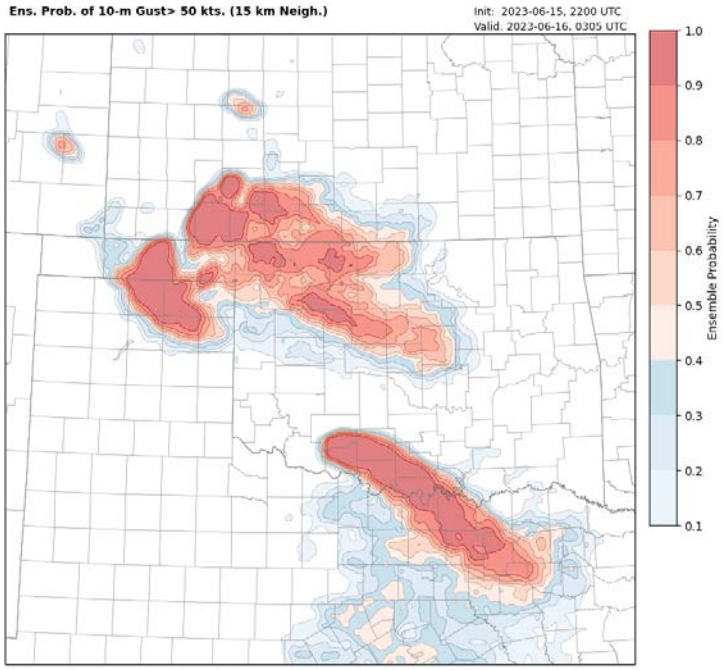
At the extreme opposite end of the timescale spectrum from CPC is an experimental forecast tool being developed by researchers and scientists at the NOAA National Severe Storms Laboratory (NSSL) also in Norman on the University of Oklahoma campus. The Warn-on-Forecast System (WoFS) is a high resolution, rapidly updating ensemble computer model used to forecast storm scale features in a designated regional location. This tool, though still in the experimental phase, is currently being used operationally by NWS Forecast Offices to identify areas at greatest risk for things like damaging winds, large hail, flash flooding, tornadoes, and even fire danger in a zero-to-six-hour timeframe. Applications of WoFS are being explored with other end-user groups such as emergency managers and first responders. There is the potential that as WoFS becomes fully operational by NOAA-NWS that infrastructure managers may find the short-term, high-resolution data especially useful for both preventative (such as public safety power shut-offs on high fire danger days) and response (identifying area at risk of maximum wind speeds) activities.



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APPENDIX G: GENERAL GUIDE FOR TRIBAL ENGAGEMENT IN ENERGY SECURITY PLANNING

Collaboration with tribal nations plays a vital role in ensuring energy security and emergency management preparedness. As part of the planning process, efforts are underway to engage with tribal nations across various regions, acknowledging their unique governance structures and roles in local and regional energy security.[354] The engagement strategy aligns with broader strategies outlined by federal entities and Indigenous associations.[355] By implementing best practices drawn from established resources, the aim is to foster strong, synergistic relationships with tribal nations that contribute to a more resilient grid.

Numerous resources exist to guide planners on respectful, meaningful tribal engagement. The 2022-2026 FEMA National Tribal Strategy guide focuses on enhancing engagement and support for Tribal Nations in emergency management.[356] It prioritizes equity, recognizes tribal sovereignty, and ensures accessibility to FEMA resources through various engagement methods such as webinars and in-person meetings. Key strategies highlighted in this document include developing tribal-specific technical assistance resources, attending routine meetings of regional tribal liaisons, and connecting tribal and FEMA leadership. It aims to build tribal capacities for climate resilience, enhance FEMA's cultural competency, and improve tribal awareness of federal resource availability. Overall, the strategy emphasizes building strong relationships, providing tailored technical assistance, enhancing communication, and promoting equitable access to resources to better support Tribal Nations in emergency management and resilience efforts.

Similarly, the NIDIS Tribal Drought Engagement Strategy can help energy planners understand how to foster successful tribal collaboration with climate and extreme weather-related issues.[357] The text suggests practices such as acknowledging and respecting tribal sovereignty, engaging in government-to-government relationships, and representing tribal boundaries accurately. Recognizing historical trauma and building trust through authentic engagement are highlighted, along with elevating Traditional Ecological Knowledge (TEK). Fulfilling the Federal Trust Responsibility involves consulting with tribes on decisions affecting their future and establishing genuine partnerships. Practical steps include incorporating acknowledgments of sovereignty and trust responsibility, involving tribes in research and implementation, and adopting culturally respectful engagement styles. Encouraging integration of Native American knowledge, respecting reciprocity, and using appropriate language are key. Overall, the emphasis is on building authentic, respectful partnerships with tribal communities and integrating their perspectives into drought programs and engagements.

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The Center for Disease Control and U.S. Forestry Service corroborate strategies previously observed with the FEMA and NIDIS framework.[358] The CDC has had success with engagement strategies including continual communication, providing adequate time before and after consultation, transparency in decision-making processes, and demonstrating a commitment to collaboration and respect for tribal sovereignty. The CDC's engagement with tribal nations has led to successful programs like Good Health and Wellness in Indian Country (GHWIC) and Tribal Practices for Wellness in Indian Country (TPWIC), which incorporate indigenous knowledge and support culturally appropriate practices. Energy planners can look to these successes as a model for energy security planning with tribes. Additionally, the Forestry Service highlights an emphasis on developing web-based decision-support tools tailored for tribal decision-makers and improving communication channels with tribes.

Energy planners can also consult best practices from tribal associations. The Northeast Regional Planning Body, a group with representatives from six New England states, six federally recognized tribes, nine federal agencies, outlines over 20 tribal consultation best practices in their Tribal Consultation Best Practices Guidelines.[359] Again, we see a focus on establishing clear standards and points of contact for effective engagement with tribal governments. It emphasizes the designation of specific personnel responsible for consultation to ensure consistency and coordination throughout the process. Additionally, it underscores the recognition and value of tribal input in decision-making processes, stressing the importance of duly considering their perspectives and ensuring accountability and transparency. Again, we see the emphasis on Tribal consultation as an ongoing process, highlighting the need for flexibility and meaningful communication between federal agencies and tribal officials. Overall, the document seeks to promote a consultative approach that respects tribal sovereignty, fosters meaningful dialogue, and leads to mutually beneficial outcomes.

The South Central Climate Adaptation Science Center, a regional center that works with natural and cultural resource managers to gather the scientific information and build the tools needed to help fish, wildlife and ecosystems adapt to the impacts of climate change, created the Guidelines for Considering Traditional Knowledges in Climate Change Initiatives underscore the crucial need to establish clear standards and ensure equity in collaborative climate endeavors involving Indigenous communities and traditional knowledge holders.[360] This entails designating points of contact and offering technical assistance, fostering consistent communication through regular meetings, and facilitating connections between tribal and federal/state leadership. By prioritizing transparency, honoring tribal sovereignty, and fostering equitable partnerships guided by principles such as "Cause No Harm" and "Free, Prior and Informed Consent," these guidelines provide an excellent roadmap to promote respectful tribal engagement.

Of the many tribal engagement resources utilized, four consistent engagement strategies emerge:

1. **Establish Clear Standards and Equity:** Provide tribal representatives with a full and equal role throughout the energy planning cycle, ensuring their voices are heard and valued. This

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includes actively involving tribal communities in decision-making processes and empowering them to contribute their expertise and traditional knowledge. By acknowledging the importance of tribal knowledge systems, energy planners can enrich their understanding of local contexts and develop more holistic and effective energy security strategies. Coordinating efforts on local, regional, and state levels, energy planners can address energy security needs in a manner that is equitable and inclusive. Seek counsel from relevant centers and organizations specializing in tribal engagement to ensure that culturally sensitive practices are employed, fostering respectful and meaningful collaboration between all stakeholders involved.

2. **Establish Points of Contact and Facilitate Mutual Technical Assistance:** Forge partnerships with tribal emergency planners and relevant organizations to foster a reciprocal exchange of technical expertise and resources. Facilitate regular outreach and coordination sessions aimed at involving tribal leaders in energy security planning initiatives, leveraging the expertise of seasoned professionals with backgrounds in tribal engagement and emergency management.

3. **Consistent Communication and Routine Meetings:** Regularly attend tribal meetings and communication channels to integrate tribal perspectives into energy planning activities. Establish consistent communication channels to facilitate feedback and information sharing between stakeholders that is ongoing.

4. **Connect Tribal and Federal/State Leadership:** Facilitate coordination between tribal leaders, state agencies, and federal agencies where applicable. Strengthen partnerships and collaboration opportunities through engagement with relevant organizations and events.

Tribal consulting in the lens of energy planning should focus on the above strategies, but it is also valuable to planners to:

- Leverage the expertise of relevant centers and organizations to ensure culturally sensitive and effective tribal engagement practices. By tapping into established resources and networks, energy planners can gain valuable insights and guidance to navigate the complexities of tribal engagement with respect and understanding of cultural nuances.
- Conduct outreach efforts that go beyond information gathering, actively seeking to foster open dialogue and mutual understanding. Through ongoing engagement and feedback loops, energy planners can continuously refine their approaches to better incorporate tribal perspectives and priorities into energy security planning processes.
- Prioritize meaningful engagement by investing time and effort into building trust-based relationships with tribal communities. By demonstrating sincerity, respect, and a willingness to listen, energy planners can cultivate partnerships that promote resilience and enhance emergency management capabilities, ensuring that tribal voices are valued and included in decision-making processes.

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APPENDIX H: ISSUING DECLARATIONS AND REQUESTING WAIVERS

ISSUING AN EMERGENCY OR DISASTER DECLARATION

Under the Oklahoma Emergency Management Act of 2003, the Governor has the authority to declare an emergency or after any natural or man-made emergency. The Governor must declare the emergency through Executive Order, or the Legislature can pass a concurrent resolution for the Governor to exercise emergency powers. Once an emergency is declared, the Governor has significantly increased powers to ensure the allocation of resources throughout the state. Examples of previous Executive Orders are shown below.

FILED
December 30, 2020
Oklahoma Secretary of
State Office

J. Kevin Stitt
Office of the Governor
State of Oklahoma

EXECUTIVE DEPARTMENT
EXECUTIVE ORDER 2020-36

I, J. Kevin Stitt, Governor of the State of Oklahoma, pursuant to the power vested in me by Section 2 of Article VI of the Oklahoma Constitution, hereby declare the following:

1. Severe winter weather, freezing rain, snow and wind beginning December 30, 2020 and ongoing is expected to cause damage to public and private properties and utilities, including electric systems, within the State of Oklahoma; and said damages have caused an undue hardship on the citizens of this State.

2. It may be necessary to provide for the rendering of mutual assistance among the State and political subdivisions of the State with respect to carrying out disaster emergency functions during the continuance of the State emergency pursuant to the provisions of the Oklahoma Emergency Management Act of 2003.

3. There is hereby declared a disaster emergency caused by severe winter weather in 39 Oklahoma counties that threatens the public's peace, health, and safety. The counties included in this declaration are:

   Alfalfa, Beckham, Blaine, Caddo, Canadian, Cleveland, Comanche, Cotton, Creek, Custer, Dewey, Ellis, Garfield, Grady, Grant, Greer, Harmon, Harper, Jackson, Jefferson, Kay, Kingfisher, Kiowa, Lincoln, Logan, Major, McClain, Noble, Oklahoma, Osage, Pawnee, Payne, Pottawatomie, Roger Mills, Stephens, Tillman, Washita, Woods, and Woodward

4. The State Emergency Operations Plan has been activated and resources of all State departments and agencies available to meet this emergency are hereby committed to the reasonable extent necessary to protect lives and to prevent, minimize, and repair injury and damage. These efforts shall be coordinated by the Director of the Department of Emergency Management with comparable functions of the federal government and political subdivisions of the State.

Based on the foregoing, pursuant to the power vested in me by Sections 1 and 2 of Article VI of the Oklahoma Constitution and 63 O.S. *§§* 683.1 *et seq.*, and pursuant to 49 C.F.R. Part 390.23, I hereby declare that there is a State of Emergency continuing in the State of Oklahoma.

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Due to winter weather conditions anticipated in the immediate future including power outages caused by ice accumulations on power lines and vegetation and strong winds, it is necessary to assist and expedite all efforts of relief. In order to accommodate this need and to provide assistance to the residents of the State of Oklahoma in this extraordinary situation, I hereby order the temporary suspension of the following as they apply to vehicles in the support efforts:

1. The requirements for size and weights permits of oversized vehicles under Title 47 of the Oklahoma Statutes whose sole purpose is transportation of materials and supplies used for emergency relief and power restoration;

2. The cost and fees of overweight permits required of carriers whose purpose is the transportation of materials and supplies used for emergency relief and power restoration, which require an overweight permit under Title 47 of Oklahoma statutes;

3. The requirements under Parts 390 through 399 pursuant to part 390.23 of Title 49 of the Federal Motor Carrier Safety Administration Regulations;

4. The requirements for licensing/operating authority as required by the Oklahoma Corporation Commission; and

5. The requirements for licensing/registration authority as required by the Oklahoma Tax Commission.

Nothing contained in this declaration shall be construed as an exemption from the Controlled Substance and Alcohol Use and Testing requirements (49 C.F.R. Part 382), the Commercial Driver License requirements (49 C.F.R. Part 383), the Financial Responsibility requirements (49 C.F.R. Part 387), or any other portion of the regulations not specifically identified herein. Motor carriers that have an Out-Of-Service Order in effect cannot take advantage of the relief from regulation that this declaration provides.

This Executive Order shall be effective until 11:59 p.m. CST, January 12, 2021.

Copies of this Executive Order shall be distributed to the Director of Emergency Management, Oklahoma Corporation Commission, Oklahoma Department of Transportation, Oklahoma Tax Commission, Oklahoma Adjutant General's Office, Office of Management and Enterprise Services, and the Oklahoma Department of Public Safety, who shall cause the provisions of this Order to be implemented by all appropriate agencies of State government.

IN WITNESS WHEREOF, I have set my hand and caused the Great Seal of the State of Oklahoma to be affixed at Oklahoma City, this 30th day of December, 2020.

BY THE GOVERNOR OF THE STATE OF OKLAHOMA

J. KEVIN STITT

ATTEST:

BRIAN BINGMAN, Secretary of State

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It is important to note that the Governor also has powers to declare a health-related emergency in the state, given special treatment to critical infrastructure, including energy infrastructure, or designating aspects of the energy industry as critical industries or businesses. A recent example of this occurred as a result of the Governor's Executive Order (2020-07) declaring a health emergency as a result of the novel coronavirus (COVID-19) pandemic. In an Executive Memo that followed after his initial Executive Order, Governor Stitt enumerated portions of Oklahoma's energy sector as essential businesses with permission to remain open during the pandemic. The text of this Executive Memo appears below.

J. Kevin Stitt
Office of the Governor
State of Oklahoma

FILED
MAR 2 5 2020
OKLAHOMA SECRETARY
OF STATE

EXECUTIVE DEPARTMENT
AMENDED EXECUTIVE MEMORANDUM 2020-01

On March 25, 2020, the 164th case of a novel coronavirus ("COVID-19"), was confirmed in the State of Oklahoma. As noted in a previous Executive Order, the United States Centers for Disease Control and Prevention has identified the potential public health threat posed by COVID-19 as "high" both globally and in the United States. In addition, on March 14, 2020, the President of the United States declared a national health emergency in the United States as a result of the national spread of COVID-19.

On March 15, 2020, I issued Executive Order 2020-07 declaring an emergency caused by the impending threat of COVID-19 to the people of this State and the public's peace, health, and safety. And, on March 24, 2020, I issued the Fourth Amended Executive Order 2020-07. Paragraph 20 of the Fourth Amended Executive Order 2020-07 ordered all businesses not identified as being within a critical infrastructure sector as defined by the U.S. Department of Homeland Security (USDHS) and located in a county experiencing community spread of COVID-19, as identified by OSDH on its website, to close.

In addition to those critical infrastructure sectors identified by USDHS, I hereby add the following:

- HEALTHCARE / PUBLIC HEALTH
  - Health care providers (e.g. physicians, dentists, psychologists, mid-level practitioners, nurses and assistants, infection control and quality assurance personnel, pharmacists, physical and occupational therapists and assistants, social workers, speech pathologists and diagnostic and therapeutic technicians and technologists).
  - Manufacturers, technicians, logistics and warehouse operators, and distributors of personal care/hygiene products.
  - Behavioral health workers (including mental and substance use disorder) responsible for coordination, outreach, engagement, and treatment to individuals in need of mental health and/or substance use disorder services.
  - Workers who provide support to vulnerable populations to ensure their health and well-being including family care providers.
  - Medicinal marijuana dispensaries and all licensed medicinal marijuana companies that are in the supply chain for any medicinal marijuana dispensary
  - Workers supporting veterinary hospitals and clinics.

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- LAW ENFORCEMENT, PUBLIC SAFETY, FIRST RESPONDERS
  - Including front line and management, personnel include emergency management, law enforcement, Emergency Management Systems, fire, and corrections, search and rescue, tactical teams including maritime, aviation, and canine units.
  - Workers at Public Safety Answering Points.
  - Fire mitigation activities.
  - Private security, private fire departments, and private emergency medical services personnel.
  - State and County workers responding to abuse and neglect of children, elders and dependent adults.
  - Animal control officers.

- FOOD AND AGRICULTURE
  - Farm supply and hardware stores
  - Groves, greenhouses, nurseries, and vineyards
  - Agriculture, Forestry, Fishing and Hunting
  - Food manufacturing
  - Beverage and tobacco product manufacturing
  - Manufacturing of fiber and forestry products
  - Veterinary services
  - Certified farmers' markets, farm and produce stands
  - Food cultivation, including farming, livestock and fishing
  - Support of agricultural production including manufacturers, processors, sellers, transporters, and suppliers of livestock, poultry, feed, seed, water, fertilizer, herbicides, or insecticide and those that care for animals, crops, groves, greenhouses, nurseries, vineyards, forests, farms, and ranches
  - Hardware stores, farm stores, and garden centers

- ENERGY

  Electricity Industry
  - Acquisition (SCADA) systems, and utility data centers; Cybersecurity engineers, cybersecurity risk management.
  - Power Generation, Transmission
  - Safety and environmental personnel, and those who support and ensure the supply chain and supply chain management
  - These categories of workers applies to all wind, solar, gas, hydroelectric and coal facilities.

  Petroleum Workers:
  - Midstream Companies
  - Liquids or produced water/waste storage facilities
  - Petroleum refinery fractionators, blenders
  - Produced water waste facilities, including UIC wells and transportation
  - Brine separation and processing facilities

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- Transportation maintenance and inspection workers
- Pipeline maintenance and construction workers who may be required to traverse state lines to maintain facilities that cross state lines
- Workers who maintain supply chain for these facilities
- Petroleum security operations employees and workers who support emergency response services

Natural and Propane Gas Workers:

- Other compression facilities
- Processing, refining, and transporting natural gas liquids, including propane gas, for use as end-use fuels or feedstocks for chemical manufacturing
- Propane gas storage, transmission, and distribution centers
- Compressed natural gas, liquefied natural gas, and propane gas retail and non-retail fuel stations, depots, and truck stops, that serve the public as well as private stations that support local and regional transportation companies such as transit authorities, refuse fleets, and freight haulers

- WATER AND WASTEWATER
  - Drinking water and wastewater
  - Drinking water plant superintendents, managers, operators and maintenance technicians
  - Drinking water distribution system operators and maintenance technicians
  - Wastewater plant superintendents, managers, operators and maintenance technicians
  - Wastewater collection system operators and maintenance technicians
  - Laboratory certified operators and employees of a government or privately-owned laboratory that are accredited to analyze routine compliance drinking water or municipal wastewater samples
  - Rural water association staff and technical support staff
  - Rural water districts, including all facilities

- TRANSPORTATION AND LOGISTICS
  - Taxis, transportation services including Transportation Network ComTaxis, transportation services including Transportation Network Companies, and delivery services, including Delivery Network Companies.
  - Wholesale trade
  - Transportation and warehousing
  - Postal services and distribution centers

- PUBLIC WORKS
  - Solid waste & hazardous waste
  - Utilities
  - Underground damage prevention services
  - Operational staff for solid waste pick-up
  - Operational staff at solid waste transfer and disposal facilities

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- Operational staff at hazardous waste treatment, storage, and disposal facilities, including underground injection control sites

- COMMUNICATIONS AND INFORMATION TECHNOLOGY
  - Broadcasting
  - Publishing industries
  - Telecommunications
  - Data processing, hosting, and related services
  - Software publishers
  - All other miscellaneous schools and instruction
  - Computer systems design and related services

- OTHER COMMUNITY-BASED GOVERNMENT OPERATIONS AND ESSENTIAL FUNCTIONS
  - Faith-based services that are provided through streaming or other technology.
  - Critical government workers, as defined by the employer and consistent with Continuity of Operations Plans and Continuity of Government plans.
  - Workers supporting public and private childcare establishments, pre-K establishments, K-12 schools, career and technology centers, colleges, and universities for purposes of distance learning, provision of school meals, or care and supervision of minors to support essential workforce across all sectors.
  - County workers responsible for determining eligibility and safety net benefits.
  - The Courts, consistent with guidance released from the Oklahoma Supreme Court and Oklahoma Court of Criminal Appeals.
  - Tag agencies
  - Workers and instructors supporting academies and training facilities and courses for the purpose of graduating students and cadets that comprise the essential workforce for all identified critical sectors.
  - Hotel Workers where hotels are used for COVID-19 mitigation and containment measures, including measures to protect homeless populations.
  - Hotels
  - Construction Workers, including residential and commercial, and workers who support the construction, operation, inspection, and maintenance of construction sites and construction projects (including housing construction and heavy and civil engineering construction)
  - Businesses and workers that support the supply chain for commercial and/or residential construction and development
  - Workers such as plumbers, electricians, exterminators, and other service providers who provide services that are necessary to maintaining the safety, sanitation, construction material sources, and essential operation of construction sites and construction projects (including those that support such projects to ensure the availability of needed facilities, transportation, energy and communications; and support to ensure the effective removal, storage, and disposal of solid waste and hazardous waste).

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- Oklahoma One-Call or OKIE 811
- Commercial Retail Stores, that supply essential sectors, including convenience stores, general merchandise stores, liquor, pet supply stores, auto supplies and repair, hardware and home improvement, and home appliance retailers.
- Motor vehicle and parts dealers
- Workers supporting the entertainment industries, studios, and other related establishments, provided they follow covid-19 public health guidance around social distancing.
- Workers critical to operating Rental Car companies that facilitate continuity of operations for essential workforces, and other essential travel.
- Workers that provide or determine eligibility for food, shelter, in-home supportive services, child welfare, adult protective services and social services, and other necessities of life for economically disadvantaged or otherwise needy individuals (including family members).
- Workers at animal care facilities that provide food, shelter, veterinary and/or routine care and other necessities of life for animals.
- Public and private golf courses, public parks, and workers needed to maintain normal operations.
- Workers involved with home repair and maintenance including roofing, lawn care, foundation repair, and similar businesses whose work is primarily performed out of doors.
- Executive, legislative, and other general government support
- Administration of human resources programs
- Administration of environmental quality programs
- Administration of housing programs, urban planning, and community development
- Administration of economic programs

- CRITICAL MANUFACTURING
  - Paper manufacturing
  - Printing and related support activities
  - Plastics and rubber products manufacturing
  - Mineral product manufacturing
  - Primary metal manufacturing including equipment

- FINANCIAL SERVICES
  - Finance and Insurance
  - Real estate and Leasing services
  - Management of companies
  - Business associations
  - Financial advisory

- CHEMICAL
  - Petroleum and coal products manufacturing
  - Chemical manufacturing

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- COMMERCIAL AND PROFESSIONAL SERVICES
  - Professional (such as legal and accounting), scientific, and technical services
  - Administrative and support services
  - Waste management and remediation services
  - Death care services
  - Dry cleaning and laundry services
  - Repair and maintenance

- DEFENSE INDUSTRIAL BASE
  - Explosives manufacturing
  - National security and international affairs

IN WITNESS WHEREOF, I have set my hand and caused the Great Seal of the State of Oklahoma to be affixed at Oklahoma City, this 25th day of March, 2020.

BY THE GOVERNOR OF THE STATE OF OKLAHOMA

J. KEVIN STITT

ATTEST:

MICHAEL ROGERS, SECRETARY OF STATE

REQUESTING WAIVERS FROM FEDERAL MOTOR CARRIER SAFETY REGULATIONS IN AN ENERGY EMERGENCY

The following are executive orders issued by the Governor in previous emergency situations which lifted Federal Motor Carrier Safety Regulations (FMCSR) during an energy emergency. These orders can be used as models for the future and altered to fit the precise circumstances being addressed. It is important to note that without a formal declaration of emergency, the Governor could still issue an Executive Order that grants a waiver from FMCSR for a particular sector, such as propane. It is also important to note that the waiver applies to any carrier providing direct relief or support to recovery efforts for the emergency situation and is not industry-specific.

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Typically, private companies or carriers will contact the Corporation Commission, but could also contact the Oklahoma Department of Emergency Management or the Secretary of Energy and Environment's Office to request the waiver. The initial contact may vary depending on the existing relationships already in place. OEM, OCC and/or the Secretary's Office then work hand in hand with the Governor's office to prepare the language for the Executive Order.

After issuing the Executive Order, the National Association of State Energy Officials recommends the following steps to ensure that affected groups are aware of the waiver being in effect:

1. Post a copy of the Governor's emergency declaration on a publicly available website and provide a link to the emergency declaration as part of notifications made to the motor carrier industry and state, local, and federal agencies.
2. Notify the motor carrier safety enforcement agency of state government that an emergency has been declared, in what part of the state, and that the safety regulations are temporarily waived as a result of this declaration.
3. Provide notification of emergency declaration to the FMCSA state office and regional administrator.
4. Notify motor carrier industry associations or motor carriers servicing the state directly through any automated system to quickly communicate with the industry. This communication should encourage, but not require, drivers transporting fuels to the areas in which an emergency has been declared to have with them a copy of the emergency declaration and a copy of the website link from the declaration can be printed.
5. Provide notification to state-level Energy Emergency Assurance Coordinators (see the "Energy Emergency Communications Procedures" chapter of this Plan) in those states within the region that may have motor carriers passing through them to provide relief in the affected state. It is also advisable to coordinate with neighboring states in advance of this declaration, if possible.

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Filed
February 12, 2021
OKLAHOMA SECRETARY
OF STATE

J. Kevin Stitt
Office of the Governor
State of Oklahoma

EXECUTIVE DEPARTMENT
EXECUTIVE ORDER 2021-06

I, J. Kevin Stitt, Governor of the State of Oklahoma, pursuant to the power vested in me by Section 2 of Article VI of the Oklahoma Constitution, hereby declare the following:

1. Extreme freezing temperatures and severe winter weather including snow, freezing rain, and wind beginning February 7, 2021, and continuing, are expected to cause damage to public and private properties and utilities, including electric, gas and water systems, within the State of Oklahoma causing an undue hardship on the citizens of this State.

2. It may be necessary to provide for the rendering of mutual assistance among the State and political subdivisions of the State with respect to carrying out disaster emergency functions during the continuance of the State emergency pursuant to the provisions of the Oklahoma Emergency Management Act of 2003.

3. There is hereby declared a disaster emergency caused by severe winter weather in ***all 77 Oklahoma counties*** that threatens the public's peace, health, and safety.

4. The State Emergency Operations Plan has been activated and resources of all State departments and agencies available to meet this emergency are hereby committed to the reasonable extent necessary to protect lives and to prevent, minimize, and repair injury and damage. These efforts shall be coordinated by the Director of the Department of Emergency Management with comparable functions of the federal government and political subdivisions of the State.

5. State agencies, in responding to this disaster emergency, may make necessary emergency acquisitions to fulfill the purposes of this proclamation without regard to limitations or bidding requirements on such acquisitions.

Based on the foregoing, pursuant to the power vested in me by Sections 1 and 2 of Article VI of the Oklahoma Constitution and 63 O.S. §§ 683.1 *et seq.*, and pursuant to 49 C.F.R. Part 390.23, I hereby declare that there is a State of Emergency continuing in the State of Oklahoma.

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Due to winter weather conditions ongoing and anticipated in the immediate future, it is necessary to assist and expedite all efforts of relief. In order to accommodate this need and to provide assistance to the residents of the State of Oklahoma in this extraordinary situation, I hereby order the temporary suspension of the following as they apply to vehicles in the support efforts:

1. The requirements for size and weights permits of oversized vehicles under Title 47 of the Oklahoma Statutes whose purpose is transportation of materials and supplies used for emergency relief and utility restoration;

2. The cost and fees of overweight permits required of carriers whose purpose is the transportation of materials and supplies used for emergency relief and power restoration, which require an overweight permit under Title 47 of Oklahoma statutes;

3. The requirements under Parts 390 through 399 pursuant to part 390.23 of Title 49 of the Federal Motor Carrier Safety Administration Regulations;

4. The requirements for licensing/operating authority as required by the Oklahoma Corporation Commission; and

5. The requirements for licensing/registration authority as required by the Oklahoma Tax Commission.

Nothing contained in this declaration shall be construed as an exemption from the Controlled Substance and Alcohol Use and Testing requirements (49 C.F.R. Part 382), the Commercial Driver License requirements (49 C.F.R. Part 383), the Financial Responsibility requirements (49 C.F.R. Part 387), or any other portion of the regulations not specifically identified herein. Motor carriers that have an Out-Of- Service Order in effect cannot take advantage of the relief from regulation that this declaration provides.

This Executive Order shall terminate at the end of thirty days.

Copies of this Executive Order shall be distributed to the Director of Emergency Management, Oklahoma Corporation Commission, Oklahoma Department of Transportation, Oklahoma Tax Commission, Oklahoma Adjutant General's Office, Office of Management and Enterprise Services, and the Oklahoma Department of Public Safety, who shall cause the provisions of this Order to be implemented by all appropriate agencies of State government.

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IN WITNESS WHEREOF, I have set my hand and caused the Great Seal of the State of Oklahoma to be affixed at Oklahoma City, this 12th day of February, 2021.

BY THE GOVERNOR OF THE STATE OF OKLAHOMA

J. KEVIN STITT

ATTEST:

BRIAN BINGMAN, Secretary of State

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J. Kevin Stitt
Office of the Governor
State of Oklahoma

FILED
February 10, 2021
OKLAHOMA SECRETARY
OF STATE

EXECUTIVE DEPARTMENT
EXECUTIVE ORDER 2021-04

WHEREAS, the State of Oklahoma and many of the surrounding states are experiencing an extended period of extremely cold weather, which has resulted in an increased demand for liquefied petroleum gas, also referred to as "propane;" and

WHEREAS, distributors of liquified petroleum products in the State of Oklahoma are already beginning to experience shortages in supply and transportation challenges; and

WHEREAS, many Oklahoman residents depend on the use of liquefied petroleum products for survival during the winter months; and

WHEREAS, the limited suspension of certain hours of service regulations for drivers of commercial motor vehicles transporting liquefied petroleum products in our state will ensure adequate supplies of liquefied petroleum products throughout the state, thereby reducing the damaging effects of a potential shortage;

NOW, THEREFORE, I, J. Kevin Stitt, Governor, pursuant to the power vested in me by Sections 1 and 2 of Article VI of the Oklahoma Constitution and 63 O.S. § 683.1 *et seq.,* and pursuant to Part 390.23 of Title 49 of the Code of Federal Regulations, hereby declare that because there is a state of emergency existing in the State of Oklahoma due to limited liquefied petroleum products supplies, it is necessary to assist and expedite all efforts of transportation of liquefied petroleum products throughout Oklahoma. In order to accommodate this need and to provide assistance to the citizens of Oklahoma in this extraordinary situation, I hereby order vehicles used in the support efforts to be exempt from Parts 390 through 399 of Title 49 of the Federal Motor Carrier Safety Regulations.

Declaration of this emergency provides relief for 30 days from Sections 390 through 399 of the Federal Motor Carrier Safety regulations for those interstate and intrastate carriers who are providing direct assistance to this emergency. Direct assistance terminates when a driver or commercial motor vehicle is used in interstate or intrastate commerce to transport cargo not destined for the emergency relief effort, or when a motor carrier dispatches such driver or vehicle to a location outside the relief area.

Nothing contained in this declaration shall be construed as an exemption from the Controlled Substance and Alcohol Use and Testing requirements (49 C.F.R. Part 382), the Commercial Driver License requirements (49 C.F.R. Part 383), the Financial Responsibility requirements (49 C.F.R. Part 387), or any other portion of the regulations not specifically identified herein. Motor carriers that have an Out-Of-Service Order in effect cannot take advantage

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of the relief from regulation that this declaration provides.

While operating under this Order, drivers of commercial motor vehicles shall be required to spend a minimum of 8 hours in sleeper berth within any given 24-hour period. The duration of each timeframe spent in sleeper berth within each 24-hour period shall be at the discretion of each driver based in his/her needs, as long as the sum of all said sleeper berth totals a minimum of the required 8 hours.

This Order applies only to the transportation of liquefied petroleum gas to provide direct assistance to this emergency. No other products, including other petroleum products, are covered by the exemption and suspension under this Order.

This emergency notice will remain in effect for 30 days.

Copies of this Executive Order shall be distributed to the Director of the Oklahoma Department of Emergency Management, Oklahoma Corporation Commission, Oklahoma Department of Transportation, and the Oklahoma Department of Public Safety, who shall cause the provisions of this Order to be implemented by all appropriate agencies of State government.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of Oklahoma to be affixed at Oklahoma City, Oklahoma, this 10th day of February, 2021.

BY THE GOVERNOR OF THE STATE OF OKLAHOMA

J. KEVIN STITT

ATTEST:

BRIAN BINGMAN, SECRETARY OF STATE

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Mary Fallin
Governor

FILED
DEC 22 2017
OKLAHOMA SECRETARY OF STATE

EXECUTIVE DEPARTMENT
EXECUTIVE ORDER 2017-44

WHEREAS, the State of Oklahoma is experiencing cold weather after a period of unseasonably mild temperatures, which has resulted in increased demand for liquefied petroleum products, hereinafter referred to as "propane;" and

WHEREAS, distributors of liquefied petroleum products in the State of Oklahoma are experiencing challenges in the implementation of electronic logging devices; and

WHEREAS, the potential for cold weather temperatures over the holidays, may result in increased demand for propane; and

WHEREAS, liquefied petroleum products resource at certain Oklahoma refineries are currently stressed, significantly delaying the delivery of liquefied petroleum products to transportation companies in some instances, thereby forcing transportation companies and retailers to obtain liquefied petroleum products from other locations in surrounding states; and

WHEREAS, many Oklahoman residents depend on the use of liquefied petroleum products for survival during the winter months; and

WHEREAS, the limited suspension of certain hours of service regulations for drivers of commercial motor vehicles transporting liquefied petroleum products in our state will ensure adequate supplies of liquefied petroleum products throughout the state, thereby reducing the damaging effects of a potential shortage;

NOW, THEREFORE, I, Mary Fallin, Governor, pursuant to the power vested in me by Sections 1 and 2 of Article VI of the Oklahoma Constitution and 63 O.S. § 683.1 *et seq.*, and pursuant to Part 390.23 of Title 49 of the Code of Federal Regulations, hereby declare that because there is a state of emergency existing in the State of Oklahoma due to limited liquefied petroleum products supplies, it is necessary to assist and expedite all efforts of transportation of liquefied petroleum products throughout Oklahoma. In order to accommodate this need and to provide assistance to the citizens of Oklahoma in this extraordinary situation, I hereby order vehicles used in the support efforts to be exempt from Parts 390 through 399 of Title 49 of the Federal Motor Carrier Safety Regulations.

049016

STATE CAPITOL BUILDING • 2300 N. LINCOLN BOULEVARD, SUITE 212 • OKLAHOMA CITY, OKLAHOMA 73105 • (405) 521-2342

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Nothing contained in this declaration shall be construed as an exemption from the Controlled Substances and Alcohol Use and Testing requirements (49 C.F.R. Part 382), the Commercial Driver's License Standards requirements (49 C.F.R. Part 383), the Minimum Levels of Financial Responsibility for Motor Carrier requirements (49 C.F.R. Part 387), or any other portion of the regulations not specifically identified herein. Motor carriers that have an Out-Of-Service Order in effect cannot take advantage of the relief from regulation that this declaration provides.

This Order applies only to the transportation of liquefied petroleum products to provide direct assistance to this emergency. No other products, including other petroleum products, are covered by the exemption and suspension under this Order.

This emergency notice will remain in effect for fourteen (14) days from December 22, 2017.

Copies of this Executive Order shall be distributed to the Director of Emergency Management who shall cause the provisions of this Order to be implemented by all appropriate agencies of state government.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of Oklahoma to be affixed at Oklahoma City, Oklahoma, this 22nd day of December 2017.

BY THE GOVERNOR OF THE STATE OF OKLAHOMA

MARY FALLIN

ATTEST:

SECRETARY OF STATE

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REQUESTING A FUELS WAIVER

In the event of a fuel supply emergency, the U.S. EPA, with the concurrence of the Department of Energy, may temporarily waive a fuel or fuel additive requirement if doing so will alleviate the fuel supply emergency. The Clean Air Act Section 211(c)(4)(C), which authorizes fuels waivers, specifies the criteria for granting these waivers, and the conditions that must be included in a fuel waiver.

According to the U.S. EPA, a formal written request for a fuel waiver should be made by or on behalf of the Governor of an affected state or territory and be directed to the U.S. EPA Administrator. The request should describe how the fuels waiver criteria specified in Clean Air Act have been met.[361] In particular, the waiver request should address the following:

- The nature of the Act of God or other event that caused the shortage
- An explanation of why the shortage was not foreseeable and could not have been prevented by prudent planning on the part of the suppliers of the fuel
- The type of fuel for which a shortage exists
- The geographic area that is affected
- The effect of the shortage on fuel supplies, such as the number of gasoline stations that are, or are expected to be, out of fuel
- The expected duration of the shortage
- The specific nature of the waiver being requested, including the duration, the geographic area, and the alternative fuel that would be allowed

There are several types of fuels waivers that states may request from U.S. EPA, but for Oklahoma, the most likely might be a waiver for the Gasoline Reid Vapor Pressure (RVP) standards. U.S. EPA regulates the vapor pressure of gasoline sold at retail stations during the summer ozone season to reduce evaporative emissions from gasoline that contribute to ground-level ozone and diminish the effects of ozone-related health problems.[362] Depending upon the state and month, gasoline may not exceed 7.8 psi or 9.0 psi. Oklahoma's gasoline is currently regulated as not to exceed 9.0 psi in all months, in all counties.[363]

If Oklahoma wishes to request a waiver for the Gasoline Reid Vapor Pressure (RVP) standards, the Governor or his authorized representative should contact the U.S. EPA Air Enforcement Division (202-564-2260) or the Transportation and Regional Programs Division (734-214-4956), both of which can be reached Monday through Friday, 8 am to 5 pm ET to obtain information about any fuel waiver request. Outside of these times, the governor or his authorized representative may contact U.S. EPA's Emergency Operations Center at its emergency number, 202-564-3850.

The U.S. Department of Energy also recommends that a state consider sharing any waiver requests or implementations with EnergyResponseCenter@hq.doe.gov to improve situational awareness,

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as U.S DOE plays a critical role in assessing fuel supply and sharing that information with the EPA.

Myriad examples of past fuels waivers issued by U.S. EPA are available at https://www.epa.gov/enforcement/fuel-waivers. In Oklahoma, the Secretary of Energy & Environment typically acts as the Governor's representative in requesting RVP waivers. Historically, these requests are sent to U.S. EPA from the Oklahoma Secretary of Energy and Environment's Office, with communication of the action to support agencies such as the OCC Oil & Gas Division, Oklahoma Department of Environmental Quality, and Oklahoma Department of Agriculture. An example of this communication is below.

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Michael J. Teague
Secretary of Energy & Environment

Mary Fallin
Governor

STATE OF OKLAHOMA
OFFICE OF THE
SECRETARY OF ENERGY & ENVIRONMENT

August 28, 2017

The Honorable Scott Pruitt
Administrator
U.S. Environmental Protection Agency
Mail Code 1101A
1200 Pennsylvania Ave., N.W.
Washington, D.C. 20460

And

Mr. Lawrence Starfield
Acting Assistant Administrator
Office of Enforcement and Compliance Assurance
U.S. Environmental Protection Agency
Mail Code 2201A, Room AR 3204
1200 Pennsylvania Ave., N.W.
Washington, D.C. 20460

RE: Request for Fuel Waiver Concerning Gasoline for Oklahoma

Dear Administrator Pruitt and Acting Assistant Administrator Starfield,

Due to the landfall of Hurricane Harvey and subsequent catastrophic flooding across Texas and Louisiana, it is believed that shortages of summertime gasoline blends will occur throughout Oklahoma and the region. On behalf of Governor Mary Fallin, I would request that the U.S. Environmental Protection Agency (EPA) exercise its authority under the Clean Air Act to temporarily waive fuel requirements for Low Reid Vapor Pressure (RVP) fuel throughout the State of Oklahoma.

This waiver request is consistent with temporary fuel waivers that you have issued for the State of Texas and has been requested for the State of Louisiana. The State of Oklahoma believes that gasoline supplies will be constrained across the region due to the closure of Gulf Coast refineries.

Thank you for consideration of this request. If you have any questions about this request, please contact Tyler Powell at (405) 522-7193.

Sincerely,

Michael J. Teague
Secretary of Energy and Environment

204 N. ROBINSON, SUITE 1010 • OKLAHOMA CITY, OK 73102 • 405-285-9213 • FAX 405-285-9212

cc: Governor Mary Fallin
Mr. Sam Coleman, Acting Regional Administrator, EPA Region 6
Mr. Guy Donaldson, EPA Region 6
Mr. John Walser, EPA Region 6
Mr. Scott Thompson, Oklahoma Department of Environmental Quality

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