Kentucky Energy Security Plan

State Energy Office
Energy and Environment Cabinet
September 2024

TEAM KENTUCKY
ENERGY AND ENVIRONMENT CABINET

1.0 Introduction

The Commonwealth of Kentucky has access to a variety of energy resources coupled with a robust network of pipelines and electric transmission lines allowing for a unique and diversified energy infrastructure. Energy providers, generators, transmitters, distributors, and associated equipment help ensure a strong and flexible infrastructure for the state. However, Kentucky has the potential to face a wide variety of man-made and natural hazard threats, most of which are small-scale and temporary. These limited disruptions are generally addressed and resolved by energy providers. Occasionally, these disruptions occur over wide areas for extended periods. It is then that they are labeled "energy emergencies" requiring a coordinated response effort from multiple public and private agencies.

Disruptions occur for a variety of reasons. These include extraordinary peak demands, unanticipated refinery or power plant shutdowns, damaged pipelines, transmission congestion, international political factors, cyber incidents, and terrorism. Hurricanes, severe thunderstorms, tornados, winter ice storms, flooding, and wildfires are the most prevalent natural disasters and account for the vast majority of energy emergencies. During recent years, Kentucky has experienced some loss of service resulting from these occurrences.

The State Energy Office of the Energy and Environment Cabinet (SEO-EEC) addresses Energy Security planning through a long-term lens of energy sustainability, resilience, and efficiency. The Kentucky Energy Security Plan (ESP) is grounded in a framework of Kentucky's Incident Command Structure (ICS), FEMA's Community Lifelines, and the roles of emergency support functions to support those lifelines.

The main purpose of the Kentucky Energy Security Plan is to provide a resource primarily for state energy emergency personnel that includes:

- A description of the energy systems in or affecting Kentucky.
- A profile of energy use and production.
- Monitoring and response procedures for energy disruptions.
- Contact information for key players in the energy systems of Kentucky.

1.1 Purpose

The purpose of the Kentucky ESP is to provide coordination, monitoring, assessment, and response to energy disruptions. The ESP outlines the current state of energy systems in the Commonwealth and describes what steps are to be taken, and by whom, in emergencies to help reduce the impact on the citizens and economy. The ESP serves as Kentucky's Standard

Operating Procedure (SOP) and guidance for energy emergency issues.

The effectiveness of the ESP is based on its ability to be a living document. It has been developed as a tool to be applied in managing Energy Security and not as a blueprint to accomplish a specific result. As such, it will be updated as personnel and situations change. Each use, either in exercise or in real world application, will allow it to be sharpened and refined.

As a living document, the ESP does have distinct phases with at least one phase active at all times. Exactly where one phase ends and another begins is not a precise point, but it allows for transition. The transition between phases will occur as the conditions in the Commonwealth change. The four phases of delineation are:

1. Monitoring
2. Situation and Preparation Phase
3. Emergency Response Phase
4. Emergency Assessment Phase

Each phase has its own unique characteristics and is discussed in detail in the Emergency Operation Design Concept (Section 3).

Energy Security planning requires good data acquisition and information management. A limited number of situations can be prepared for, but in the end, quick access to accurate data is an essential attribute of this plan. The Kentucky ESP describes a process that looks at all available data, inventories, assets, and liabilities. Because of the unlimited number of potential emergencies that can occur, this Plan will rely heavily on the acquisition and organization of data in lieu of situational planning and modeling. It will also identify stakeholders in the energy arena. It will examine their roles and interests and assess how those roles and interests enhance emergency preparedness in Kentucky. Finally, it will outline an orderly process to employ these assets and agencies in responding to emergencies.

1.2 Defining Energy Emergencies

All energy emergencies are defined as energy imbalances: when the supply of energy resources is temporarily not able (or allowed) to meet the demand. Energy imbalances can occur at any time with or without warning. They may be the result of natural events or artificially induced by human events. Upon becoming an emergency, the energy system can move from a normal

balance, or state of energy security, to an energy shortage to an energy crisis. The energy system can also move from the normal balance directly to a crisis, or state of energy insecurity. Influencing factors may include:

- Natural Disasters (earthquakes, floods, wildfires)
- Severe Weather Occurrences (tornados, snow and ice storms, hurricanes, wind)
- Artificial Pricing (embargos, collusion)
- Human Proceedings (labor disputes, strikes, cyber incidents)
- Government Activities (political instability, environmental regulation)
- Terrorism (direct physical or cyber)

Any of the factors listed above can solely, or in combination, be responsible for a brief energy disruption or a more prolonged crisis. The difference between general disruption and crisis is one of magnitude and duration. The system's stakeholders' ability to respond to a disruption can determine the extent of the resulting crisis. Issues that must be considered by the ESP in limiting the scope of or managing an emergency are:

- Intensity or Magnitude
- Cause(s)
- Geographical Distribution
- Duration
- Commodities Affected
- Time of Year
- Public Reaction
- System's Ability to Respond and Restore

Because of the dependence of energy through all areas of society, it is difficult to envision and plan for every possible energy emergency as each situation may be unique and require a specialized plan for correction. Below is a description of ways critical lifelines are dependent on energy supply.

The ESP recognizes this potential situational distinctiveness and relies on information, preparation, and cooperation to address each problem specifically. This requires that the ESP be dynamic. The strength of this plan is placed in the process to discover solutions. Confidence is vested in knowledge of the system through data collection and the working relationships of individuals through a defined structure of operation.

1.3 Basic Emergency Assumptions

Basic emergency parameters are random in nature and occurrence. Characteristics of emergencies that are difficult to predict include the following:

- The triggering event – natural, political, technological
- Geographic distribution of the event
- Time interval involved
- Magnitude of the primary and secondary effects of the emergency
- The speed at which the event occurs

These characteristics will obviously influence the ability and manner in which responders treat energy emergencies. Recognizing the potential unpredictability of these variables necessitates the development of multiple tools and techniques in management. Several other attributes associated with emergencies, while not present in all emergency situations, occur often enough to be considered basic planning considerations. Assumptions may include:

- Abnormal weather is the key event triggering outages.
- Electricity is the commodity most likely to experience outages.
- Public health and safety services require primary consideration in restoration.
- There will be many secondary disruptions caused by interruption of the primary energy flow.
- Management and repair will require the coordinated efforts of multiple public and private agencies.
- Some areas may be inaccessible or need to have access restricted.
- Hoarding or cost escalation of commodities is a real probability.
- Information dissemination to the public is critical to diffuse panic.

1.4 State Government Role in Energy Emergency Management

When the demand for energy is greater than the supply or there is a disruption in the energy delivery system, energy insecurity is created. Typically, market forces and existing energy providers act swiftly and adequately address these disruptions or imbalances; however, these situations can occasionally result in an energy emergency.

If the situation becomes severely imbalanced or no visible means of correction is available, then state government intervention may become necessary in order to protect the health, safety, and

welfare of its citizens. The government's intervention should be as minimal as possible to assist in the restoration. The major reliance should still be on market forces and direct response by energy owners and operators for correction.

The state's role in managing any energy emergency should be one of facilitator. In cooperation with other public institutions, energy providers, transportation brokers, and energy distribution groups, the state will attempt to find the least market-intrusive solution possible to rectify the problem. The state's primary goals in managing energy disruptions include:

- Establish legal authority to oversee management of energy shortfalls.
- Develop a single point of contact to act as coordinator during emergencies.
- Ensure provision of energy to essential service.
- Gather and disseminate accurate information in a timely manner during all energy situations.
- Be prepared to assist with public resources to decrease the severity and longevity of the emergency.
- Implement programs that effectively respond to the consequences of a variety of energy shortages.
- Solicit public participation in reducing demand during the emergency.
- Keep the public informed about the emergency and the actions that will be necessary for them to contribute to abating the crisis.

Because of the state's dependency on constant and reliable supplies of all sources of energy, the management of any disruption is critical. Circumstances can and do change quickly and without warning. A management system that relies on the overall coordination of resources from multiple public and private sources is imperative to accommodate the near limitless situations that may arise.

1.5 Community Lifelines

In 2019, FEMA developed the Community Lifelines construct to increase effectiveness in disaster operations and better position these emergency support agencies to respond to catastrophic incidents. Of the 15 Emergency Support Functions (ESF), FEMA identifies eight Community Lifelines that are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function.

Community Lifelines reframe incident information and understanding, communicate incident impacts using plain language, promote unity of effort across the whole community, and prioritize efforts to stabilize lifelines during incident response. During the initial response, priority efforts focus on stabilizing Community Lifelines.

Figure 1: FEMA Community Lifelines

1.5.1 Cross- Sector Interdependencies

Below is an illustration of the interdependencies among the critical infrastructure sectors including the most crucial lifeline sectors: communication, transportation, water, and energy.

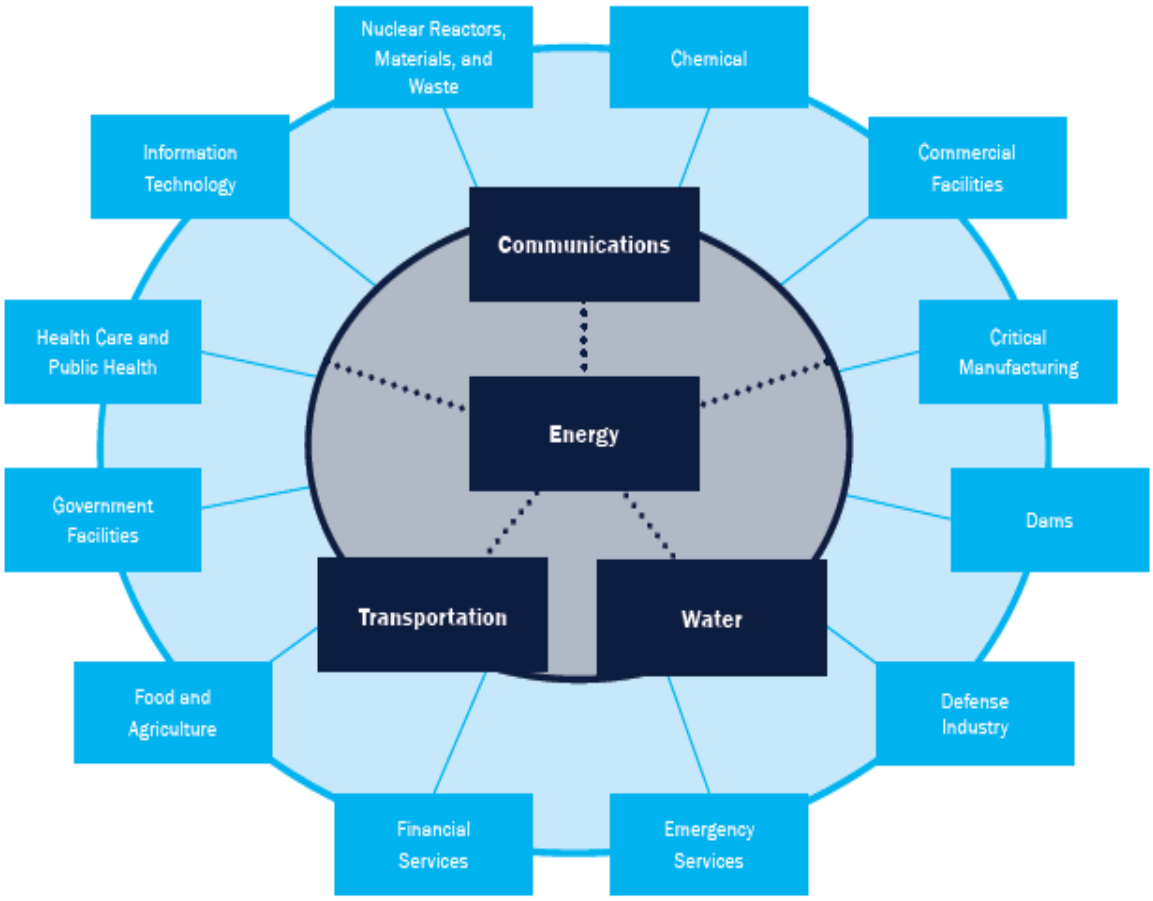


Figure 2: Critical Infrastructure Sector Interdependencies

Lifelines provide an outcome-based, survivor-centric frame of reference that assists responders with: Root Cause Analysis, Interdependencies, Prioritization, and Ease of Communication. The energy system consists of electricity, natural gas, oil, coal, nuclear, and renewable energy assets that are interconnected and complex. It is necessary that planners understand the dependent relationships among energy infrastructure systems, key local services, and valued community assets. Identifying and understanding interdependencies (two-way) or dependencies (one-way)

between infrastructure assets and sectors is important for assessing risks and vulnerabilities and energy security and resilience planning.

The Department of Homeland Security (DHS) has defined 16 critical infrastructure sectors including energy. All of the other critical infrastructure sectors depend on power and/or fuel to operate. A disruption or loss of the services provided by the energy sector can directly affect the security and resilience within and across numerous sectors. The energy sector also depends on other sectors to help provide its services. There are also interdependencies within the energy sector itself. A comprehensive understanding of such interdependencies enables the sector to mitigate potential vulnerabilities and helps ensure that the nation's economy continues to deliver goods and services during extraordinary events.

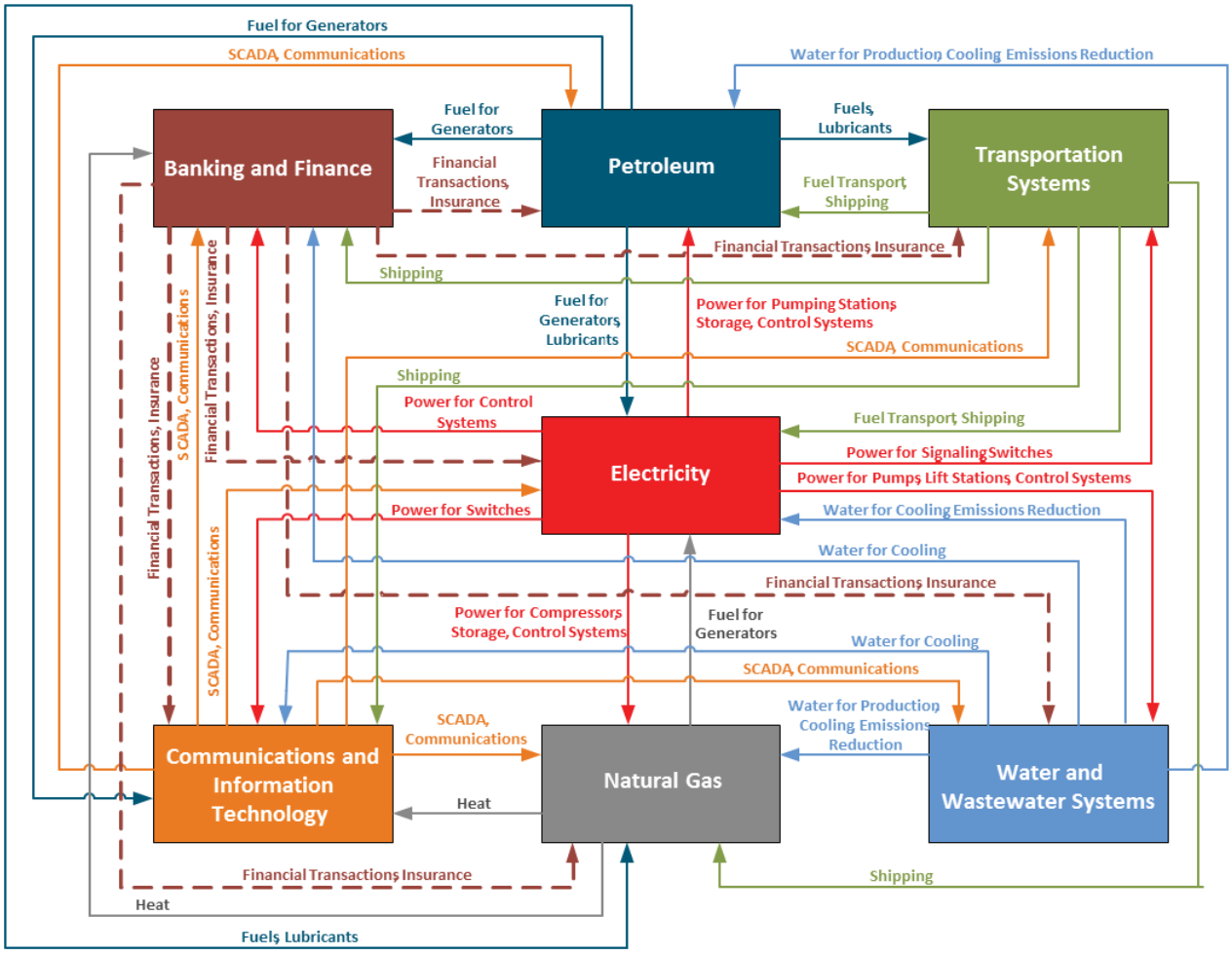


Figure 3: Critical Infrastructure Interdependencies

In order for infrastructure systems—such as transportation, communications, water, and wastewater systems to maintain their functionality, energy infrastructure must be operating properly. This understanding can help plan for additional energy-related resilience and help mitigate the potential consequences of large-scale failures of energy systems. Listed below is how energy (power and fuel) can specifically relate to energy supply management issues.

ELECTRICITY

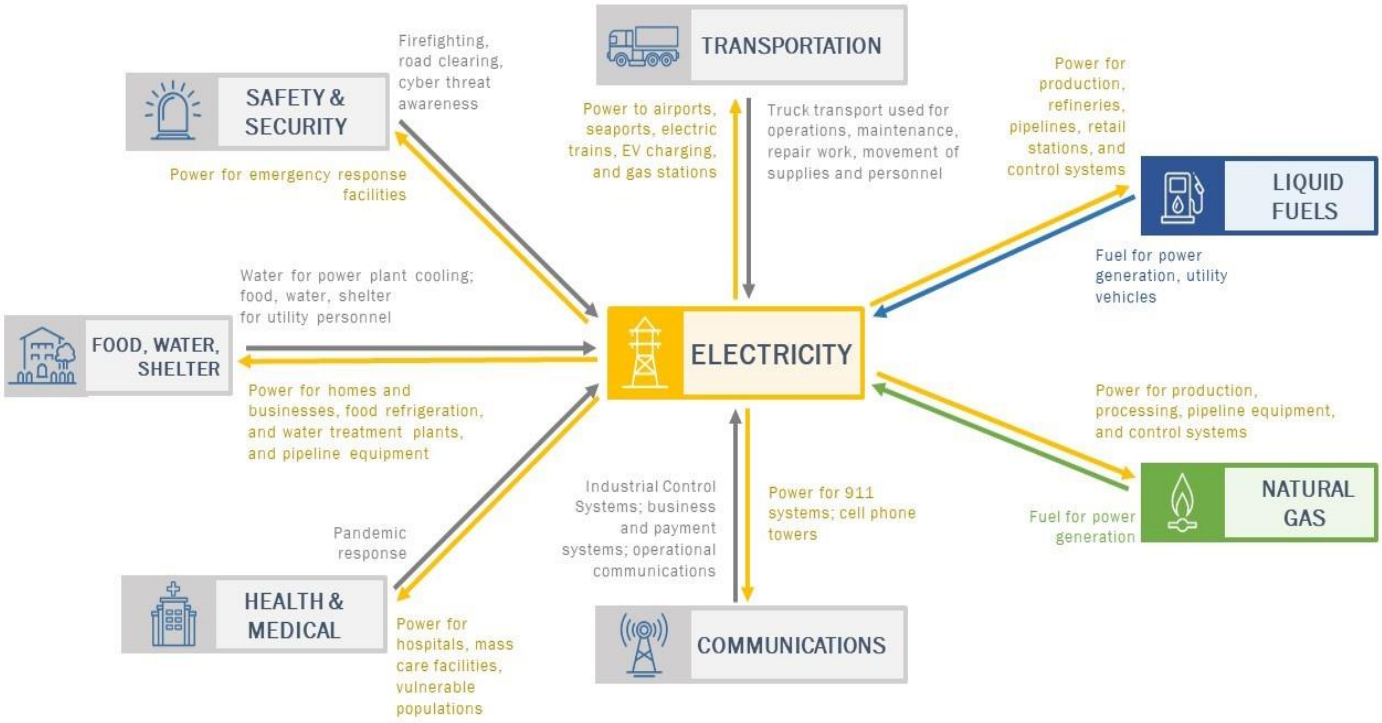


Figure 4: Energy Lifeline Interdependencies

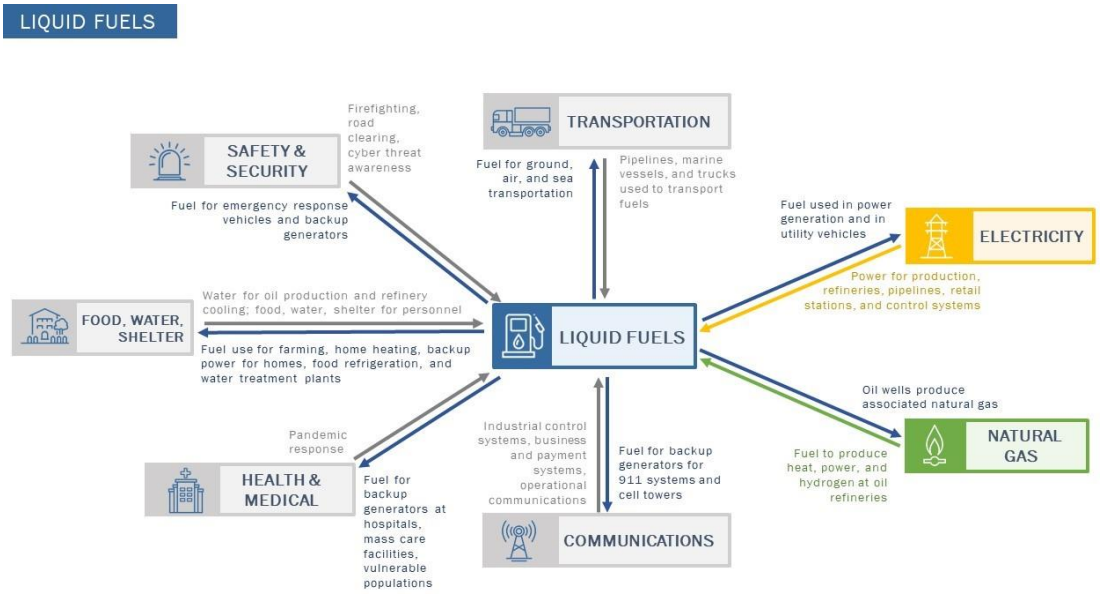


Figure 5: Liquid Fuels Lifeline Interdependencies

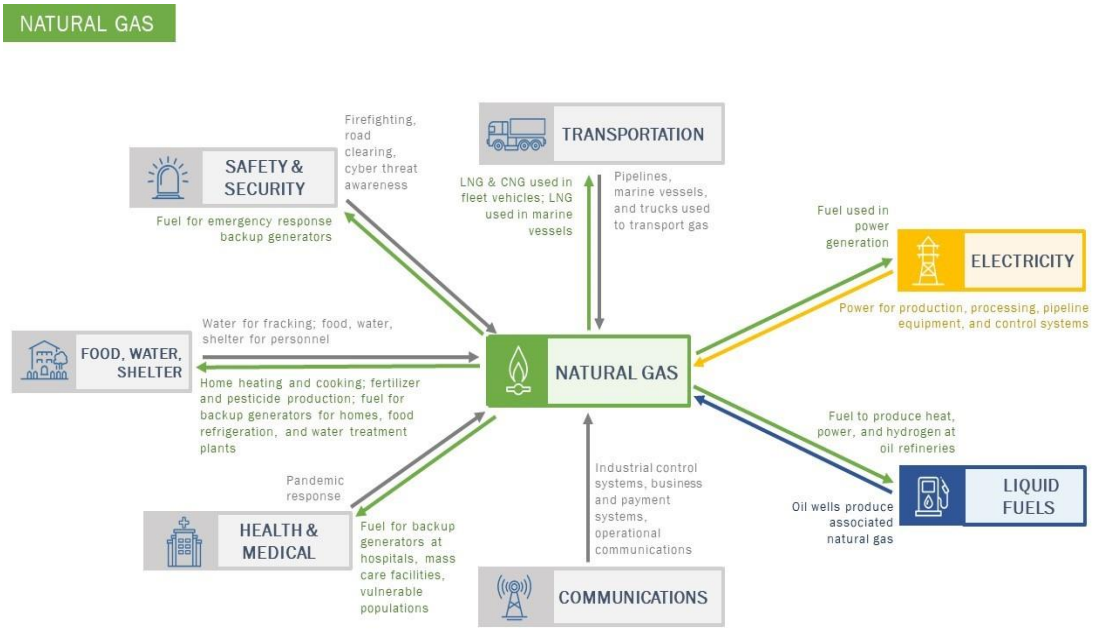


Figure 6: Natural Gas Lifeline Interdependencies

2.0 Organization and Management

2.1 Organization

In the event of an energy emergency in Kentucky, the following agencies are the responsible parties involved in identifying, addressing, and resolving the disruption:

- The Governor's Office
- Kentucky Division of Emergency Management
- State Energy Office in the Energy and Environment Cabinet
- Public Service Commission
- Energy Assurance Advisory Group
- Kentucky Government Agencies

Not every event will require the involvement of all agencies; each agency works independently to manage specific events without the assistance of other groups. However, each group works in a cooperative and consolidated manner to address emergencies when they occur.

In the event of a declared emergency, the chain of command and assignment of responsibilities follows in the order as outlined above. In addition to the state agencies and resources listed above, the Commonwealth of Kentucky will seek information and assistance from groups outside of state government. These groups will include primary energy suppliers, trade associations, transportation providers, pipeline companies, and other relevant organizations. Input from this diverse group is helpful in determining the type and scale of the emergency and in planning the appropriate response.

Energy Emergency Response contacts can be found in Appendix C.

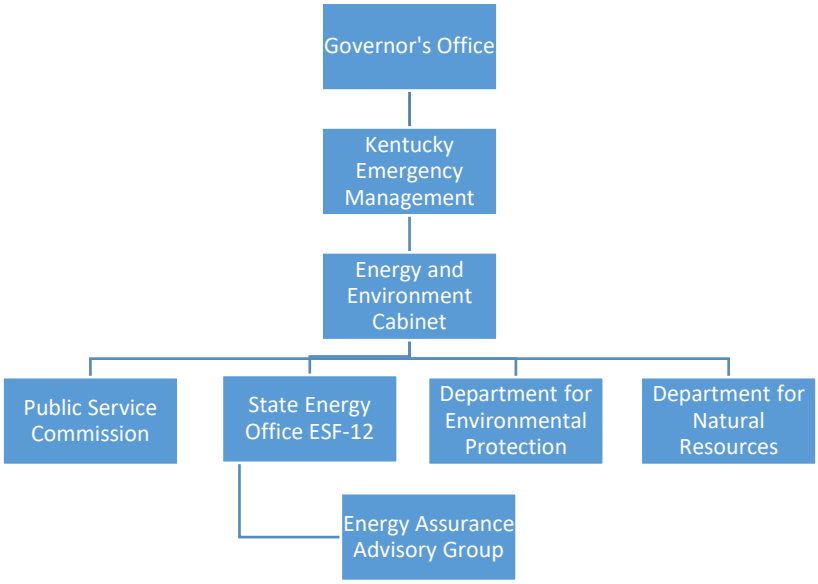


Figure 7: Energy Emergency Command Chart

2.2 Governor's Office

The ultimate authority to respond to any emergency resides in the Governor of the Commonwealth of Kentucky. In accordance with KRS Chapter 39A.100, the Governor may declare an emergency and assume direct operational control of all disaster and emergency response forces in the Commonwealth. With the exception of firearms and ammunition, the Governor may secure any needed resource in the state including means of transportation and communication, fuel, food, clothing, medicine, and buildings.

Short of declaring an emergency, the Governor may also take necessary actions to mitigate any situation that, without intervention, may escalate into an emergency. The Governor can ask the public to voluntarily conserve electricity, gasoline, and other energy sources in times of minor energy shortfalls. Likewise, in times of a more severe energy crisis, the Governor has the authority to issue mandatory conservation and usage measures.

In times of an emergency, the Governor is the final communication link, acting as the point of contact with the federal government and other state governments. In addition, the public looks to the Governor for critical information and general reassurance when difficulties arise.

2.3 Kentucky Division of Emergency Management

The Director of the Kentucky Division of Emergency Management is the Governor's designated representative to coordinate the Commonwealth's response to all state emergencies. The Kentucky Division of Emergency Management (KYEM) is a division of the Kentucky Department of Military Affairs. KYEM functions and roles are dictated in Chapter 39A of the Kentucky Revised Statues (Appendix B). It has two primary mission statements.

> **Mission 1:** To protect the Commonwealth from all situations that could result in a loss of life or loss of property. To establish and maintain world class programs focusing on education and preparedness, community restoration, communications, service coordination, planning, preparation, mitigation, response and recovery.
>
> **Mission 2:** To protect and restore our Commonwealth from all forms of dangers through effective preparation, mitigation, planning, training, response and recovery operations using effective communications, collaboration and coordination techniques.

KYEM is the lead state agency solely dedicated to carrying out mitigation, preparedness, response and recovery related to actual or potential emergency activities in the state. KYEM's main office is located on the Boone National Guard Center in Frankfort. It also has 10 Area Response Offices located throughout the state. In addition, each county in the state has an Emergency Management Director.

Throughout the Commonwealth, the Kentucky Division of Emergency Management (KYEM), as outlined in KRS 39A, 106 KAR 1:210, and 106 KAR 1:220, is responsible for coordination of emergency response/relief/recovery training and exercises in preparation for natural and manmade disasters such as tornadoes, storms, earthquakes, hazardous material incidents, as well as acts of terrorism involving weapons of mass destruction.

All other agencies in the Commonwealth will actively support KYEM in response to emergencies of severe specific incidents.

Figure 8: Kentucky Division of Emergency Management

KYEM AREA OFFICES

Eric Gibson, Division Director
Eric.Gibson@ky.gov

State Emergency Operations Center
ky.seoc.operations@kyem.org
502-607-6600
502-607-6601

Dustin Heiser, CEM
Assistant Director of Operations
Dustin.Heiser@KY-EM.ORG
502-607-1601
502-401-8558

Stephanie Robey
Assistant Director of Administration
stephanie.l.robey2.nfg@army.mil
502-607-5769

Jessica "Jesse" Elbouab
Public Information Supervisor
Jessica.Elbouab@ky-em.org
502-607-5721
502-229-3304

24 Hour State Warning Point
1-800-255-2587

AREA 1	AREA 2	AREA 3	AREA 4	AREA 5	AREA 6	AREA 7	AREA 8	AREA 9	AREA 10
Manager, EM (43) **David Koon** david.koon@ky-em.org Pending 502-607-3237	**Manager, EM (43)** **Pat Hardesty** patrick.c.hardsety2.nfg@army.mil 502-607-3261 270-498-6580	**Manager, EM (44)** **Gary Fancher** gary.a.fancher.nfg@army.mil 502-607-2309 270-779-0773	**Manager, EM (46)** **J.D. Sparks** james.d.sparks30.nfg@army.mil 502-607-2641 502-693-8022	**Manager, EM (54)** **Kenna "Marti" Burton** kenna.burton@ky-em.org 502-607-2462 502-226-0153	**Manager, EM (47)** **Alex Hyrcza** alex.hyrcza@ky-em.org 502-607-3562 502-234-8264	**Manager, EM (48)** **Jason York** jason.york@ky-em.org 502-607-3326 606-356-1888	**Manager, EM (51)** **VACANT** Tentative Aug. 1st Fill date	**Manager, EM (51)** **David McGill** david.mcgill@ky-em.org 606-877-3149 502-229-7159	**Manager, EM (51)** **Bruce Crouch** bruce.crouch@ky-em.org 270-283-7773 502-607-5587
Admin **Sherion Roberts** sherion.roberts@ky-em.org 502-607-3237	**Admin** **Sherion Roberts** sherion.roberts@ky-em.org 502-607-3237	**Admin** **Heather Renfrow** Heather.Renfrow@ky-em.org 502-607-2308	**Admin** **LeeAnn Gibson** leeann.f.gibson.nfg@army.mil 502-607-3561	**Admin** **Misty Callahan** misty.l.callahan2.nfg@army.mil 502-607-3325	**Admin** **LeeAnn Gibson** leeann.f.gibson.nfg@army.mil 502-607-3561	**Admin** **Misty Callahan** misty.l.callahan2.nfg@army.mil 502-607-3325	**Admin** **Sherry Jenkins** sherry.l.jenkins18.nfg@army.mil 502-607-5587	**Admin** **Sherry Jenkins** sherry.l.jenkins18.nfg@army.mil 502-607-5587	**Admin** **Heather Renfrow** Heather.Renfrow@ky-em.org 502-607-2308
Benton Armory 453 Old Symsonia Rd. Benton, KY 42301	**Owensboro Armory** 3300 Tamarack Road Owensboro, KY 42301	**Glasgow Armory** 410 Cavalry Drive Glasgow, KY 42141	**Louisville Bowman Field Armory** 3600 Century Div Way, Louisville, KY 40205	**EM Coordination Center** 4301 Airport Road Lexington, KY 40510	**Burlington Readiness Center** 2676 Conrad Ln, Burlington, KY 41005	**National Guard Armory** 4911 KY 801 N., Morehead, KY 40351	**EM Coordination Center** 26 Armory Rd Prestonsburg, KY 41653	**KY Div. of EM Management** Pending Harlan, KY 40741	**KY Div. of EM Management** 109 Grande Avenue Somerset, KY 42501

Figure 9: KYEM Regions

2.4 State Energy Office of the Energy and Environment Cabinet

The State Energy Office of the Energy and Environment Cabinet (SEO-EEC) has many roles and functions. SEO-EEC has direct responsibility for development of Energy Security and energy emergency management planning in the state. The SEO-EEC's energy mission is to support the utilization of all of Kentucky's energy resources for the betterment of the Commonwealth while protecting and improving our environment.

Staff within the SEO-EEC are responsible for monitoring, advising, and implementing programs and policies to meet the Governor's energy strategy or state-led energy initiatives for the Commonwealth. The office does this through grant management, data and modeling analysis, education and outreach, and policy support to regulatory agencies. In addition to working directly with the energy commodity producers, the SEO-EEC also works with the companies that transport and deliver energy resources to processors and consumers.

Along with planning and participation in policy directives for all energy sources, the SEO-EEC has direct responsibility for the coordination of petroleum fuels – propane, heating oil, kerosene, gasoline, and diesel fuels. The SEO-EEC has the responsibility to facilitate both the flow of information among and between state, federal, and non-governmental agencies during energy emergency situations and the development and maintenance of the ESP.

While the Energy Emergency Assurance Coordinator (EEAC) is the primary point of contact for managing and responding to energy emergencies in the state, it requires a team effort to provide the level of knowledge necessary to oversee a number of emergencies. This can be due to the many disciplines the emergency crosses or the speed at which information is required to respond efficiently. The EEAC in each state has the responsibility to communicate and share information with other states in the impacted region when a multi-state energy emergency occurs under an agreement supported by Department of Energy (DOE), national Governors Association (NGA), National Association of State Energy offices (NASEO), National Association of Regulatory Utility Companies (NARUC), and National Emergency Management Association (NEMA).

The SEO-EEC will respond to energy emergencies, especially those of a catastrophic nature, using a team concept. Individuals may vary depending on the situation, but the core team will consist

of the following members: Energy Security coordinator; data analyst; and public information officer.

This core team will collectively gather information, analyze the emergency, access available resources, and prepare situational reports. The team will also provide information and make recommendations to the Energy Assurance Advisory Group (EAAG).

The Kentucky SEO-EEC is responsible for initiating Emergency Support Function 12 (ESF-12) during times of energy emergencies. The SEO-EEC will work together with KYEM and all energy emergency partners to address any energy deficiency in the state. The SEO-EEC is the primary body to assure all Kentucky emergency energy partners are aware of circumstances and coordinating their efforts to solve any energy emergency.

2.5 Emergency Support Function-12 (ESF 12)

The Kentucky Energy Security Plan is a component of the State Emergency Operations Plan (SEOP). The Kentucky Division of Emergency Management (KYEM) is the primary agency responsible for emergency operations management in Kentucky and ultimately oversees all aspects of the SEOP. In the event of an emergency, the Director of KYEM may activate the State Emergency Operations Center (SEOC), which would activate the SEOP. Depending on the type of emergency, the activation of the SEOP may trigger the activation of the ESP, of which ESF 12 is an element.

ESF 12 is one of 15 Emergency Support Functions found in Appendix (A) and is a part of the SEOP. The basic framework for the ESFs remains constant from the federal government through to the smallest local entity. This allows for uniformity of information transfer and structuring of management responsibilities. Specific procedures and administrative requirements related to most emergencies are outlined in some detail.

ESF-12 is the primary Emergency Support Function that defines how energy-related emergencies in Kentucky will be handled and provides resources and personnel to meet the energy-related needs of the Commonwealth before, during and after emergency events or disasters.

ESF 12 is responsible for monitoring, collecting, analyzing, and disseminating information on energy networks, system damage, estimated impact in affected areas and restoration efforts. The

private sector owns and operates the vast majority of the State's energy infrastructure and takes the lead in the rapid restoration of infrastructure-related services after an incident occurs. The term energy includes producing, refining, transporting, generating, transmitting, conserving, building, distributing, and maintaining energy systems and related components.

The SEO-EEC works in coordination and in partnership with the Kentucky Public Service Commission (PSC) along with other ESFs contained within the EEC. The SEO-EEC will not normally act in a direct management capacity during an energy emergency, but will provide coordination, information and assistance to those agencies providing direct assistance.

The goal of ESF-12 is to implement organized procedures to determine how energy resources are used within the state during an emergency. It does so by establishing organizational structure, outlining direction and control, developing a concept of operation, and assigning responsibilities. The ESF-12 as found in the SEOP is as follows:

2.5.1 Structure and Operations

ESF-12 Coordinator

- State Energy Office within Energy and Environment Cabinet (SEO-EEC)

Primary Agencies

- Energy and Environment Cabinet (EEC)
- Public Service Commission (PSC)
- Energy Assurance Advisory Group (EAAG)

Support Agencies

- Kentucky Office of the Attorney General (KOAG)
- Kentucky Cabinet for Economic Development (CED)
- Kentucky Cabinet for Health and Family Services (CHFS)
- Kentucky Department for Local Government (DLG)
- Kentucky Department of Agriculture (KDA)
- Kentucky Finance and Administration Cabinet (FAC)
- Kentucky Emergency Management (KYEM)
- Kentucky Office of Homeland Security (KOHS)
- Kentucky Transportation Cabinet (KYTC)
- Kentucky Infrastructure Authority

- U.S Department of Energy Office of Cybersecurity, Energy Security, and Emergency Response (DOE-CESER)
- U.S Department of Energy ESF-12
- National Association of State Energy Officials (NASEO)
- National Association of Regulatory Utility Commissioners (NARUC)
- Federal Emergency Management Agency (FEMA) Region IV ESF-12
- U.S Department of Energy Office of Cybersecurity, Energy Security, and Emergency Response (DOE-CESER)
- National Association of State Energy Officials (NASEO)
- National Association of Regulatory Utility Commissioners (NARUC)
- Federal Emergency Management Agency (FEMA) ESF-12
- U.S. Department of Energy
- U.S. Environmental Protection Agency

MISSION

The mission of ESF-12 is to provide for the organization, coordination, and direction of all energy resources within the Commonwealth for use during an emergency. This is done by defining and establishing responsibility and authority in energy matters at the various levels within the Commonwealth, and by establishing close working relationships with public and private sector energy producers, marketers and transporters.

ASSUMPTIONS

- Corrective actions will require cooperation at multiple levels of government and with private sector energy providers.

- A wide range of events, both natural and human derived, can disrupt existing energy networks. These disruptions will require state, local and federal agencies to take action, in conjunction with the private sector, to re-establish normalcy.

- Not all events will require the participation of all agencies. All events will be managed at the lowest level of responsibility.

- Energy emergencies affecting the state will typically be managed by energy related agencies that comprise the Kentucky Energy and Environment Cabinet.

DIRECTION AND CONTROL

- The KYEM Director, via the SEOC, is the Governor's designated representative to coordinate the Commonwealth's response to all state emergencies. During an energy emergency, the SEOC receives guidance and recommendations from the SEO-EEC.

Additionally, the SEOC coordinates energy emergency policy and actions with the EEC Secretary. The SEOC is responsible for coordinating issues concerning local government operations and works directly with local government through the KYEM Area Managers.

- The SEO-EEC is responsible for tracking energy networks affecting the Commonwealth and overseeing the coordination and implementation of the Energy Security Plan.

- The SEO-EEC oversees the activities of the Energy Assurance Advisory Group. The EEC Secretary chairs the Advisory Group.

- The Energy Assurance Advisory Group is responsible for (1) Reviewing and implementing the state Energy Security Plan; (2) Representing and communicating the needs of their respective constituencies to ESF-12; and (3) Serving as liaison to national or regional organizations.

CONCEPT OF OPERATIONS

Operational Phases

Preparedness

- Review and update state and federal disaster procedures as they relate to ESF-12 activities.
- Continually monitor the energy network infrastructures and supply chains.
- Develop the Emergency Energy Security Plan and train key personnel in operational phases.
- Access information on existing state and federal databases regarding energy supplies and demand.
- Develop and maintain relationships with all public and private energy industry personnel involved in operational phases of energy management.
- Participate in exercises to test the operational effectiveness of the emergency response plan.
- Coordinate the Energy Assurance Advisory Group.
- Upon instructions from the Governor or representative, shift to response phase.

Response

- Develop situational energy assessment and provide to EEC Secretary and the SEOC.
- Contact energy industry personnel and energy emergency committee members to provide update assessment.
- Start a continuity file notebook; the continuity file will consist of all event-related actions documented for the event.
- Establish contact with and request information on supply and demand from producers, distributors, or trade organization of the energy commodity experiencing the disruption.
- Establish contact through the SEOC with county emergency management agencies in the affected areas.
- Obtain information on current energy utilization conditions and needs.
- Coordinate press releases in accordance with the Emergency Energy Security plan and the SEOC Joint Information Center (JIC), and coordinate communications utilizing prepared media advisories and public announcements regarding the potential energy shortage and appropriate public actions.
- Obtain current information regarding energy shortages, prices, and curtailments in the affected region.
- Share information and coordinate responses between like agencies, if the nature of the emergency involves multiple states.
- Establish contact with respective federal government agencies, providing update on emergency status and anticipated actions.
- Identify and contact the Federal Coordination Officer (FCO) through the SEOC in accordance with FEMA ESF-12.
- Utilize the Ready-Op software for situational awareness and communication with ESF-12 partners.
- Activate the Energy Assurance Advisory Group.
- Advise the Governor and the SEOC on current and continuing functions, problems and activities in the energy area.
- Assist the Governor or the SEOC in carrying out the policies, plans, and instructions pertaining to energy resources as outlined in the Emergency Energy Security Plan.
- Advise the Governor or the SEOC on the Commonwealth's energy resource needs.
- Implement policies and programs outlined in the Emergency Energy Security Plan to maximize available supplies or minimize existing demand levels.

- Maintain current information on the availability of energy resources and systems within the Commonwealth.
- Analyze the current situation and determine the best utilization of available energy resources.
- Recommend, if the situation continues to deteriorate, to the SEOC that the Governor declare a state of emergency under the provisions of KRS Chapter 39A.100.
- If it appears that options available to the Commonwealth to deal with the problem have proven inadequate, the next level of mobilization is to request federal assistance. Federal assistance would generally be available in the case of a national or international energy emergency. The SEO-EEC and representatives from other appropriate state departments will be responsible for coordinating, monitoring, and assisting federal programs. Federal assistance may be requested sooner if such actions prevent the need to take actions that are more drastic.
- Recommend opening of public shelters during time of crisis dealing with energy-related problems.
- Shift to recovery phase upon instructions from the SEOC or the Governor.

Recovery

- Carry out operations as directed by the SEOC to save lives and property.
- Revert to response or preparedness phase upon direction of the SEOC.
- Advise the SEOC and the Governor on current and continuing functions, problems, and activities related to the energy disruption.
- Assist the SEOC and the Governor in carrying out the policies, plans, and directives outlined in the Emergency Energy Security Plan or current operational plan pertaining to restoring energy resources balance.
- Advise the Governor or the SEOC on state energy resource needs.
- Maintain current information on the availability of energy resources.
- Coordinate requests for energy resources based on current policies or situational operation plans.
- Recommend the issuance of authorizations for necessary use of energy resources to essential users.
- Research, analyze, and determine the best utilization of available energy resources supply based on current conditions.

- Survey organizations upon completion of the operation and the costs of preparing and conducting the operation.
- Analyze the effectiveness of the Emergency Energy Security Plan in addressing the situation and formulating a response to the energy disruption.

ASSIGNMENT OF RESPONSIBILITIES

Primary Agencies

Energy and Environment Cabinet

- *Department for Environmental Protection (DEP)*
    - The DEP is responsible for coordinating ESF-3 (Public Works) and 10 (Oil and Hazardous Materials) activities as it relates to energy issues and works cooperatively with ESF-12.
    - The DEP is also responsible for assisting with fuel waivers, working on debris management and solid waste issues following an event, coordinating water and wastewater emergency information, education and outreach on hazardous material management during an event, and responding to oil and hazardous material releases.
- *Department for Natural Resources (DNR)*
    - The DNR is responsible for the inspection, permitting, and reclamation of Kentucky coalmines and the safety of mineworkers.
    - The DNR is responsible for the permitting, inspection, and reclamation of the crude oil and natural gas industry in Kentucky.
    - The DNR is responsible for the protection, conservation and enhancement of Kentucky's forest resources and for providing assistance to Kentucky's 121 conservation districts.
- *Office of Nature Preserves*
    - Manages the cabinet's rare species and natural areas management programs.
- *Public Service Commission (PSC)*
    - The PSC is responsible for all issues dealing with natural gas and electrical service, including utilities normally considered non-jurisdictional.

- The PSC is responsible for natural gas pipelines and electric transmission issues.

- *State Energy Office within Energy and Environment Cabinet (SEO-EEC)*

  - The SEO-EEC serves as coordinator for ESF-12 and is responsible for all issues dealing with natural gas products and petroleum industries [all liquid petroleum fuels and liquid petroleum gas (LPG)].
  - The SEO-EEC will be the primary agency responsible for monitoring, collecting, analyzing, and disseminating information on energy networks with the Commonwealth.
  - The SEO-EEC will not normally act in a direct management capacity during an energy emergency but will provide information and assistance to agencies providing direct assistance.
  - The SEO-EEC will develop and maintain an Emergency Energy Security Plan for the Commonwealth.
  - The SEO-EEC will coordinate the Energy Assurance Advisory Group.
  - The SEO-EEC and the PSC provide staff to the SEOC as needed.
  - When required, the SEO-EEC assign ESF-12 Coordinators to the Federal JFO as described in the NRF.

Local Government Representatives

- County governments are responsible for the coordination of all energy resources within their respective areas in coordination with the SEOC.
- Each county judge executive or mayor of an urban county government will coordinate energy resources and supplies during an emergency through the SEOC.
- Government representatives oversee local or regional energy emergency plans.

Supporting Agencies

- All supporting agencies for this ESF will provide information and resources as required by the ESF-12 Coordinator.

- Supporting agencies will ensure their representatives are properly trained and exercised on the plans and procedures relating to their work.

- When requested, support agency representatives will conduct ESF-12 support activities as identified by the Secretary of the EEC.

At all phases of an energy emergency, the SEOC is the primary point of coordination and must be advised of all assistance provided. The SEOC and appropriate law enforcement and emergency response agencies must be immediately alerted should events deteriorate to the extent that citizens and property within the Commonwealth are exposed to greater risk.

Energy Assurance Advisory Group

The Energy Assurance Advisory Group is comprised of public sector advocates, local government representatives, supporting state agencies, private sector associations, public sector association, industry and utility partners, along with relevant federal and state associations.

- The Group will meet annually to review the Energy Security Plan and at the request of the EEC Secretary as issues arise.
- Each member is responsible for communicating to the SEO-EEC of energy-related disruptions, events, needs, or concerns.
- Each member is responsible for understanding the functions, roles and responsibilities of ESF-12.

Energy Assurance Advisory Group Members:

EEC Primary Agencies

Support Agencies

Kentucky Public Service Commission

Office of the Attorney General (OAG)

- The OAG serves as a primary support agency where it represents interests of the public. OAG deals with issues involving price gouging for all energy sources except for utilities under the jurisdiction of the PSC.

Private and Public Associations

- Kentucky Municipal Utility Association
- Kentucky Oil and Gas Association
- Kentucky Gas Association
- Kentucky Coal Association

- Kentucky Utility Information Exchange
- Kentucky Association of Manufacturers
- Kentucky Chamber of Commerce
- Kentucky Chapter of American Petroleum Institute
- Kentucky Propane and Gas Association
- Kentucky Petroleum Marketers Association
- Kentucky Industrial Utility Customers
- Kentucky Clean Fuel Coalition
- Kentucky Association of Counties
- Kentucky League of Cities
- Kentucky Council of Area Development Districts
- Kentucky Association of Electric Cooperatives
- Kentucky Rural Water Association
- Kentucky Motor Trucking Association
- Kentucky Emergency Management Association
- Red Cross

Industry Representatives

- Energy industries (mining, extraction, generation, production, transmission, and distribution, transportation, wholesale and retail) are responsible for operating their systems and facilities to provide the maximum possible service within their capabilities, and fulfill essential needs as specified by appropriate governmental authorities. This includes responsibility for management, continuity, personnel and facility protection, conservation of supplies, restoration of damaged facilities, and the expansion or improvement of systems as practical and as necessitated under emergency conditions.

- To carry out these responsibilities, a representative of the major private sector industries operating in Kentucky will serve on the Energy Assurance Advisory Group and will recommend priorities, provide guidance and develop solutions.

- Operational control of the energy industries will remain with the responsible officials of the industry.

The SEO-EEC will serve as the coordinating body to assure all ESF-12 functions outlined in the SEOP are accomplished. Each organization noted in ESF-12 has essential responsibilities that are critical to the Kentucky ESP, and the SEO-EEC is responsible for organizing and coordinating this effort.

ESF-12 also offers guidance as to how and when agencies will participate in responding to disruptive or emergency energy situations. ESF-12 also offers a broad concept of operation from preparedness to recovery. Each phase suggests general activities to be carried out during that phase.

The Department of Energy CESER has developed an ESF-12 "Playbook" that provides a starting point for energy emergency response planning including a framework for evaluating energy emergencies, guidance and templates for emergency response actions, and other supplemental planning, monitoring, and response resources. The Playbook is intended to provide guidance on how and when to utilize authorities and response actions detailed in ESP.

The ESF-12 Playbook can be found in attachment # 1 of Appendix A.

2.6 Public Service Commission

The Kentucky Public Service Commission (PSC) is a three-member administrative body with quasi-legislative and quasi-judicial duties and powers. The PSC regulates over 1,100 utilities in the state. It is funded by an assessment, paid by these utilities, based on their annual gross intrastate revenues. The PSC performs its regulatory functions through issuance of written orders following adjudicative and rulemaking procedures. Specific citations can be found in KRS Chapter 278 and administrative regulations promulgated by the Commission.

The mission of the PSC is to foster the provision of safe and reliable service at a reasonable price to the customers of jurisdictional utilities while providing for the financial stability of those utilities by setting fair, just, and reasonable rates and supporting their operational competence by overseeing regulated activities.

The Commission regulates the intrastate rates and services of investor-owned electric, natural gas, telephone, water, and sewage utilities, customer-owned electric and telephone cooperatives, water districts and associations, and certain aspects of gas pipelines. The following are some of the areas for which the Commission has regulatory responsibility:

- Rate increase or reduction.
- Expansion or reduction of utility service boundaries.
- Construction and operation of utility facilities.
- Meter accuracy.

- Operating conditions of a utility.
- Management audits.
- Valuation of utility property.
- Natural gas and coal purchasing practices.
- Issuance or assumption of securities by a utility.
- Consumer complaints.
- Compliance with service and safety regulations.

The PSC is also responsible for oversight of regulated electric and natural gas utilities during any energy emergencies. The SEO coordinates information on non-regulated utility interruptions during an event. Specific reporting requirements (807 KAR 5:006, Section 26 and 27) are currently in place for the regulated electric utilities. Section 27 (c) Loss of service for four (4) or more hours to ten (10) percent or 500 or more of the utility's customers, whichever is less, must be reported to the PSC. Information includes the number of customers without service, probable cause of the failure, personnel and resources dedicated to the problem, and an estimated time of service returning. A map of the Electric Distribution Service Areas can be found in Section 6.1. A PSC outage report template can be found at the end of the Disruption Tracking Section, 5.4. Utilizing the PSC reporting system and Environment for Analysis of Geo-Located Energy Information (EAGLE-I). The PSC and SEO-EEC form a coordinated situational awareness of statewide outages along with routine communication with regulated and non-regulated utility partners.

2.7 Energy Assurance Advisory Group (EAAG)

The Kentucky Energy Assurance Advisory Group (EAAG) is composed of public-sector advocates, local government representatives, supporting state agencies, private-sector associations, public-sector associations, and industry and utility partners along with relevant state and federal associations.

The organizations on the EAAG are responsible for communicating information and coordinating resources to their constituents and vice versa. These organizations will also represent the EAAG and their constituencies at regional and national meetings that deal with the same type of energy issues. The EAAG periodically meets to discuss energy issues and policies that affect the state.

2.8 Kentucky Agencies

The Cabinet for Health and Family Services (CHFS) provides funding and program oversight for the Low-income Home Energy Assistance Program (LIHEAP), while the Kentucky Housing Corporation (KHC) provides program oversight for the Weatherization Assistance Program (WAP) and coordinates community action agency and citizen advocacy issues. More details on these programs can be found in section 8.0)

The Office of the Attorney General (OAG) assists in customer complaints, consumer protection, and issues requiring legal assistance. It also investigates price and service complaints, except for specific price complaints against utilities under the jurisdiction of the PSC.

The Department of Agriculture's responsibilities include working with agricultural producers and commodity groups to monitor fuel or electricity disruption effects within sector such as events affecting propane for the poultry industry or other industry impacts. In addition, the Department is responsible for supporting accurate weights and measures of fuel and assisting with Reed Vapor Pressure (RVP) waivers.

The Kentucky Department for Public Health (DPH) is responsible for developing and operating state public health programs and activities for the citizens of Kentucky. The mission of DPH is to improve the health and safety of people in Kentucky through prevention, promotion, and protection.

The Department of Aging and Independent Living (DAIL) in the Cabinet for Health and Family Services (CFHS), is the designated State Unit on Aging under the Older Americans Act. Their mission is to develop community-based systems of care that foster independence and quality of life of older persons and young functionally impaired adults. Services include Homecare, Adult Day/Alzheimer's Disease Respite, Ombudsman Services, Senior Employment Personal Care Attendant Services, Benefits Counseling, Caregiver support, and other services such as congregate and home-delivered meals and supportive services.

The Kentucky Transportation Cabinet (KYTC) serves as the lead agency to determine if waivers of Federal Motor Carrier Safety Administration (FMCSA) regulations are appropriate and/or required. Coordination for such waivers is issued by the KYTC Department of Vehicle Regulation.

The major mission of the Kentucky Office of Homeland Security (KOHS) is to lead the Commonwealth's coordination and collaboration efforts with public and private preparedness

partners to ensure a ready and prepared Kentucky. Specific energy-related tasks for KOHS are related to counterterrorism, critical infrastructure, buffer-zone protection, community safety and security and federal-grant administration. The KOHS also has administrative oversight of the Kentucky Intelligence Fusion Center (KIFC). In addition to other security activities, the KIFC serves as a 24/7 traffic and incident-management center that monitors highway construction, maintenance, weather, and other events affecting traffic flow and highway safety.

The Department for Local Government (DLG) assists in the coordination of energy issues and concerns with municipalities and county judges. DLG is particularly adept in the dissemination of information and training of local government officials.

2.9 Federal Agencies

States interact with many agencies to help protect citizens or assets during times of energy shortages or emergencies. The federal agency that states generally work with more than any other in this capacity is the Department of Energy (DOE). The Energy Information Administration (EIA) is the chief federal agency that compiles energy data and statistics. In addition to other energy information, DOE also maintains a secure site, ISERnet, for state agencies and other responders to share information on responding to and planning for energy disruptions.

The Office of Cybersecurity, Energy Security, and Emergency Response (CESER) mission is to maintain unique sector-wide situational awareness; discover and mitigate vulnerabilities and cyber threats; and orchestrate response and recovery operations through capacity building, partnerships, research, and information sharing to safeguard against all hazards and protect our nation's energy system. CESER focuses on emergency planning and response. It is also the primary federal agency for formulating strategies to protect critical infrastructure under the National Infrastructure Protection Plan (NIPP).

CESER has regional ESF-12 coordinators that facilitate incident coordination across government and with the private sector to enhance response and recovery efforts and coordinate federal capabilities to mitigate the impact of energy disruptions. Formal incident coordination processes and procedures, including the deployment of cyber assistance capabilities, are aligned with the National Incident Management System (NIMS) and National Response Framework (NRF) in place. In the event of a cyber-incident, DOE will exercise its emergency authority for cyber incidents based on these clearly defined processes and procedures. Ongoing activities include training, exercises, and information sharing.

DOE Environment for Analysis of Geo-Located Energy Information (EAGLE-I) system is an interactive geographic information system (GIS) that allows users to view and map the nation's energy infrastructure and obtain near real-time informational updates concerning the electric, petroleum, and natural gas sectors within one visualization platform. EAGLE-I provides capabilities for monitoring energy infrastructure assets, reporting energy outages, displaying potential threats to energy infrastructure, and coordinating emergency response and recovery. EAGLE-I is a tool developed by a set of institutions from the United States that enables users to locate scientific resources around their country. It uses an ontology to map the resources (such as scientific equipment) to their location facilitating reuse and collaboration.

The following tables provide an overview of the many federal departments and agencies that play a role in energy security. Many of these agencies have roles and responsibilities that extend beyond the energy sector. Each agency's energy-related activities have been categorized as applying to electricity, liquid fuels, or natural gas. Agencies that safeguard the cybersecurity and physical security of energy infrastructure are also indicated.

Agencies' energy security activities may involve:

- Energy emergency preparedness and response, including hosting and participating in preparedness planning and exercises and deploying responders or resources during emergency events.
- Information sharing and situational awareness, including publishing data and threat information and issuing situation reports during emergency events.
- Development and enforcement of standards and regulations for energy industry safety and security. During emergency events, some of these standards and regulations may be waived to facilitate faster response and restoration.

Department or Agency		Sector	Preparedness & Response	Situational Awareness	Standards & Regulations
White House		⚡ ⛽ 🔥 🔒	✓	✓	
DHS	FEMA	⚡ ⛽ 🔥	✓	✓	
	CISA	🔒	✓	✓	
	Coast Guard	⛽ 🔥	✓		✓
	TSA	⛽ 🔥 🔒	✓		✓
	CBP	⚡ ⛽ 🔥			✓
DOE	CESER	⚡ ⛽ 🔥 🔒	✓	✓	
	OE	⚡		✓	✓
	EIA	⚡ ⛽ 🔥		✓	
	FERC	⚡ ⛽ 🔥			✓
DOT	FMCSA	⚡ ⛽			✓
	PHMSA	⛽ 🔥	✓		✓
EPA		⚡ ⛽ 🔥			✓
IRS		⛽			✓
DOD	USACE	⚡ ⛽ 🔥	✓		✓
NRC		⚡	✓	✓	✓
DOJ	FBI	🔒	✓		
DOI	DOI BSEE	⛽ 🔥		✓	✓

⚡ Electricity ⛽ Liquid Fuel 🔥 Natural Gas 🔒 Cyber and physical security

Figure 10: Federal Agencies Energy Security Activities

Department or Agency		Energy Security/Emergency Response Role
White House		The White House—particularly the National Security Council—participates in public briefings and interagency situational awareness activities. The President also has the authority to declare a national state of emergency.
Department of Homeland Security (DHS)	Federal Emergency Management Agency (FEMA)	FEMA coordinates federal incident response and recovery activities. FEMA's duties during an event include assisting the President in carrying out the Stafford Act, operating the National Response Coordination Center (NRCC), supporting all Emergency Support Functions (ESFs) and Recovery Support Functions (RSFs). FEMA mission assigns the Defense Logistics Agency (DLA) to provide fuel support to federal responders and, if requested, SLTT responders and critical infrastructure. FEMA funds Public Assistance (PA) disaster funds, hazard mitigation projects through the Building Resilient Infrastructure and Communities (BRIC) Program, Hazard Mitigation Grant Program (HMGP), and others.
	Cybersecurity and Infrastructure Agency (CISA)	CISA leads the national effort to understand, manage, and reduce risk to cyber and physical infrastructure. CISA manages the Pipeline Cybersecurity Initiative, leveraging expertise from government and private partners to identify and address cybersecurity risks to pipeline infrastructure. CISA publishes best practices for cybersecurity protection. During a cyber incident, CISA assists impacted infrastructure, helps investigate the responsible actors, and coordinates the national response to significant cyber events.
	U.S. Coast Guard	The U.S. Coast Guard is the principal federal agency responsible for maritime safety, security, and environmental stewardship in U.S. ports and inland waterways used for the movement of energy products, including petroleum, natural gas, and coal. The Coast Guard reviews and approves security assessments and security plans developed by vessel owners and terminal operators, and inspects terminals for compliance with security requirements. The Coast Guard's role is particularly important during hurricanes and other severe weather that can disrupt energy supplies (primarily liquid fuels) into and out of U.S. ports.

Department or Agency		Energy Security/Emergency Response Role
	Transportation Security Administration (TSA)	TSA oversees the physical security and cybersecurity of all U.S. pipelines. TSA issues directives for owners and operators of pipelines to better secure pipelines against cyberattacks. TSA also oversees security at marine ports, where oil and gas marine terminals, petroleum refineries, and other energy infrastructure may be located. TSA conducts background checks and issues federal identification cards (called TWIC® cards) to workers accessing secure areas within port boundaries, including fuel truck drivers, refinery workers, and other energy industry workers. TSA may waive TWIC requirements during energy emergencies to facilitate energy restoration and response activities.
	CZM2 (CBP)	CBP is the primary federal agency tasked with ensuring the security of the nation's borders. CBP is responsible for enforcing and administering laws and regulations to control and oversee vessel movements in to, out of, and between U.S. ports. CBP enforces the Merchant Marine Act of 1920, also called the Jones Act, which generally prohibits the transportation of merchandise between two U.S. ports in any vessel not built in, documented under the laws of, and owned by citizens of the United States. Applications may be made to CBP for the Secretary of Homeland Security to grant a Jones Act waiver, which can help facilitate the delivery of fuel and equipment during energy shortages.
U.S. Department of Energy	Office of Cybersecurity, Energy Security, and Emergency Response (CESER)	CESER's mission is to enhance the security of U.S. critical energy infrastructure to all hazards, mitigate the impacts of disruptive events and risk to the sector overall through preparedness and innovation, and respond to and facilitate recovery from energy disruptions in collaboration with other federal agencies, the private sector, and State, local, tribal, and territory governments. CESER's preparedness and response activities include SLTT capacity building, energy security and resilience planning, hosting energy emergency exercises and deploying ESF-12 responders to impacted regions during emergencies. CESER facilitates interagency coordination, shares situational

Department or Agency		Energy Security/Emergency Response Role
		awareness products, and provides emergency response support to SLTT governments. CESER also advances research, development, and deployment of technologies, tools, and techniques to reduce risks to the Nation's critical energy infrastructure posed by cyber and other emerging threats. CESER administers programs that can be used to mitigate impacts to energy infrastructure and energy supply, and to provide resources during energy emergencies: • The Federal Power Act Section 202(c) grants DOE the power to temporarily order connections of facilities, and generation, delivery, interchange, or transmission of electricity during grid emergencies. • The Strategic Petroleum Reserve is a federally owned emergency supply of crude oil. Volumes can be released to mitigate the impact of crude supply disruptions. • The Northeast Home Heating Oil Reserve and Northeast Gasoline Supply Reserve provide emergency supplies of heating oil and gasoline, respectively.
	Office of Electricity (OE)	OE provides national leadership to ensure that the Nation's energy delivery system is secure, resilient and reliable. Through research and development, OE develops new technologies to improve electric infrastructure. OE also oversees the Federal and state electricity policies and programs that shape electricity system planning and market operations.
	Office of Enterprise Assessments	The Office of Enterprise Assessments oversees four federal Power Marketing Administrations (PMAs) - Bonneville Power Administration (BPA), Southeastern Power Administration (SEPA), Southwestern Power Administration (SWPA) and Western Area Power Administration (WAPA) – that operate electric systems and sell the electrical output of federally owned and operated hydroelectric dams in 34 states.
	U.S. Energy Information	EIA collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its

Department or Agency		Energy Security/Emergency Response Role
	Administration (EIA)	interaction with the economy and the environment. EIA's data can be used in energy security planning and energy emergency response activities. EIA publishes state energy profiles, data products related to energy supply, demand, infrastructure, and prices, as well as GIS maps.
	Federal Energy Regulatory Commission (FERC)	FERC is an independent agency that regulates the interstate transmission of electricity, natural gas, and oil. FERC's role includes oversight of the transmission and wholesale sale of electricity in interstate commerce, transportation of oil by pipeline in interstate commerce, and proposals to build liquefied natural gas (LNG) terminals and interstate natural gas pipelines as well as licensing hydropower projects. During energy emergencies, FERC also has emergency authority under the Interstate Commerce Act to direct companies to provide preference or priority in transportation, embargoes, or movement of traffic. This authority can be used to direct interstate pipeline operators to prioritize shipments of specific fuels to address shortages.
U.S. Department of Transportation	Federal Motor Carrier Safety Administration (FMCSA)	FMCSA sets safety requirements for interstate commercial drivers, such as hours of service requirements limiting how long drivers can be on the road before a mandatory break. During energy shortages, FMCSA can waive these requirements to facilitate the delivery of specific energy products, most often liquid fuels, or to facilitate the movement of utility crews, trucks, and other resources involved in the restoration of electric power.
	Pipeline and Hazardous Materials Safety Administration (PHMSA)	PHMSA regulates pipelines and rail tank cars to advance the safe transportation of petroleum, natural gas, and other hazardous materials. The agency establishes national policy, sets and enforces standards, educates, and conducts research to prevent incidents. The agency also prepares the public and first responders to reduce consequences if an incident does occur. During pipeline incidents (explosions or spills), PHMSA investigates and issues corrective action orders to pipeline operators before pipeline service can resume. During energy shortages, PHMSA can issue emergency special permits and

Department or Agency		Energy Security/Emergency Response Role
		waivers of certain regulations to facilitate the pipeline supply of fuel to the affected region. PHMSA also regulates rail tank cars that carry petroleum, biofuels, or liquefied natural gas.
U.S. Environmental Protection Agency (EPA)		EPA sets standards for certain fuels, including regulating the vapor pressure of gasoline, requiring reformulated gasoline in certain markets, and specifying the sulfur content in diesel fuel. These fuel specifications can be waived during emergencies to facilitate the supply of fuel into the affected region, or to provide fungibility of available supply within the affected region. EPA also regulates air emissions from energy infrastructure, including power generating facilities and fuel storage terminals. During events, EPA may choose not to enforce these regulations to facilitate power supply and fuel supply in the affected region.
Internal Revenue Service (IRS)		IRS collects federal motor taxes on diesel fuel used for on-highway transportation. Diesel used for off-highway purposes (heavy machinery, generators, farm equipment, etc.) is not subject to tax and is dyed red. In coordination with EPA, the IRS can choose to not collect the penalty typically imposed on using non-highway diesel in on-road vehicles (although the IRS still collects tax on this fuel).
Department of Defense (DOD)	U.S. Army Corps of Engineers (USACE)	USACE assists FEMA during disaster response, including installing generators and delivering generator fuels in communities through its Temporary Emergency Power Mission and sending responders to assist in disasters and provide situational awareness.
U.S. Nuclear Regulatory Commission (NRC)		The NRC is involved in emergency preparedness and response involving nuclear facilities or materials. The NRC also publishes a daily status report on all nuclear power reactors.
U.S. Department of Justice (DOJ)	Federal Bureau of Investigation (FBI)	The FBI leads investigations into cyber attacks and intrusions. The FBI collects and shares intelligence and engages with victims while working to unmask those committing malicious cyber activities.

Department or Agency		Energy Security/Emergency Response Role
U.S. Department of the Interior (DOI)	Bureau of Safety and Environmental Enforcement (BSEE)	BSEE has responsibility for the safety of the environment and conservation of offshore resources. BSEE administers the Oil Spill Preparedness Program and provides support for oil spill response efforts. During hurricanes and other inclement weather in the Gulf of Mexico, BSEE publishes data on the offshore oil and gas rigs that have been evacuated, as well as the amount of production that has been temporarily shut in. BSEE also leads the development of workplace safety and environmental compliance strategies for offshore renewable energy projects on the Federal Outer Continental Shelf.

Other Information Resources

Resource: CESER Energy Waivers Library
CESER's Energy Waivers Library provides additional detail on regulatory relief granted by federal agencies during energy disruptions. The library also lists contact information for each agency and provides examples of past uses of each waiver.

Resource: CESER Roles and Authorities
CESER's Roles and Authorities webpage outlines the various executive branch and DOE authorities that establish CESER's role in securing the Nations' energy infrastructure, maintaining situational awareness, discovering and mitigating cyber threats, and orchestrating response and recovery operations.

Resource: Power Outage Incident Annex (2017)
For more detailed descriptions of federal agency roles during a long-term power outage, refer to **Table 10: Roles and Responsibilities in a Long-Term Power Outage Incident** in FEMA's Power Outage Incident Annex (2017).

Resource: National Incident Management System (2017)
FEMA's National Incident Management System (NIMS) provides a consistent nationwide template that guides all levels of government, nongovernmental organizations and the private sector through the command and coordination of incidents, resource management, and information management. This framework is applicable to emergency responders and other emergency management personnel, NGOs, the private sector, and elected and appointed officials responsible for making decisions regarding incidents.

Figure 11: Descriptions of Federal Energy Security & Emergency Response Roles

Not listed in the table above but nonetheless critical to state coordination are the agencies listed below.

The **U.S. Department of Agriculture (USDA)** responsibilities include propane for crop drying, protecting livestock, and supporting accurate weights and measures. The Rural Development Utilities Program (RDUP) is also housed at USDA. The RDUP provides funding and tracks energy consumption data for rural electric cooperatives.

The **U.S. Department of Commerce (DOC)** is an excellent resource for demographics used in developing emergency planning documents. DOC also houses the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) (formerly the Mineral Management Service) and the National Oceanic & Atmospheric Administration (NOAA). The BOEMRE regulates the oil and gas production fields in the Gulf of Mexico. NOAA provides weather-related information including time-sensitive data for tracking hurricanes, wildfires, winter storms, and other emergencies.

2.10 Regional Coordination

Energy Emergency Response

The **Energy Emergency Assurance Coordinators Program** (EEAC) is a cooperative effort between the U.S. Department of Energy's (DOE) Office of Cybersecurity, Energy Security, and Emergency Response (CESER), the National Association of State Energy Officials (NASEO), the National Association of Regulatory Utility Commissioners (NARUC), the National Governors Association (NGA), and the National Emergency Management Association (NEMA).

The EEAC Program provides states with a means of sharing and receiving credible, accurate, and timely information with other states and DOE leading up to and during energy emergencies.

Structured communications are essential for understanding the severity, magnitude, and consequences of energy disruptions regardless of the causes.

EEACs serve as points of contact for DOE in the event of an emergency. Membership is made up of representatives from state energy offices, public utility commissions, state ESF-12 responders, emergency management agencies, homeland security agencies, local governments, and governors' offices. Additional guidance can be found here.

Kentucky SEO-EEC has designated a primary and secondary EEAC contact who have planning and/or response roles during energy emergencies. These individuals are registered on ISERnet, which DOE hosts. States should review and update their EEAC contacts annually.

National Response Framework

In 2008, the U.S. Department of Homeland Security released the National Response Framework (NRF), which establishes a comprehensive approach to preparing for and providing a unified response to disasters and emergencies. It describes specific authorities and best practices for managing incidents that range from severe but localized to large-scale terrorist attacks or catastrophic natural disasters.

A foundational principle upon which the NRF rests is engaging partnership across all jurisdictional levels—federal, state, and local. This partnership provides unity of effort that respects jurisdictional authorities and operational capabilities and ensures efficient incident management and effective use of resources.

During energy disruptions and emergencies, the U.S. Department of Energy (DOE), as the Federal lead for Energy through Emergency Support Function 12 – Energy (ESF-12), provides coordination across local, state, tribal, territorial, and federal government entities; nongovernmental organizations; and the private sector to enhance response and recovery efforts. In addition to conducting regular touchpoints with industry entities and the Federal interagency, DOE achieves this by hosting regional coordination calls for state energy entities or participating in regional coordination and information-sharing calls for State Energy Offices hosted by the NASEO Energy Security Committee prior to and during energy emergencies. KY SEO, as a member of the EEAC and the NASEO Energy Security Committee, participates in these calls to share and receive information with US DOE CESER and impacted states.

DOE also provides timely and accurate situational awareness through the release of event-specific and monthly Situation Reports (SitReps) which are designated as Official Use Only. KY

SEO, as a member of the EEAC, is a recipient of and contributor to these SitReps which provide for a common operating picture in regions impacted by hazards and whose energy security, delivery, or infrastructure systems have been compromised.

NASEO Energy Security Committee

The Kentucky SEO-EEC is an active member of the NASEO Energy Security Committee: a State Energy Office-led committee which provides technical assistance, peer-to-peer learning, resources, and logistical support to State Energy Offices in support of their energy emergency response and energy security, resilience, and hazard mitigation activities. NASEO hosts two monthly calls which contribute to regional coordination and information sharing. The first, NASEO's Energy Security Committee Calls, provide an opportunity for participating State Energy Offices to learn about innovative and novel approaches and resources for energy security planning and energy emergency response planning. They also serve as an opportunity to solicit State Energy Office input on regional and national energy security priorities. The second call, NASEO's State Hazards and Operations Rundown Call, is a round-robin-style forum wherein State Energy Offices provide updates to the Committee on ongoing energy emergency responses in which the state is involved, including tactics, best practices, and lessons learned. It also serves as a regular forum for State Energy Offices to share information pertaining to imminent, expected, or ongoing hazards, which allows for proactive regional coordination and information sharing.

NEMA-NASEO Regional Petroleum Shortage Collaboration

The Kentucky SEO-EEC is an active member of the state-driven Southeast/Midwest Petroleum Shortage Response Collaborative (SPSRC/MWPSRC), a collaboration with the National Association of State Energy Offices (NASEO) and the National Emergency Management Association (NEMA), with support from the U.S. Department of Energy (DOE) Office of Cybersecurity, Energy Security, and Emergency Response (CESER). Due to the reliance of imported fuels into the Commonwealth via pipeline and truck, cooperation and coordination with other states in the region, and states reliant on the same petroleum infrastructure, is of utmost importance. Created to facilitate the development of a regional catastrophic fuel response framework, this multistate collaborative benefits from deliberate examination, dissection, and cross-referencing of existing state and regional response plans, concepts, and annexes, and leverage peer-learning to improve respective state plans and ultimately provide a faster and consistent response throughout the region. The SPSRC/MWPSRC includes many key players in the energy-emergency management nexus with the unique task of regional catastrophic fuel planning (including State Energy Offices, State Emergency Management agencies, liquid fuels industry, and federal partners). When two or more states are impacted by an incident the region may elect for the multi-state implementation of measures and programs (as

appropriate) to facilitate a coordinated and collaborative response effort. Participation in the SPSRC/MWPSRC acknowledges of the need to work together and share resources to best address state and regional petroleum shortage preparedness and response needs.

NARUC-NASEO Regional Micro-Grid Working Group

The Kentucky SEO-EEC is an active member of the NARUC-NASEO Micro-grids State Working Group to share public- and private-sector best practices to advance beneficial micro-grid development and take advantage of technical expertise from the U.S. Department of Energy (DOE).

The Working Group is hosts and facilitates discussions between State Energy Offices and PUCs to explore micro-grid technologies and applications, policy and regulatory frameworks, and financing models to understand the full range of benefits that micro-grids can provide to owners/ operators, ratepayers, and other stakeholders. A key objective of the Working Group is to highlight and draw lessons from existing micro-grid projects. NARUC and NASEO are jointly leading this work in close collaboration with the DOE Office of Electricity and are relying on state input to guide this collaborative initiative. This group meets quarterly.

Southeast Regional EV Information Exchange

The Kentucky SEO-EEC is an active member of the NASEO Southeast Regional EV Information Exchange group that convenes bi-monthly to provide a coordination touch point for Southeast transportation agencies and SEOs to share information and best practices as well as to identify potential areas for collaboration on topics including, but not limited to: Implementation of the National Electric Vehicle Infrastructure funding including, EV infrastructure planning (siting and securing of site hosts, permitting, pricing, signage, minimum operating standards, accessibility, ownership models, etc.); policy development; and program implementation.

In addition, the group fosters ideas on how to promote electric transportation solutions in communities that are rural, low-income, or that face disproportionate air quality burdens; the role of EV infrastructure during evacuations; and considerations regarding the use of EVs to build resiliency into power supply delivery.

Kentucky's Electric Vehicle Infrastructure Deployment Plan (EVIDP) was developed in accordance with the National Electric Vehicle Infrastructure (NEVI) Formula Program Guidance that was issued by the Joint Office of the U.S. Department of Transportation and U.S. Department of

Energy (Joint Office). Combined, these efforts resulted in a plan that provides a thoughtful and flexible framework for developing a statewide charging network across the Commonwealth.

Kentucky's EVIDP was developed by the Kentucky Transportation Cabinet (KYTC) in close coordination with Kentucky's Energy and Environment Cabinet (EEC). The agencies established a steering committee that included the Public Service Commission (PSC) and the Federal Highway Administration (FHWA) to provide oversight and direction for the plan. Work on the plan began in January 2022 and the plan was submitted to the Joint Office in July 2022.

The nation's transportation system is beginning its most significant transformation since the Interstate System was established. The Federal Bipartisan Infrastructure Law (BIL), enacted as the Infrastructure Investment and Jobs Act (IIJA), passed in 2021 provides investments to help modernize infrastructure assets and support emerging technologies including electric vehicles (EVs). The resulting changes will provide long-lasting infrastructure and mobility improvements including supporting the adoption of electric vehicles by developing a national network of electric vehicle chargers.

In parallel with the federal initiatives, major automotive manufacturers have announced $7.8 billion in investments in EV battery production in Kentucky. This includes $5.8 billion and 5,000 new jobs to establish BlueOvalSK in Hardin County and $2.0 billion and 2,000 new jobs at Envision AESC in Warren County. These projects will position Kentucky to be the EV battery production capital of the United States. They also position Kentucky's residents and businesses to be major beneficiaries of this industry transformation.

One of the new Federal policy and funding initiatives included in the IIJA was the creation of the National Electric Vehicle Infrastructure (NEVI) Formula Program which provides funding to states to deploy EV charging infrastructure to support this automotive industry and technology shift to EVs. The guidance issued for the NEVI Formula Program required that states develop an Infrastructure Deployment Plan outlining how they would utilize the formula funding.

Kentucky has developed an EV Infrastructure Deployment Plan (EVIDP) that addresses the federal guidelines with partnerships across agencies and stakeholders.

Regional Exercises

The Kentucky SEO-EEC participates in energy emergency preparedness exercises, many of which are regional in nature and involve a multitude of State Energy Offices, State Emergency Management, industry, and federal participants. These exercises have allowed for KY SEO to review, validate, and critique its energy emergency response plans, policies, and procedures, including the ESP, the State Emergency Operations Plan, and the Continuity of Operations (COOP) Plan.

These exercises also serve as unique opportunities for participants to expand their energy emergency response networks within their region and explore robust, hypothetical, yet realistic, scenarios that assist in regional preparedness and continuous improvement. In recent years, KY SEO has participated in the following exercises:

- DOE Clear Path XII Petroleum Shortage TTX (2024)
- NASEO Energy Security Bootcamp (2024)
- Microgrid Knowledge Conference (2024)
- GRID EX Exercise hosted by TVA (2023)
- NASEO-NARUC Micro-grid Action Planning Workshop (2023)
- NEMA-NASEO Regional Petroleum Shortage Workshop (2023)
- NASEO Energy Security Boot camp – National Workshop (2023)
- Operation Catfish – Southeast Regional Exercise (2022)
- Shattered Cheddar – Midwest/PADD 2 Regional Exercise (2022)
- Fractured Freeze – Multi-Regional Exercise (2022)
- Mission Moon Pie – Southeast Regional Exercise (2019)
- Shaken Fury – Multi-Regional Exercise (2019)
- Clear Path VII – US DOE Regional Exercise (2017)

3.0 Emergency Operation Design Concept

3.1 Emergency Operation Concept

A perfect system for the management of energy emergencies does not exist. Potential emergencies are so numerous that it would not be practical to prepare response plans for all possible scenarios. Effective Energy Security preparedness and emergency response management can be achieved through meticulous advanced preparation. This section outlines the Commonwealth's approach to effectively manage energy resources under a diverse set of potential threats.

The National Association of State Energy Officials (NASEO) has compiled State Energy Assurance Guidelines. Kentucky's Plan is based around these guidelines. "Quick Guidelines: Ten Things You Should Know to be Prepared", which are contained within NASEO's guidelines are outlined below:

- Make sure you and your staff are prepared to deal with the needs of policy makers.
- Know your state's energy profile and interdependencies.
- Know the geography and demographics of your energy infrastructure.
- Know your key government and energy contacts.
- Maintain a good working relationship with private and public sector contacts.
- Be prepared to work with the media.
- Know the legal authorities that support your response.
- Understand how you can effectively respond.
- Maintain an alternative budget for emergencies.
- Keep your Energy Security plans up to date.

The U.S. Department of Energy (DOE) has released an Energy Security Plan framework developed to provide clarity and detail on the six elements outlined in Section 40108 of the Infrastructure Investment and Jobs Act (IIJA) hereafter referred to as the Bipartisan Infrastructure Law (BIL). The DOE's goal is to support states and provide additional clarification beyond the text of the BIL.

The framework provides a logical flow of information by organizing the six elements into practical sections that reduce redundancies. DOE understands that states are working from

existing energy security plans and that each of those plans is different. DOE anticipates that states will use different approaches to address the six elements described in the BIL, and the framework is intended to provide examples and to serve as a reference only.

The Guidelines and Framework can be found in Appendix D, attachment #1.

Administration of the ESP is based heavily on information acquisition, definition of organizational responsibilities, and the efficient movement of information. Specific information will be compiled on the state's overall energy system through the Kentucky Energy Profile. The Profile addresses the types and amounts of fuels used, fuel sources, and the sectors where they are used. It will also examine the generation, transmission, and distribution systems for the various power sources. Specific attention is also paid to the end uses of energy supplies in the Commonwealth. Obtaining accurate information is also vital to assessing the vulnerabilities and consequences that exist at all points in the system.

In order for information from the Profile to be useful, it must be applied. In the case of energy management, organizational responsibilities are divided among many governmental agencies, private businesses, and support organizations. The ESP is a reference that identifies which group or organization has primary responsibility or can help resolve a specific energy issue or concern. Organizational roles and responsibilities are defined and contact information for the key personnel responsible for the operation of the group, is provided.

This ESP does not attempt to alter current agency roles or functions but instead to facilitate the free flow of information and data between agencies for use during emergencies**.** Through the early identification, coordination, and continual sharing of information, energy issues and concerns can be resolved efficiently and effectively, and at the lowest operational level.

Information concerning potential energy emergencies must be channeled and shared within the Commonwealth and among all providers. This free exchange of information will aid in helping all participants maintain perspective on the energy situation. See section 4.3 for communication protocol.

3.2 Continuity of Operations

The Energy and Environment Cabinet (EEC) has essential operations that must be performed or rapidly resumed in a disaster or emergency. While the impact of an incident cannot be predicted, planning for operations under such conditions may mitigate the effects of the disaster or emergency on people, facilities, and EEC services. To that end, the EEC has prepared a Continuity of Operations Plan (COOP) to serve as a guide for sustainment or resumption of essential services affected by a disaster.

This COOP establishes guidance to support EEC essential functions when a disaster or emergency threatens or affects EEC operations to the point that changes to the delivery of EEC services, or the relocation of EEC personnel or operations are required. This Plan provides guidance for when the EEC may need to implement COOP activities related to an incident that affects essential functions, roles of staff, facilities, or delivery of services.

This COOP Plan describes how the EEC will execute essential functions during and after a disaster or emergency that disrupts normal operations. This Plan is intended to guide the EEC during an actual incident; however, specific actions will depend on the situation. This Plan serves as a consolidated location for critical information related to the delivery of essential functions and resources that facilitate services.

3.3 Phased Response Contingency

The Commonwealth's response to energy emergencies is divided into four defined phases. Each phase describes the appropriate level.

- Phase I – Monitoring
- Phase II – Situation Assessment and Preparation
- Phase III – Emergency Response
- Phase IV – Emergency Assessment

The dividing line or time of transition between phases is not precise. While based largely on a quantitative set of criteria, the actual decision to transition between phases is generally qualitative. With input from KYEM and supporting agencies, the Energy Security Coordinator will make the determination on when to move to the next phase based on the current conditions.

While not typically the case, transitioning between phases does not necessarily have to follow in numerical order. A severe disaster or terrorist event could easily precipitate an immediate emergency response. It is also possible that the need arises to manage multiple but varied events that warrant designation as separate phases.

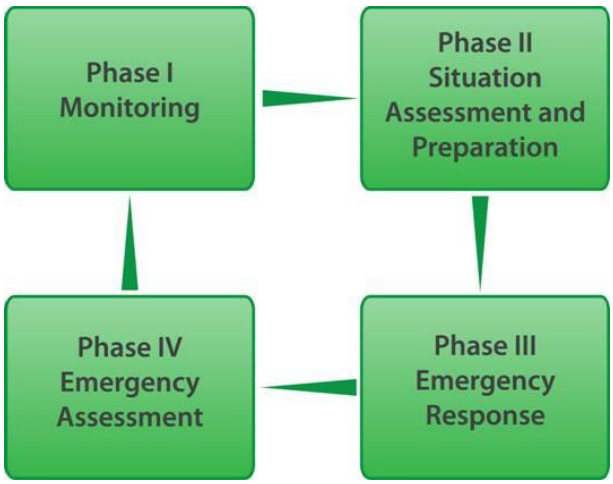


Figure 12: Phases for Managing an Energy Shortage

Detailed energy emergency descriptions of potential issues and proper response actions for each phase are provided below. The Energy Security Coordinator will assess the severity of the emergency then determine the appropriate response action to undertake. Successful implementation of one management phase may well prevent the need to implement the next phase.

Monitoring – Phase I

Phase I activities are related to general data acquisition and preparation. This phase is the normal state of affairs without energy deficiencies. Activities include monitoring of state, regional, and world energy activities; making and renewing contacts with energy providers, suppliers, and government groups; developing new strategies for emergency plan implementation; assisting in the development of regional and local energy plans; revising the statewide energy profile; updating individual components of the emergency plan; and conducting training exercises for key personnel regarding plan implementation.

Situation Assessment and Preparation – Phase II

Phase II activities involve an intensification of the components outlined in Phase I. This phase is fundamentally an early warning stage. Any number of conditions or events (weather, price escalation, human error, etc.) can necessitate preparatory activities.

As information is monitored, particular attention is paid to issues that have the potential to negatively affect the supply and distribution system. The main purpose of the Preparation Phase

is to determine the nature, extent, duration, and consequence of any imminent emergency as quickly as possible.

The Energy Security Coordinator, as the designated state point of contact, will continue data and information collection efforts to ensure the most accurate current energy profile is in hand. The SEO-EEC will then analyze the information to determine the potential magnitude and duration of the energy emergency.

If warranted, the Energy Security Coordinator will notify all affected program partners of the current situation. Greater emphasis is placed on continual information sharing and an increased level of dialogue.

If it is determined that a pending emergency does not exist at this point in time, the Energy Security Coordinator can continue to monitor and evaluate at Phase II levels. If this is not necessitated, then efforts can revert to the Monitoring phase.

Emergency Response – Phase III

Phase III is a call to action. Emergency response is required when the decision has been made that specific government action is required to ensure the health, safety, welfare, and economic well-being of the citizens of the Commonwealth. Should the SEO-EEC determine that market and energy providers are unable to quickly and adequately address this situation without government action, the SEO will review the circumstances and determine the appropriate actions.

Possible actions could range from continued monitoring to declaration of a state of emergency. At a minimum, procedures will continue in an orderly process to follow steps as outlined in this ESP. The course of action may require implementation of only one specific action or the comprehensive execution of ESF-12.

In addition to Phase 3 activities, the following actions may be implemented:

- Increase the level of communication among state agencies and other affected energy industry participants.

- Employ programs that maximize energy supplies or minimize demand, and closely monitor the situation for desired results. These programs could be either voluntary or regulatory in nature.
- If the emergency is multi-state or national in scale, designated representatives can obtain information on how to share data with the Energy Emergency Assurance Coordinators (EEAC) through the EEAC's website: https://www.naseo.org/eeac. Interested parties can register as EEAC on ISERnet and use the contact list provided to share information. Additional information on the EEAC can be found in section 2.10 of this plan.
- Call together with specific or multiple energy management departments or organizations to discuss contingency actions.
- If the implemented actions are ineffective and the situations worsen, it may be necessary for KYEM to recommend to the Governor that they should declare a State of Emergency under KRS Chapter 39A.
- If all resources available to the Commonwealth prove not to be adequate in rectifying the situation, the next option is to request federal assistance through the declaration of a State of Emergency. KYEM would request this from the Governor. KYEM will be the primary agency to coordinate all actions in a state of emergency. The following federal assistance may be requested without disaster declaration: HOS wavier, Coast Guard ice breaking, temporary waiver of vehicle fuel air quality requirements, RVP waiver, and use of the Strategic Petroleum Reserves (SPR).

Emergency Assessment – Phase IV

During the Emergency Assessment phase, energy systems and commerce will be returning to normal conditions. The Governor can rescind any formal declarations or voluntary requests at this time. Monitoring activities of the ESP can return to pre-emergency status.

As the emergency is resolved, state and other responding agencies should evaluate all response plans that were implemented to determine the effectiveness of all responses. Evaluations should include:

- A description of the emergency.
- A chronology of the actions taken to rectify it.
- An assessment of the mitigation efforts with detail given to the specific actions taken.

- Recommendations for improvement.

Each responding agency should conduct its own evaluation of actions taken during the emergency. The SEO-EEC will review these assessments and examine how they conform to the activities outlined in the ESP.

The primary purpose of the assessment phase is continuous improvement. After each use of the ESP, whether in practice or real-life application, the system will be revised to make it more effective for the next use.

3.4 Emergency Activation Levels

In addition to a phased response plan, determining the appropriate level of action based on the severity of the incident is a crucial step in evaluating the proper emergency response. The following classification system will be used as a guide to aid in shaping the Commonwealth's response. SEOC activations are based on the level of operational schemes as listed below. SEOC activation does not need to be sequential. For planning purposes, the activation levels do not specifically take into account the percentage reduction in fuels or the duration of the incident, rather it addresses the resources required to remedy the situation.

Level 5 - Normal Operations: Level 5 is the normal, day-to-day, SWP duty status. This is the lowest level of an incident or event and can be generally managed using the Duty Officer (DO) and the Manager on Call (MOC) and does not require deployment of more than one (1) state resource. The incident or event is of limited duration and usually closed within one (1) operational period (12-hours).

Level 4 Modified - Virtual Monitoring: This is for an incident or event that requires a higher level of management than just the MOC and DO but does not require the activation of the SEOC. The Operations Section Chief (OSC), Planning Section Chief (PSC), Kentucky National Guard Joint Operating Center (KYNG JOC), and Area Managers are monitoring the situation virtually through WebEOC. If the event deteriorates, the OSC coordinates with the KYEM Assistant Director for Operations or KYEM Director and recommends a SEOC activation level. The incident or event is of a limited duration and usually closed out within two (2) operational periods.

Level 4 - This requires a higher level of management than Level 4 Modified. This level of incident or event usually involves multiple resources but is not a long-term event. A limited formal

activation of SEOC structures may be required, but only to maintain situational awareness and adequately report actions taken by deployed assets. SEOC staffing includes, at a minimum, the SEOC Manager, OSC, PSC, KYNG JOC, and an operations officer. The incident or event is of a limited duration and usually closed out within three (3) operational periods.

Level 3 - Partial Activation: This level of incident or event is of greater complexity than the previous levels and requires immediate activation of the SEOC structure to manage multiple resources over an extended period to meet significant needs of local first responders and emergency management agencies. This requires the activation of select ESF representatives and has a significant impact on KYEM staff. Deployment of an Incident Management Assistance Team (IMAT) to support local operations may be necessary. The incident is of an extended duration and usually managed through three (3) or more operational periods. The procedures outlined in ESF-12 will be activated and the SEO-EEC will coordinate all activities to assure the duration and intensity of the emergency is minimized.

Level 2 - Full Activation: This level of incident or event requires all ESF state partners. Multiple regional assets across the Commonwealth may provide resources and could include the introduction of a federal resource. The incident is of an extended duration, not being closed out within a clearly defined number of operational periods. This incident may require the activation of a local/county/state Incident Management Team (IMT) and an IMAT to supplement the SEOC staff and field operations. The SEO-EEC may invite the Energy Efficiency Advisory Group (EEAG) to meet and review the pending energy situation, as appropriate. The ESP will help the SEO-EEC to coordinate and resolve energy problems and issues experienced by the citizens and businesses of the Commonwealth.

Level 1 - Full Activation with Federal Partners: This level of incident or event is catastrophic. These incidents significantly affect the Commonwealth and require the full activation of all local, county, and state assets and the full integration of the SEOC with all required federal resources. This type of incident spans multiple operational periods from days to weeks to possibly months. An earthquake of 5.5 magnitude along the NMSZ is an example of a catastrophic Level 1 event, as well as the 2009 Kentucky Ice Storm that impacted the entire state.

3.5 Utility and Service Provider Response and Restoration Stages

A central tenant to the SEO-EEC ability to assess and support response and restoration is understanding the utility response and restoration process.

Kentucky has a complex network of electric utility providers spanning public and private. The graphic below details the general steps to restoring power.

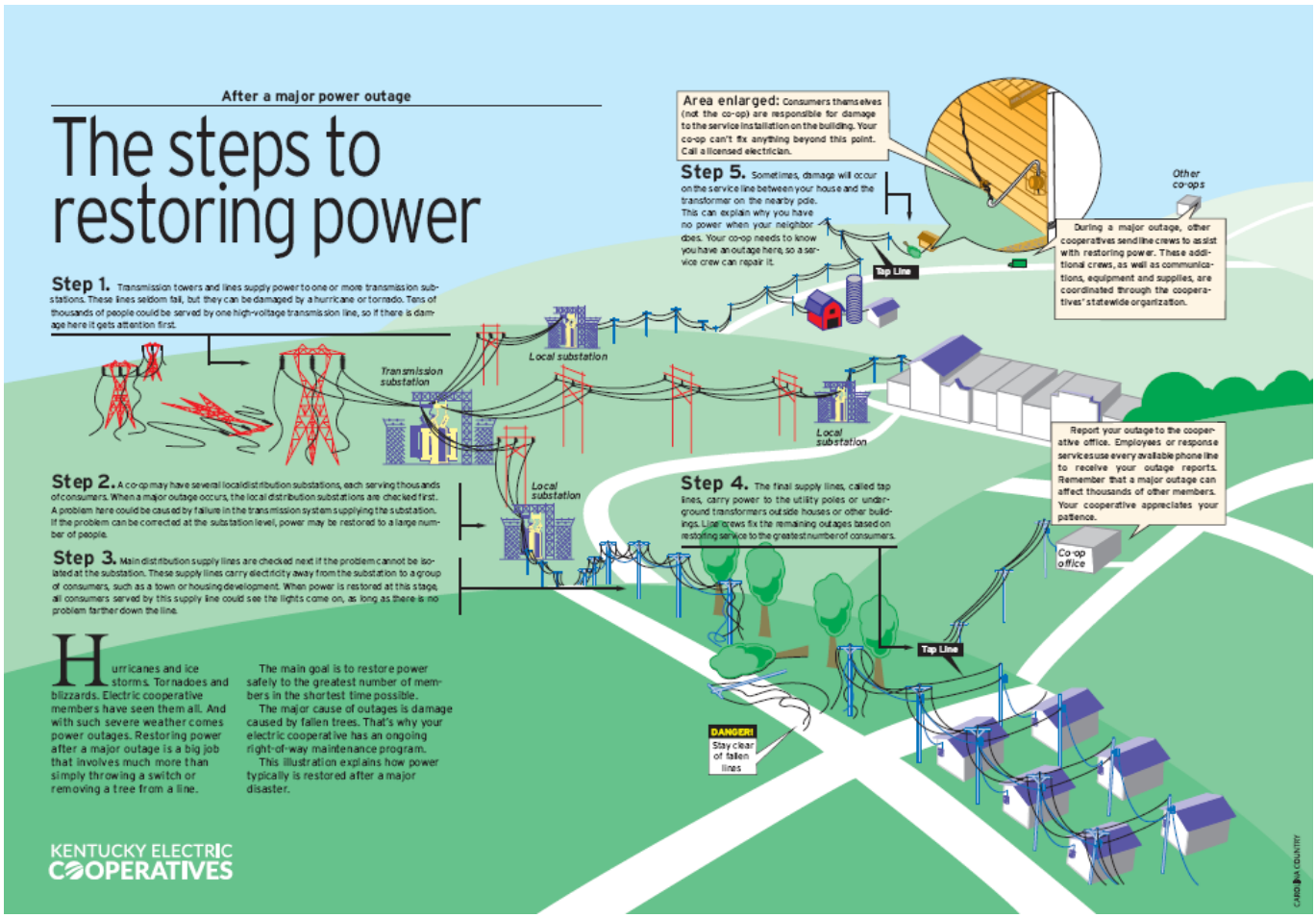


Figure 13: Steps to restore Electric Grid

During times of a power disruption, it is imperative that local communities understand what the restoration priorities are for the critical infrastructure being affected. Online outage maps can be conduits for reporting and finding out about the cause of the outage and repair time estimates for the public.

For hazardous liquid and gas pipeline breaks, The Pipeline Association for Public Awareness issues the Pipeline Emergency Response Guidelines. The general steps to a pipeline incident response include:

- Securing the scene
- Identifying the hazard
- Assessing the situation
- Obtaining assistance from trained personnel
- Responding to protect people, property, and the environment and
- Working cooperatively with the pipeline operator

While the pipeline operator concentrates on isolating the pipeline, responders concentrate on isolating and removing ignition sources and moving the public out of harm's way. The protection of people is always the highest priority. Protective actions are those steps taken to preserve the health and safety of emergency responders and the public during a pipeline incident.
For Natural Gas disruptions, multiple steps require close collaboration between utilities and customers to provide a safe restoration of service. In large-scale interruptions, natural gas supply must be turned off in the affected areas to allow for repairs and to ensure public safety. The graphic below details the general steps to restoring natural gas.

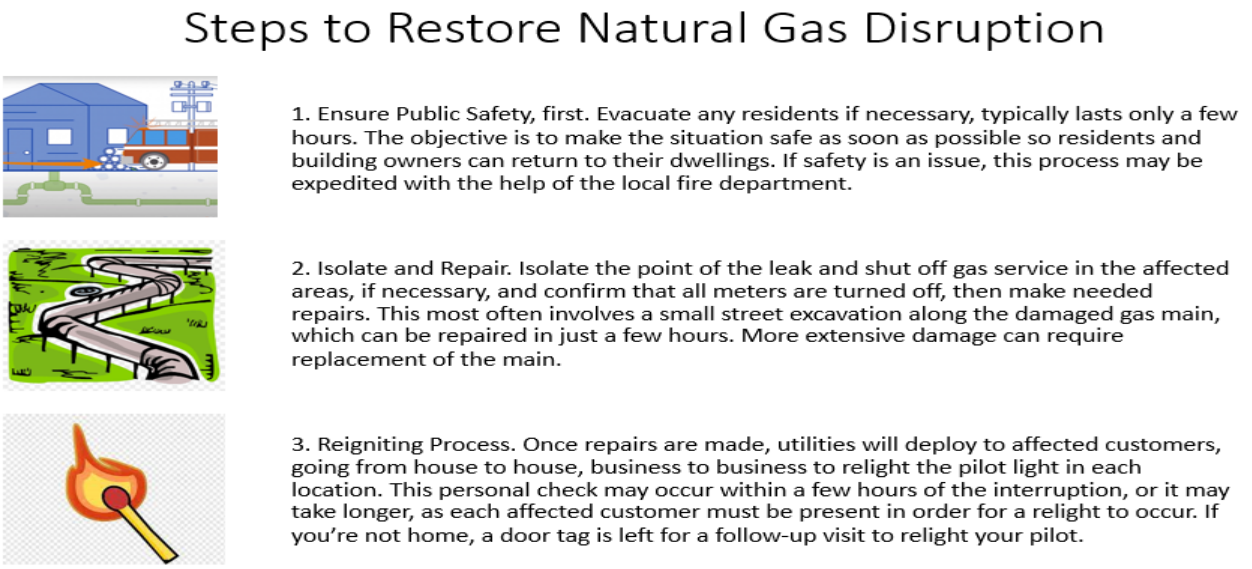


Figure 14: Steps to Restore Natural Gas

4.0 Communication and Public Information

4.1 Introduction

During an emergency, the ability to gather accurate information and disseminate it to responding agencies and the general public is of utmost importance. When a situation occurs where a lack of information exists on the severity of a crisis, people naturally assume the worst-case scenario. This reason alone is why a strong integrated public information program is paramount to emergency response management. Presenting timely and accurate information can ease fears by eliminating confusion and uncertainty.

Of equal importance to providing information to the public at large is the necessity to provide timely and accurate information to agencies and individuals actively involved in emergency response. These groups may include federal, local and state government agencies, first responding organizations, elected officials, energy providers, transportation companies, and charitable and human service groups. In addition to providing information to these groups, it is vital that a system is enacted that allows for the two-way movement of information and data. By establishing a point of contact and enacting basic procedures for managing multi directional information flows, an environment will be created to ensure that all participants are working together with current and accurate data.

While this section addresses the primary functions undertaken by the State Energy Office (SEO) in the management of public communication, it should be noted that once an emergency is declared, primary responsibilities for information accumulation and distribution falls under the direction of ESF-15. Communication management at that point will operate through the Commonwealth Joint Information Center (CJIC). The KYEM Information Officer will serve as coordinator. ESF-15 is found in Annex (A) of the Kentucky State Emergency Operations Plan (SEOP).

4.2 Communication Aims

Since communication is the sharing of ideas or the presenting of information, the fundamental goal of any communication or public relations program is how to do this most effectively. Communication during emergency response will contain the following guiding principles:

- Present a highly visible and calm front to reduce the possibility of a panic response during the disruption.
- Provide accurate information on the nature and scope of the emergency.
- Provide essential information on where citizens can obtain vital supplies and services to aide in coping with the emergency.
- Establish an effective multi-dimensional information exchange between all parties involved with energy production, transmission, and distribution, and those involved with directing emergency response management at all government levels.

4.3 Communication Plan Elements

As stated previously, effective two-way communication and information sharing between all levels of government, private sector energy industries, the media, and the public is imperative for successful emergency management. To avoid confusion during an emergency, it is important to have established needs identified before the actual emergency. These include establishing communication procedures, identifying responsible individuals, procuring necessary equipment, and identifying operational facilities. Kentucky's COOP includes the following elements:

- Contact - While external communication is generally a more formalized activity that will pass through KYEM before dissemination, internal energy-related communication and operation agencies will establish separate, specific internal procedures. The SEO-EEC shall act as the primary point of contact for gathering and disseminating information related to any energy disruption. For energy interruptions, the Energy and Environment Cabinet's Public Information Officer (EEC-PIO) shall serve as the primary contact for public communication activities. The SEO-EEC will research, obtain, analyze, and distribute relevant and accurate energy information on a timely basis.
- Equipment and Facilities - The severity and geographical distribution of the emergency will affect the equipment and facility needs related to emergency management. For most disruptive events, existing equipment and facilities will support communication and information efforts. For catastrophic events, it may be necessary to move operations to the SEOC. Basic equipment needs include the following:
    - Computers with internet connectivity to communicate with all persons and groups involved in the emergency management activity. They are also important in acquiring and processing large amounts of information when modeling changing situations or potential solutions.

- Landline telephone system preferably with a toll-free capability to allow for easy access when reporting information from remote locations.
- Cell phones, fax machines, satellite phones, two-way, and ham radios may all be useful tools to be employed in exchanging information. Energy stakeholders contact information is maintained by the SEO-EEC. Agreements with KYEM and the EEC Emergency Response Team (ERT) have been reached to contact team members or energy providers by satellite phone in the event that conventional communications fail.
- The existing print, broadcast, Internet, and social media are vital in the one-way distribution of information. Taped or live telecasts can be used to both inform and educate the populace relating directly to the emergency or available assistance programs. Depending on the scale and severity of the event, this information may be distributed by the Governor's Office, KYEM, or at the specific agency level. For all declared emergencies, all publicly distributed information will pass through the Division of Emergency Management for approval.

- Procedural Considerations - Information and data will be reviewed by the SEO-EEC, processed, and transferred as necessary.

4.4 Communication and Outreach

- State Outreach - The SEO-EEC will utilize WebEOC, a web-based crisis management system designed for supporting the Incident Command System (ICS) method of response management for significant incidents and providing a unique toolset for supporting daily operations in the Regional Response Centers and the HQ Emergency Operations Center to disseminate information to KYEM. For Official Use Only (FOUO). For more information, contact KYEM.

Figure 15: ESF-12 Public Private Sector Communication Protocol

- Private Partner Outreach - The SEO-EEC will use ReadyOp, a disaster management tool deployed for efficiently and effectively planning, managing, communicating, and direct activities within a single organization or in a unified command structure involving multiple organizations, to communicate with energy partners and other ESF partners. One of the unique features of ReadyOp is the custom forms that can be created and shared electronically as needed. Designed to handle the fast-paced, demanding communication challenges of ICS, ReadyOp's flexibility supports daily and exercise/response activities for a single organization as well as unified, multi-location agencies and operations.

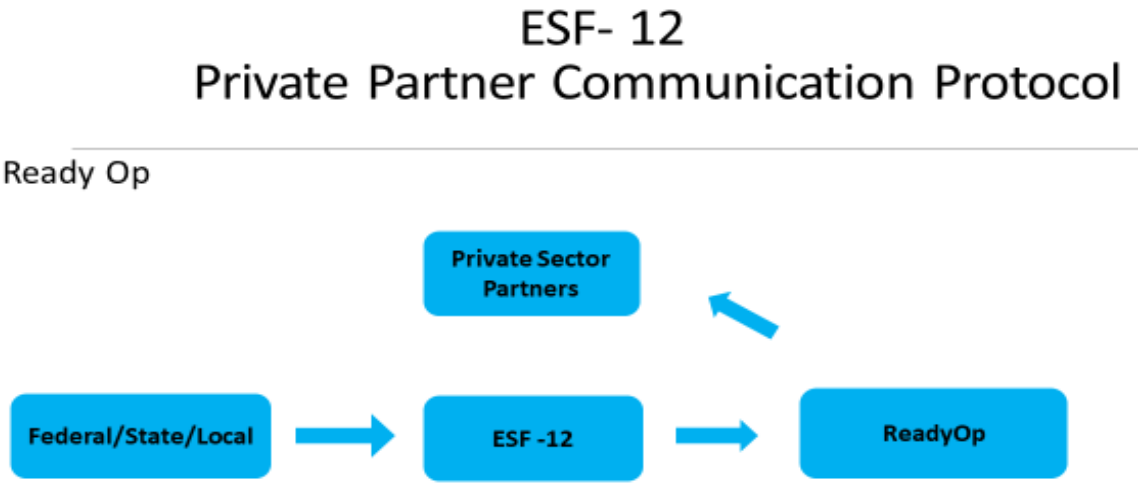


Figure 16: ESF-12 SEO Communication Protocol

- Publications/Public Outreach - In addition to disruption-specific communications, the SEO-EEC and the PSC will utilize print, broadcast, Internet, and social media applications to distribute information on issues in the energy arena. This may include scientific research, fuel reports, program and policy directives, energy conservation directives, and news stories relating to energy events. These publications can be used to both inform and educate and may be helpful during a disruption event – especially one of a lasting duration. Current offerings include:
- Land, Air & Water, Kentucky Energy & Environment Cabinet's Webzine
- Naturally Connected, A blog of the Kentucky Energy and Environment Cabinet
- Electronic Newsletter of the SEO-EEC
- Kentucky Public Service Commission website (press releases, outage information and utility service area maps)
- Social Media – FaceBook, Twitter, and YouTube
- Kentucky Energy and Environment Cabinet's Office of Energy Policy website

The Kentucky Energy and Environment Cabinet Office of Communications (EEC-OOC) procedures for press releases are as follows:

1. Press releases are prepared by the State Energy Office PIO (or other agency) and forwarded to the EEC-OOC Communications Director for review and editing. Pending final edit approvals, the EEC-OOC Communications Director forwards the press release to EEC Secretary for approval.
2. Once approved by the EEC Secretary, the EEC Communications Director forwards the press release to the Governor's communication staff for further approval.
3. Once approved by the Governor's office, the EEC- OOC posts the press release on **GovDelivery** for distribution.
4. EEC-OOC director and staff manage social media/story-ideas/blog-posts.
5. EEC Office of Communications Director and staff for writing and publication manages the EEC Blog, "Naturally Connected" and the "Land Air and Water" webzine.

5.0 Energy Profile

5.1 Energy Usage in Kentucky

One of the first steps undertaken to prepare an effective Energy Security plan is the development of an energy profile. The energy profile provides an indication of the state's dependence on specific fuel types along with the acquisition, processing, transportation, distribution, and marketing systems for those fuels. The data will be used to develop measures that will reduce or lessen the impact of energy emergencies and effectively assist in system operation and restoration during an energy shortage.

Kentucky has a robust network of energy resources and is both a major producer and consumer of energy. In 2022, Kentucky was ranked seventh in the United States in industrial electricity consumption per capita. In 2022, it ranked 14th in total energy consumption per dollar of state Gross Domestic Product (GDP).

Kentucky has over 10,000 miles of electric transmission lines, over 1,700 electric substations, 50 operating power plants, and two wholesale regional power markets plus the Tennessee Valley Authority (TVA).

In 2022, natural gas was used to generate 25% of the electricity produced in Kentucky. Hydropower generated approximately 7% of the electricity produced in Kentucky. Petroleum generated less than 1% of electricity. Other renewable sources generated less than 1% of the electricity produced in Kentucky. Coal was used to generate 68% of the electricity produced in Kentucky.

Coal is the largest energy source in the state. Kentucky ranks fifth in production in the United States mining 28.5 million tons in 2022. Most of the coal produced in the state is exported to the east coast. Of that used within the state, nearly all goes to producing electricity.

In 2022, Kentucky produced 86 Billion Cubic Feet (Bcf) of natural gas–less than one percent of the nation's total. The industrial sector is the largest user of natural gas in the state. Over one-third of the total consumption has gone to serve industry. Kentucky has 32,741 miles of natural gas, hazardous liquids, and hydrocarbon gas liquids pipelines, 20 active natural gas storage areas, and two processing plants. Kentucky has over 2,500 fuel distributors including approximately 240 propane distributors.

There is one operating petroleum refinery in the state with a combined processing capacity of about 283,000 barrels per calendar day. There are also three biofuel plants and one ethylene cracker.

While most crude enters via pipeline from the gulf coast, there is a nominal amount of crude from Kentucky and surrounding states refined here. Kentucky ranks 21st in the nation in consumption of petroleum products, 18% below the national average.

The Kentucky energy profile can be divided into two main elements. One is a depiction by fuel source of the provider industry with supplemental information on the support structure for that energy source. The other is a description of how and where energy is used. This assessment can also include an evaluation of the vulnerability connected to its use and location.

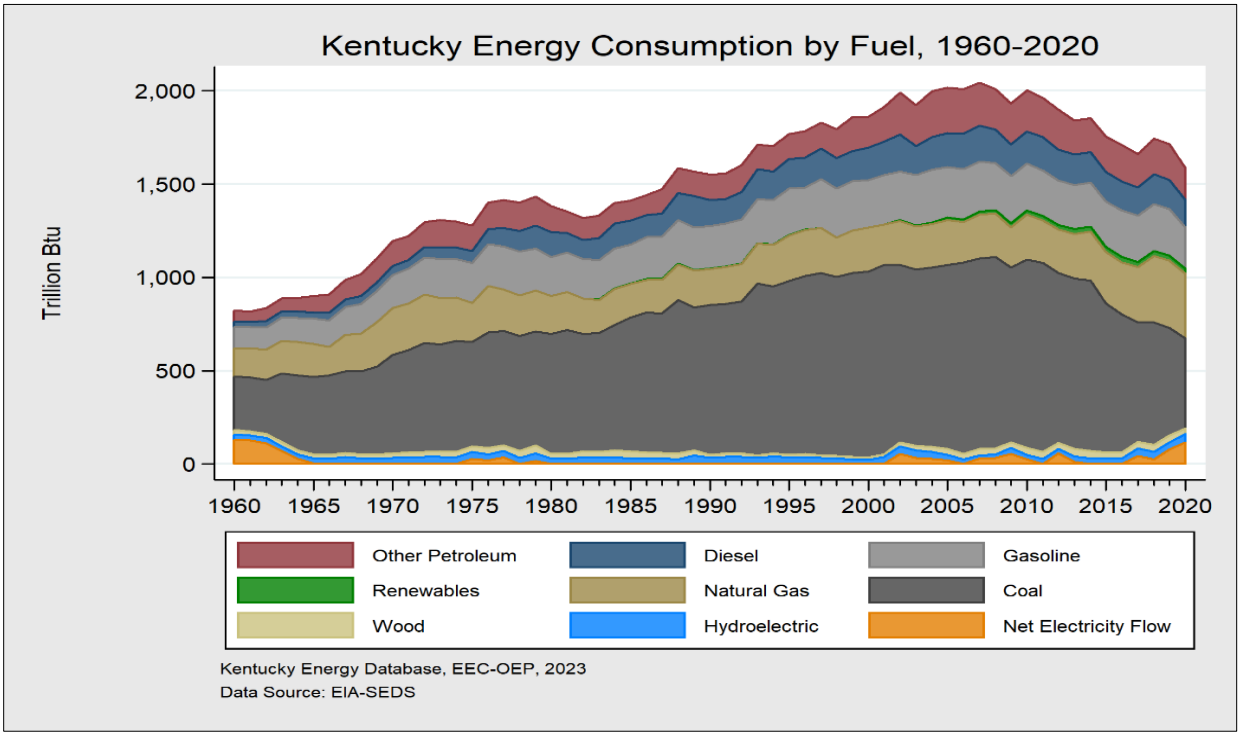


Figure 17: Kentucky Energy Consumption by Fuel, 1960-2020

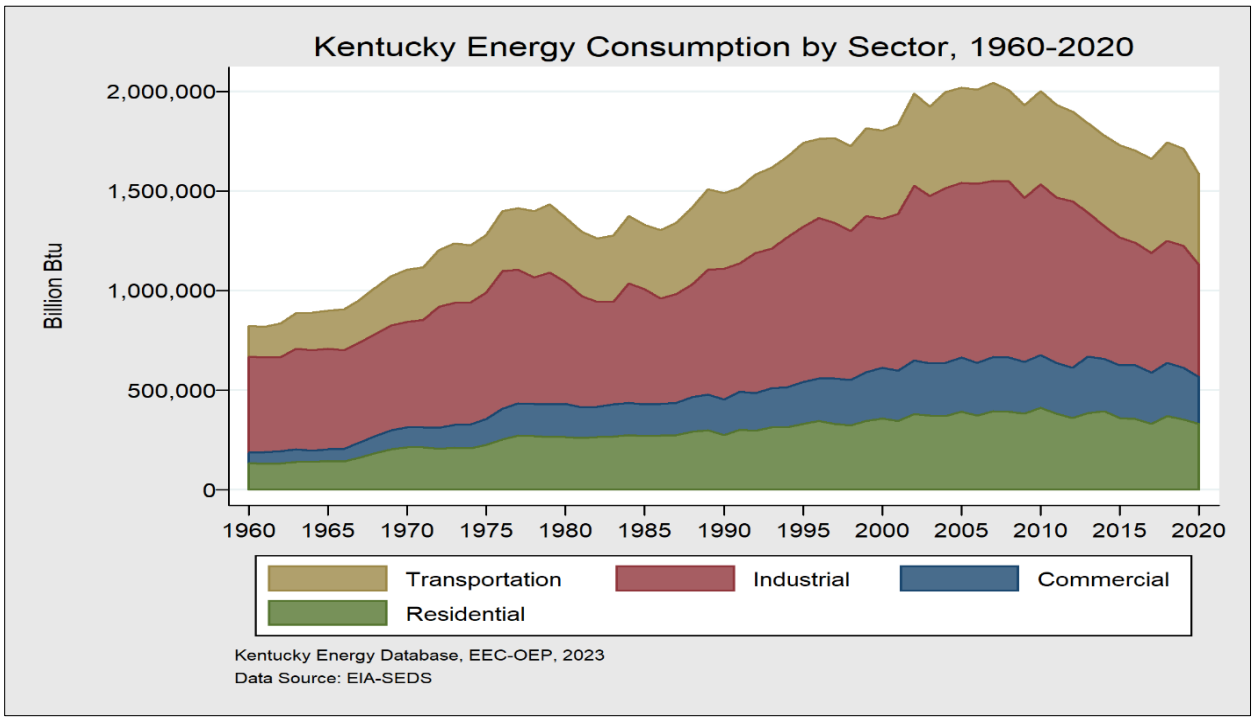


Figure 18: Kentucky Energy Consumption by Sector, 1960-2020

The Energy Information Administration (EIA), a statistical information clearinghouse for the federal government, prepares and compiles much of this data and is a major resource for relevant information. Other information is industry- or location-specific and must be obtained directly from the source. Categories of data include a timeline of usage by source and sector, details of raw material supply, system of volume throughput, material storage volumes and capacities, and transportation providers and routes. Energy emergency plan data may be comparable to or overlap with other more general energy plan data, but it will typically differ due to the focus being on provider and the response to emergencies. Portions of the data released will often need to be general in nature in order not to reveal specific critical assets.

For the ease of use of the ESP, critical data is included in section 6.0-Energy Commodities. This will allow for quick retrieval of vital information in times of energy emergencies. Other necessary, but less critical, information will be included in the ESP's appendices.

5.2 Critical Infrastructure

The identification and understanding of critical infrastructure assets in the Commonwealth are not a direct emergency response activity; it is an examination of the energy infrastructure prior to a disruption. It is important to know where critical infrastructure points are and what alternatives exist that are vital to overall Energy Security efforts.

Both government and private-sector energy providers strive to ensure that production, transmission, and distribution systems are secure and reliable. This assurance, however, is becoming increasingly difficult as the size and interdependency of energy networks increase. Identification and understanding of the critical nodes allow providers to establish a more robust system by reducing vulnerabilities, deterring threats, minimizing the consequences of an attack, lessening natural disaster effects, and improving recovery times.

Given that it's difficult to protect against or completely eradicate all potential hazards, effective emergency plans must prioritize swift and efficient responses to mitigate the adverse consequences of any unforeseen event.

Some of the components to consider are:

- Physical Assets
- Threat Environment (Human and Natural)
- Existing Policies, Procedures, and Plans
- Cyber Security Systems
- Operational Security Networks
- Risk Characterization
- State, Regional, and Local Roles and Responsibilities
- Energy Efficiency and Renewable Energy Systems

This ESP is strongly based on the provision of information and utilization of existing networks and expertise for the identification of and response to energy disruptions. Critical infrastructure identification and protection follow the same format. For the purposes of the ESP, critical node identification has been incorporated from the Department of Homeland Security (DOHS) National Infrastructure Protection Plan. More precisely, it comes directly from the Energy Sector-Specific Plan. The Energy Sector-Specific Plan details how the National Infrastructure Protection Plan risk management framework is implemented within the context of the unique characteristics and risk landscape of the sector. Each Sector Risk Management Agency develops

a sector-specific plan through a coordinated effort involving its public and private sector partners. The DOE is designated as the Risk Management Agency for the Energy Sector. Due to their delicate and sensitive nature, sites and protection mechanisms are not listed directly in this document but have been utilized to develop the Commonwealth's overall energy emergency response. A secure web portal of critical infrastructure, as identified by DOHS, is maintained by the US DOE and available for EEAC reference.

The Homeland Infrastructure Foundation-Level Data (HIFLD) Subcommittee Online Community addresses improvements in collection, processing, sharing, and protection of national geospatial information across multiple levels of government in order to help provide a common foundation for data visualization and analysis.

HIFLD Open includes only publicly available critical infrastructure layers. As part of the HIFLD mission to build a more transparent and collaborative ecosystem for information sharing, the HIFLD Open Portal is integrated with the Geospatial Platform through Data.gov and other data providers.

For layers deemed sensitive or requiring further access restrictions, HIFLD Secure serves as the portal for these datasets. HIFLD Secure contains FOUO and licensed data that is available for download on the DHS Geospatial Information Infrastructure (GII) located at https://gii.dhs.gov. The HIFLD data enhancement process is producing higher-quality versions of legacy HSIP layers that are immediately accessible on the HIFLD Secure portal and include over 125 static data layers.

5.2.1 Cybersecurity

Cybersecurity, which has been a critical component of Energy Security for many years, is not limited to smart grid activities. Prior to widespread deployment of internet-connected devices within energy systems, operators relied on computer software to assist system operators in managing the complex system. However, with expanded integration of remote sensing and direct communications to the software, the vulnerability to malicious cyber-attacks has multiplied significantly. This is primarily due to the increased number of entry points and greater reliance on automation. Modern energy systems' reliance on data movement and information transfer expands and magnifies the possible threats to and vulnerabilities in the system. Cybersecurity plans are essential for the physical security of generation, transmission, and distribution infrastructure.

Cyber with Energy

Energy systems (electric, oil, and natural gas) within Kentucky use computing technologies to manage business systems and to control and monitor the processes and transportation of energy from production/generation to end use. The energy sector relies heavily on both information technology (IT) systems and operational technology (OT) systems.

OT systems include industrial control systems (ICS) that consist of purpose-built hardware, software, and data networks developed specifically for industrial customers. These systems were designed and built using tools and technology created before the Internet and technology boom of the late 90s. While these older systems are still in use, they have evolved and adopted newer technologies, including IT technologies built to allow internet connections.

Today the energy sector is technology driven, and these changes have resulted in many benefits including improvements to efficiency, resiliency, and flexibility. However, cybersecurity vulnerabilities and the capabilities of malicious actors have also changed over the past 20 years. Cyber threats are not limited to personally motivated individuals. Threats also come from well-financed criminal and nation-state groups focused on profit, political gain, or power. The skill level and ability of these groups to compromise Internet-connected, Internet-adjacent, or even traditional ICS assets that were never designed to connect to the internet continues to grow.

Technologies

OT systems interact with the physical environment or manage devices that interact with the physical environment. These systems monitor or control physical devices, processes, and events. Examples include:

- Energy Management Systems and Supervisory Control and Data Acquisition (SCADA)
- Oil refinery, gas processing, and electricity generation distributed control systems (DCS)
- Pipeline pump/compressor stations and electrical substations
- General industrial control systems used in energy processes

A key area of distinction between IT and OT systems is that a cyber incident within energy OT systems can result in a physical consequence in addition to potential losses of data or damage to an organization’s reputation. Some differences in the possible consequences/impact of an attack on an IT system compared with an OT system are described below.

	Information Technology	Operational Technology
Impacts	• Brand damage/ loss of confidence in company • Loss of personally identifiable information (PII) • Loss of business data • Customer/supplier payment issues	• Operator loses visibility into operations • Operator forced to switch to manual operations mode • Supply fails to meet demand • Disruption to basic daily activities – loss of power or access to fuel. • Health, safety, and economic impacts • Impacts from prolonged disruptions can cascade into larger consequences

Figure 19: Potential Impacts of a Cyber Attack on Energy Infrastructure

A cyber-physical event can cause loss of power or access to fuel, initiate prolonged cascading impacts, create potential risks to health and safety, and result in economic impacts to not just the company but to the people and businesses that rely on that energy. For cybersecurity best practices for industrial control systems, CISA and DOE created an infographic outlining key areas of consideration, listed in the above table.

For more than a decade, energy and utility organizations have been tasked with meeting standards from the North American Electric Reliability Corporation (NERC) and mandated by the Federal Energy Regulation Commission (FERC). NERC Standards provide a cybersecurity framework for the identification and protection of Critical Cyber Assets to support reliable operation of the Bulk Electric System. These standards recognize the differing roles of each entity in the operation of the Bulk Electric System, the criticality and vulnerability of the assets needed to manage Bulk Electric System reliability, and the risks to which they are exposed.

The U.S. Department of Homeland Security created the Pipeline Cybersecurity Initiative (PCI) and has charged the Cybersecurity and Infrastructure Security Agency (CISA) and the Transportation Security Administration (TSA) with assessing cybersecurity risks to the Nation's pipeline infrastructure—with a focus on Oil and Natural Gas (ONG) pipelines. This effort aligns CISA's cybersecurity resources, the TSA's pipeline security relationships and authorities, and the Department of Energy (DOE) energy sector expertise with industry knowledge and experience to

identify cybersecurity risks and develop risk strategies to prepare for, respond to, and mitigate major cyber events and strengthen the security and resilience of the Nation's pipeline infrastructure.

The Kentucky Intelligence Fusion Center is created within the KOHS and codified into state law to improve intelligence sharing among public safety and public service agencies at the federal, state, and local levels.

The ultimate goal is to provide a mechanism where law enforcement, public safety officers and officials, and the private sector can come together with a common purpose to improve the ability to safeguard our homeland and prevent cybersecurity attacks and criminal activity.

The Commonwealth Office of Technology operates the Office of the Chief Information Security Officer and is responsible for IT security functions. The Office works with the entire enterprise to establish the best security practices and risk management processes, and deploys strategies aimed at protecting and securing the Commonwealth's data. The Office also plays a major role in promoting security awareness.

The National Association of Regulatory Utility Commissioners (NARUC) has developed the Cybersecurity Manual, a comprehensive suite of cybersecurity tools, to help Public Utility Commissions (PUCs) gather and evaluate information from utilities about their cybersecurity risk management and preparedness. Components of the Cybersecurity Manual can be used individually but are designed to work together. NARUC's intent is to provide a comprehensive set of assessment tools that, when applied, provide a consistent, complete view of utilities' cybersecurity preparedness.

The National Association of State Energy Offices has also issued the Enhancing Energy Sector Cybersecurity: Pathways for State and Territory Energy Offices. State Energy Offices' roles in cybersecurity vary across the nation. Some have an active or a formal role while others do not. The SEO-EEC's role in Kentucky in cybersecurity is limited to coordinating with state government agencies and across the public private sector nexus on situational awareness of cyber security events.

On April 13, 2016, the PSC issued Order 2012-00428 on Consideration of the Implementation of Smart Grid and Smart Meter Technologies. In that order, the Commission concluded that:

"The Commission agrees with the Joint Utilities that a mature, effective cybersecurity process is one that is continuously evolving to address new cyber threats. However, the Commission believes that each utility should have some form of cybersecurity plan in place beyond the FERC or NERC mandatory standards. Therefore, the Commission will require that the Joint Utilities develop internal procedures addressing cybersecurity."

Given the sensitivity of cybersecurity concerns, the Commission also concluded that:

"The utilities should be allowed to keep their procedures confidential. The Commission, therefore, will not require each utility's actual internal procedure be filed; rather each utility will be required to certify the development of cybersecurity procedures. The utilities will be required to make a presentation describing their procedures to the Commission (and the AG), should he wish to attend. In addition, the Joint Utilities will be required to continue to make cybersecurity presentations every two years to the Commission through the Track Meeting process."

See Appendix I for a Cyber-Security PSC order 2012-00428.

Cybersecurity Threats

The Annual Threat Assessment that the Office of the Director of National Intelligence (ODNI) released in 2022 emphasizes, as it has in the past, that cyber threats from nation states remain acute. ODNI's concerns are focused on Russia, China, Iran, and North Korea, all of whom currently possess the ability to remotely damage infrastructure in the US or compromise supply chains. We know that adversaries – whether politically, socially, or financially motivated – are targeting our nation's energy infrastructure and the digital supply chain. Graphics below show categories of different kinds of threat actors and different kinds of cyber-attacks used by attackers.

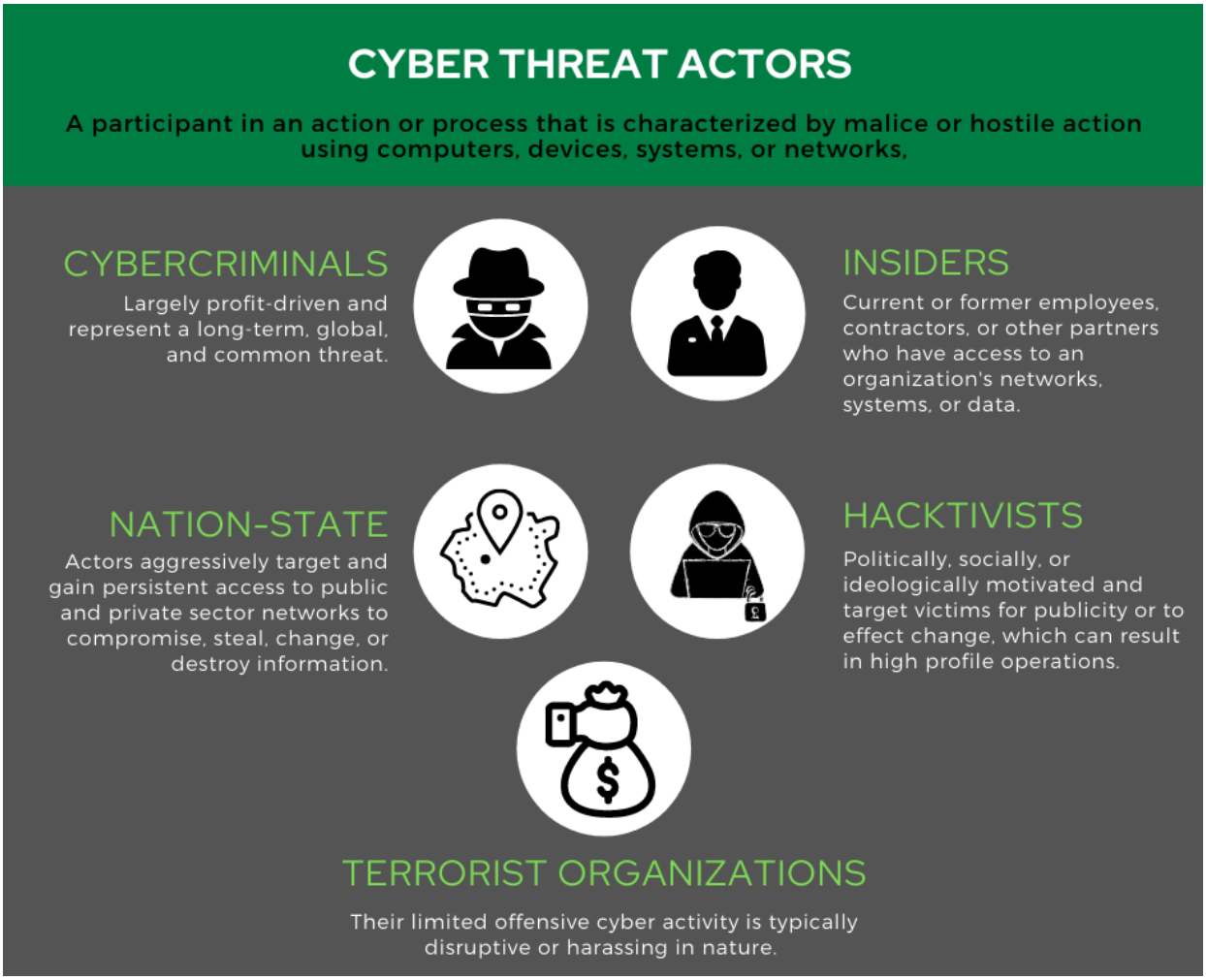


Figure 20: Cyber Threat Actors

The energy sector is uniquely significant in that it serves as the backbone for all other critical infrastructure sectors, providing the essential power and fuel required for continuity of operations. Unfortunately, this makes the Nation's energy infrastructure an attractive target for cyber-attacks. While 100% security is not possible, many steps can be taken to harden OT systems to mitigate against these threats.

Understanding the current and evolving threat landscape as well as possible consequences of a cyber-physical event can help state officials and energy owners and operators understand risks. Knowledge about risks can then be used to prioritize investments, such as purchases, staff resources, and training, based on the kinds of threats and vulnerabilities that pose the greatest risks to an organization. Investments can be focused on areas that can mitigate the highest risks.

Because the majority of the nation's critical infrastructure is owned and operated by private companies, both the government and private sector have a common incentive to reduce the risks of disruptions to critical infrastructure. The National Infrastructure Protection Plan (NIPP) recognizes that public-private partnerships are vital to keeping critical infrastructure safe and secure, including from cyber-attacks.

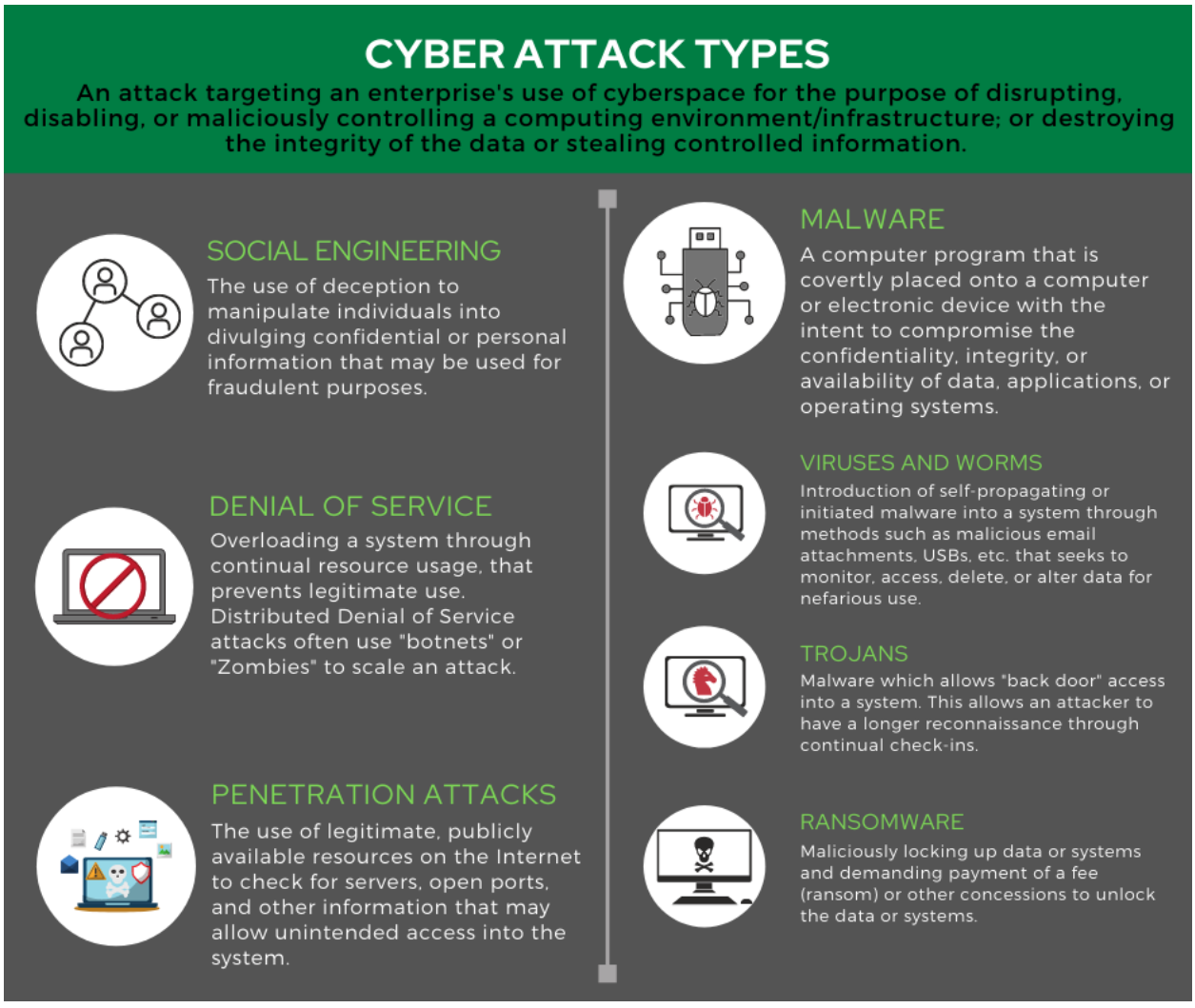


Figure 21: Cyber Attack Types

Federal and State Cyber Information Sharing

Cybersecurity information sharing is vital and ideally bi-directional. This includes sharing cybersecurity best practices, guidance, and trends; information on emerging cyber threats and

vulnerabilities affecting energy sector stakeholders; and real-time information sharing during the response and recovery stages following a cyber event.

Robust, timely, actionable information is crucial to all partners because each has a unique role to play in protecting critical infrastructure against cybersecurity threats as well as participating in a coordinated response should a cyber incident occur.

The Commonwealth of Kentucky engages in information sharing through a variety of mechanisms whereby the state receives, analyzes, and/or shares information with energy and emergency officials and energy industry partners. This may include but is not limited to the following:

- Actively monitoring announcements and alerts from Information Sharing and Analysis Centers (ISACs).
- Testing cyber information sharing mechanisms through exercises.
- Facilitating or attending threat briefings (unclassified or classified).
- Distributing actionable indicators or detection signatures of malicious activity, vulnerability information, courses of action (to proactively defend or to stop and remediate an attack), and cyber threat intelligence.
- Incentivizing industry participation in federal cyber information sharing programs.
- Fusion center practices may include bi-directional information sharing with the sector, briefings, or other outreach.
- Public utility commission holds formal or informal discussion with utilities about cybersecurity strategies, plans, and challenges.
- State facilitates informal energy CISO or industry group calls to share cybersecurity updates, trends, and questions.

CESER-Supported Resources for Assessing Cyber Maturity

The Department of Energy's Cybersecurity Capability Maturity Model (C2M2) enables organizations to voluntarily measure the maturity of their cybersecurity capabilities in a consistent manner through a publicly available tool.

The American Public Power Association (APPA) developed the Public Power Cybersecurity Scorecard, an online self-assessment tool for municipal utilities to evaluate their cybersecurity programs and overall posture. This tool is based on C2M2 and builds upon the assessment with additional resources.

The National Rural Electric Cooperative Association (NRECA) developed the RC3 Cybersecurity Self-Assessment. The assessment, available either hardcopy or online, is designed to help cooperatives understand their cybersecurity posture and is part of the larger Rural Cooperative Cybersecurity Capabilities (RC3) Program. The RC3 program develops and provides tools and resources focused on improving the cybersecurity capabilities of cooperatives. The program also provides opportunities for collaboration, education, and training.

The National Association of Regulatory Utility Commissioners (NARUC) has developed a suite of cybersecurity resources for public utility commissions (PUCs), including *Understanding Cybersecurity Preparedness: Questions for Utilities*. These resources may be useful in preparing an SEO for a conversation with their state's PUC about cybersecurity, the overall maturity levels of the state's regulated utilities, and where gaps need to be addressed.

Resource	Members	Description
Multi-State Information Sharing and Analysis Center (MS-ISAC)	ESF-12 Leads	The MS-ISAC is dedicated to improving the overall cybersecurity posture of state, local, territory and tribal (SLTT) governments, and is a resource for information on cyber threats to critical infrastructure. **Kentucky** members of the MS-ISAC can share threat information to the energy sector when appropriate.
Electricity Information Sharing and Analysis Center (E-ISAC)	Electricity owners and operators in North America Approved individuals at states with energy emergency response roles	The E-ISAC provides information and resources to help the North American electricity industry prepare for and defend against both cyber and physical security threats.
Oil and Natural Gas Information Sharing and Analysis Center (ONG-ISAC)	Public and private ONG companies, select collaborators and partners, subject to membership requirements.	The ONG-ISAC serves as a central point of coordination and communication to aid in the protection of exploration and production, transportation, refining, and delivery systems of the oil and natural gas (ONG) industry, through the analysis and sharing of trusted and timely cyber threat information, including vulnerability and threat activity specific to ICS and SCADA systems.

Downstream Natural Gas Information Sharing and Analysis Center (DNG-ISAC)	Natural gas utility companies.	The DNG ISAC serves natural gas utility (distribution) companies by facilitating communications between participants, the federal government and other critical infrastructures.

Figure 22: CESER-Supported Resources for Assessing Cyber Maturity

Note: The U.S. Department of Energy's Office of Cybersecurity, Energy Security, and Emergency Response (CESER) intends to expand this cyber-specific state resource based on state feedback and needs in late 2022.

5.3 Energy Information and Analysis

Information and the ability to manage it properly are vital to any emergency response effort. This ESP is heavily weighted toward information and data management that will assist direct responders in emergency management activities. Three separate but interrelated undertakings have been developed that will be utilized to provide information and analysis of energy disruptions that occur in the Commonwealth. They are:

- the development of a comprehensive database
- a statewide energy profile
- GIS and Data visualization tools for understanding existing energy modeling platforms

5.3.1 Data Collection and Organization

The SEO-EEC has assembled a comprehensive database detailing energy, environmental, and economic statistics to provide quantitative analysis and policy interpretation of issues related to Kentucky's energy infrastructure. A product of this effort, the Kentucky Energy Database is a summary of time series data sets encapsulating energy-related statistics for the Commonwealth for the period from 1950 to 2022.

The majority of the variables located in this database were acquired from publicly available resources, primarily the DOE State Energy Data System (SEDS). This data system is produced and maintained by the U.S. Energy Information Administration (EIA). Since the SEDS does not contain many critical variables (particularly economic, socioeconomic, and environmental) required for a holistic analysis of energy systems, many other Kentucky subject-specific data sets were incorporated into the database to provide a more comprehensive system to utilize.

This database is the first comprehensive effort of this nature to be developed in Kentucky and

will serve a number of purposes. Among them are:

- Serve as an impartial repository of energy statistics for the public, researchers, and policy makers.
- Provide an understanding of the dynamics of energy consumption and production activities within the Commonwealth.
- Support the Commonwealth ESP that identifies potential threats to energy systems in Kentucky and facilitates the restoration of energy supplies in the event of an emergency.

A direct outcome of the database is the Kentucky Energy Profile 2023. The summary statistics of the Kentucky Energy Database provide an annual snapshot of energy consumption and production within Kentucky.

5.3.2 KY Energy Profile

In order to ensure the Commonwealth's energy systems are operating normally, the first step is to define "normal operations". To understand normal operations, the SEO-EEC utilizes the Kentucky Energy Profile for emergency planning and disruption tracking purposes. This profile summarizes the various energy systems currently operating in Kentucky.

The Profile includes data on energy production and usage in various forms across all energy sectors. In addition, it examines in specificity the production, generation, and transmission systems associated with all energy commodities. Particular attention is paid to network elements with critical system functionality. The profile includes information on the geospatial distribution of energy providers and facilities within the state, along with cataloging contacts for corporations and individuals responsible for their operation.

The foundation of the Kentucky Energy Profile 2023 consists of one summary time series data set and four supporting multidimensional panel data sets, each with a different unit of observation. The profile is a platform where statistics and time series analyses can easily be used to generate answers to energy-related questions of interest across many topical areas. The profile provides a comprehensive assessment of energy consumption and production within the state by supplying detailed summary statistics and identifying time series trends. The information can be developed into charts, quantitative tables, analytic graphics, and maps.

In addition to and in conjunction with profile development, the SEO-EEC also monitors various sources for information on energy systems at the local, state, national, and international levels.

Information collected or examined includes reports from federal and state agencies, professional association forecasts, academic publications, news reports, and direct observation when possible. The SEO-EEC will compare this information against the base year established in the profile to determine inconsistencies, issues, and trends. In the event that problems are identified, they will initiate the procedures outlined in this ESP and dictate that actions be taken to address the problems in a timely manner. The 2023 Energy Profile can be found in Appendix E.

5.3.3 Energy Risk Assessment and Vulnerabilities

Risk assessments assist decision makers with securing and building resilient infrastructure, while providing a better understanding about the impacts of disruption to energy infrastructure. Identifying vulnerable energy infrastructure nodes and understanding the interdependencies between community lifelines and susceptibility to an energy disruption are critical to emergency planning and emergency response.

Determining the risk associated with energy systems and energy infrastructure is a complex, continuous, and ever-changing process that involves the whole community. All disasters start and end at the local level, therefore, local governments, emergency response planners, critical facility owners, and emergency managers should first understand the complexities of the community's energy needs and capabilities. Understanding this basic data helps tailor engagement strategies and shape programs to meet the various needs for energy resilient investments that ultimately lead to a more efficient use of existing resources, regardless of the size of the incident or community constraints.

The Office of Cybersecurity, Energy Security, and Emergency Response (CESER) has developed State Energy Risk Profiles that examine the relative magnitude of risks at a State level, highlighting energy infrastructure trends and impacts. The profile presents both natural and man-made hazards with the potential to cause disruption of the electric, petroleum, and natural gas infrastructures.

Below are example data sets and maps that highlight Kentucky's risks and hazards overview 2009-2019 from this profile and the Energy Infrastructure Risk application. Please refer to Appendix E of the ESP, attachment #1 for the full version of the KY Energy Sector Risk Profile, and section 1.5.1 for examples of energy sector interdependencies.

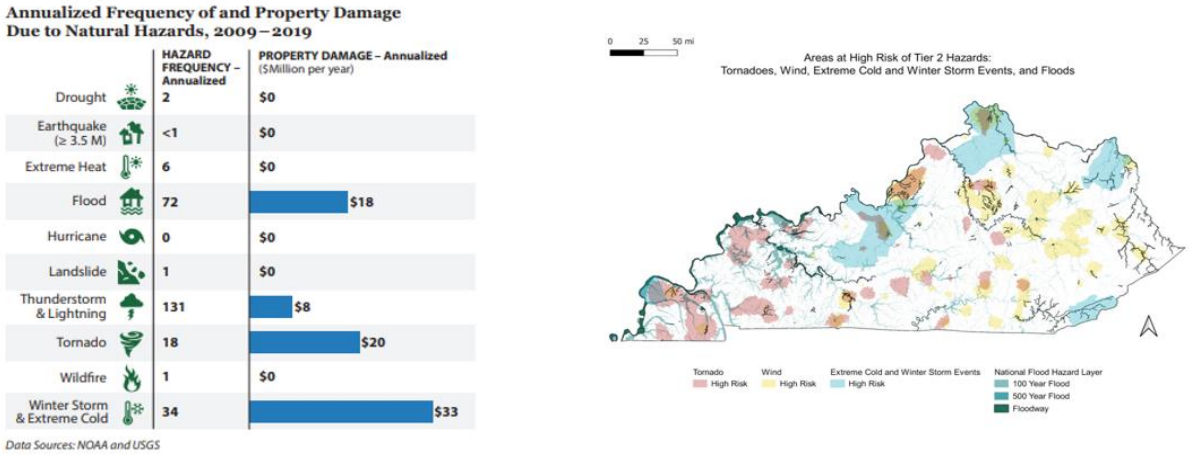


Figure 23: Kentucky Risks and Hazards Overview 2009-2019

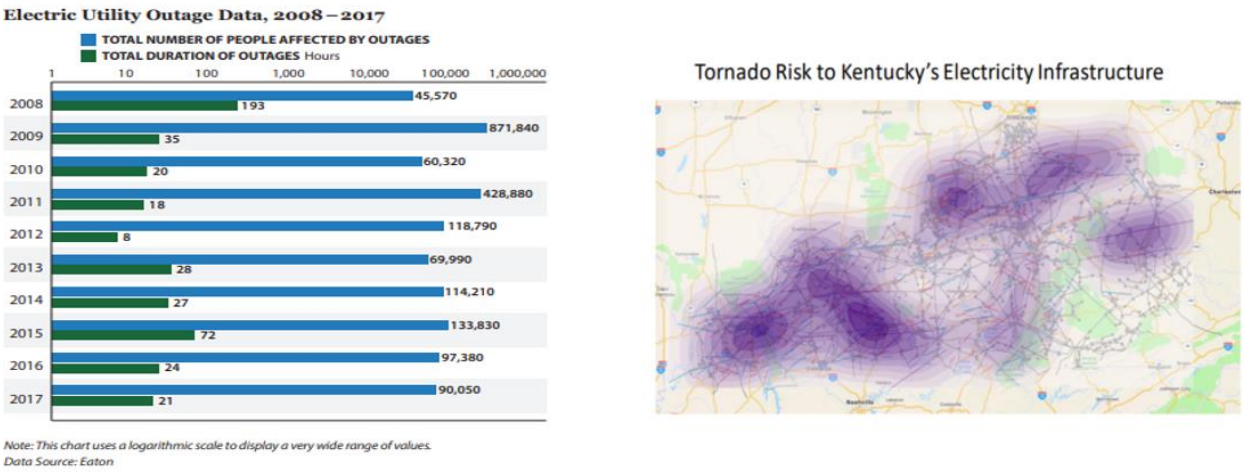


Figure 24: Electric Outages and Tornado Risk Areas

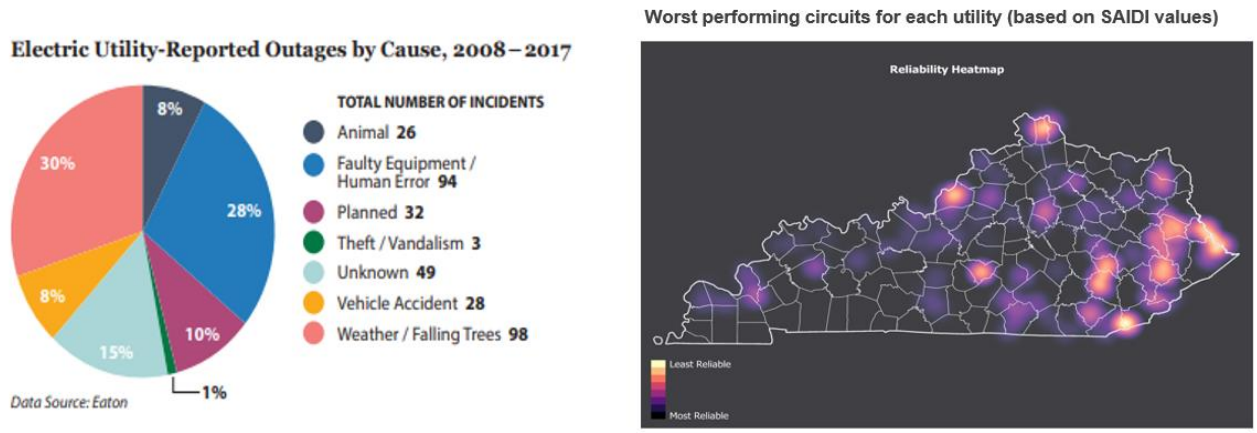


Figure 25: Electric Outages and Reliability Heat Map

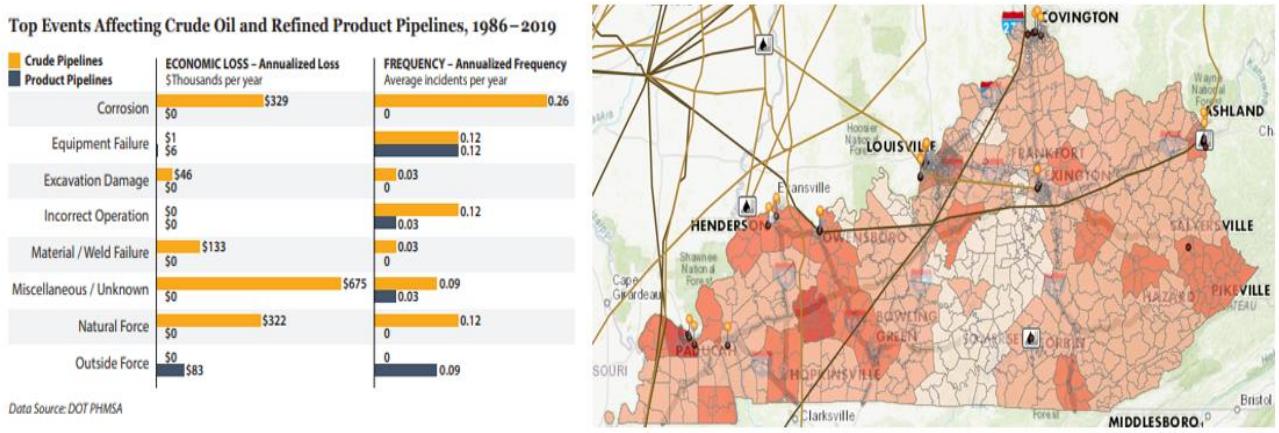


Figure 26: Petroleum & Crude Oil Pipeline and Annual Flooding

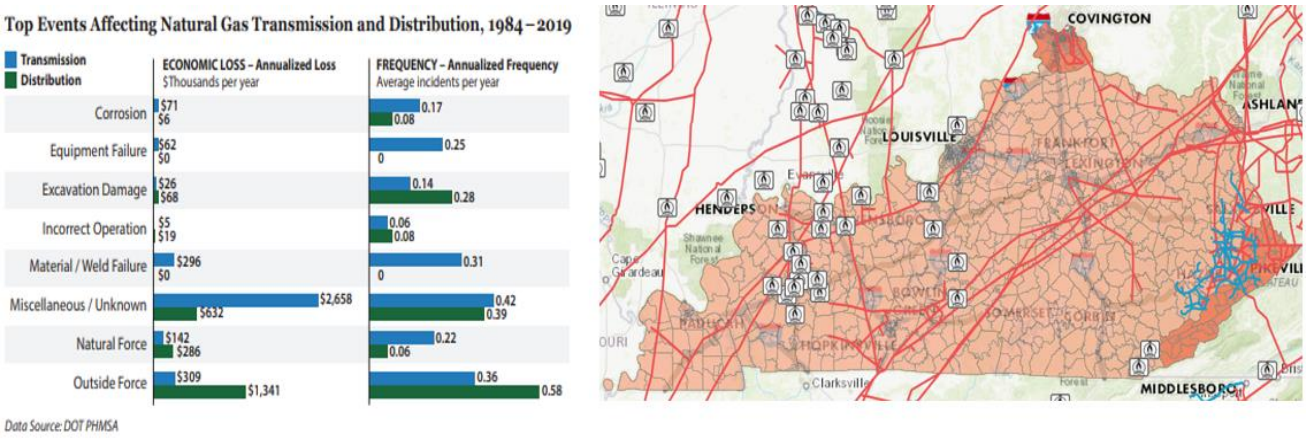


Figure 27: Natural Gas Transmission & Distribution and Winter Weather

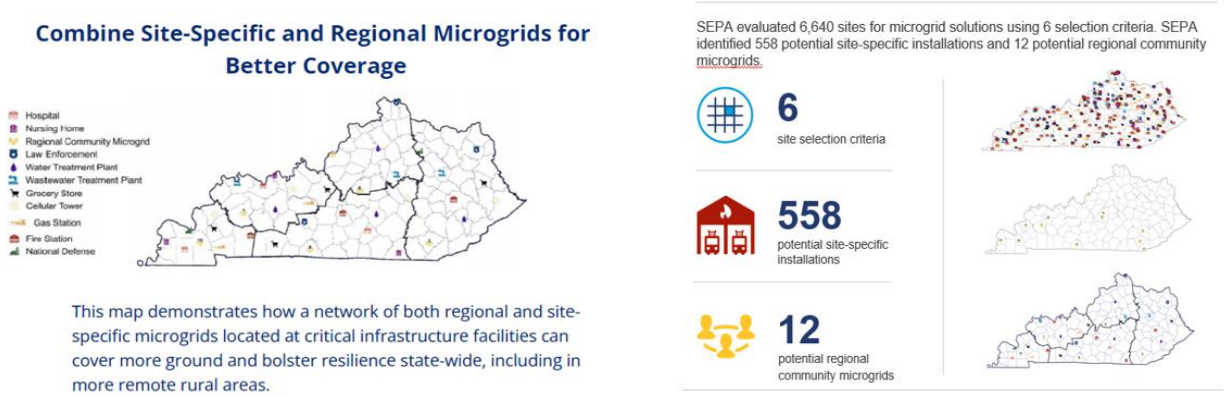


Figure 28: Kentucky Micro-grid Deployment Map 2021

Vulnerabilities

The EEC-SEO utilizes The FEMA National Risk Index for data collection and understanding risks and vulnerabilities in our communities. The National Risk Index is a FEMA online mapping application that identifies communities most at risk to natural hazards. These maps visualize natural hazard risk metrics that include expected annual losses from natural hazards, social vulnerability, and community resilience. The National Risk Index's interactive web maps are at the county and Census tract level and made available via geographic information system (GIS) services for custom analyses. This data presents a holistic view of community risk to natural hazards and supports resilience efforts by providing an overview of multiple risk factors.

In the National Risk Index, risk is defined as the potential for negative impacts as a result of a natural hazard. The equation behind the index is illustrated below.

Figure 29: FEMA National Risk Index Metrics

An illustration of vulnerabilities for the 18 natural hazards for the Commonwealth of Kentucky is depicted below. These vulnerable areas are viewed in context to supply chain infrastructure for the various energy commodities contained within these geographic areas. Supply Chain diagrams can be found in Section 6.0: Energy Commodities of this ESP.

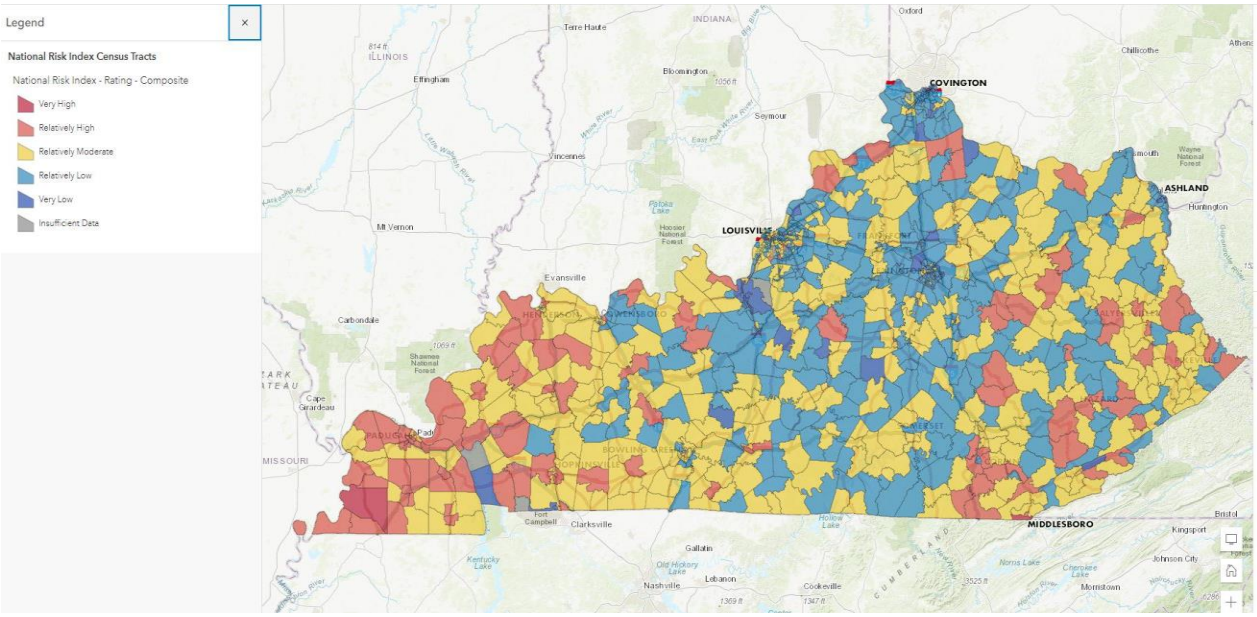


Figure 30: Kentucky ALL Hazards Map

5.3.4 Identification of Potential Threats

Recognizing that preparedness is a shared responsibility, the National Preparedness System calls for everyone—not just government agencies—to be involved in preparedness efforts. Community-wide involvement is an important principle in preparedness that entails involving stakeholders throughout preparedness development and ensuring preparedness materials reflect their roles and responsibilities.

The Threat and Hazard Identification and Risk Assessment (THIRA) is a three-step risk assessment process that helps the Commonwealth's communities understand their risks and what they need to do to address those risks.

Kentucky communities will use the THIRA to identify their threats and hazards and the effect on their holistic community, impacts that could take place, and capabilities that each community should have in preparation for the possible impacts of their identified threats. KYEM oversees the THIRA processes with local communities.

The data from the THIRA process is used in determining Kentucky's jurisdictional capability gaps. The process becomes the Stakeholder Preparedness Review (SPR). During the SPR process, communities complete a self-assessment of their current capability levels against the targets identified in the THIRA. Using the targets from the THIRA, communities identify their current capability and how that capability changed over the last year, including capabilities lost, sustained, and built.
Communities will identify capability gaps related to planning, organization, equipment, training, and exercises, and indicate their intended approaches to address those gaps while also maintaining their current capabilities.

From a statewide perspective, the Commonwealth is subject to threats from a variety of natural and man-made disruptions.

Potential Energy Disruption Causes

- Natural Disasters
  - Earthquakes
  - Fires
  - Flooding
  - Ice
  - Wind
  - Snow
  - Extreme Heat and Cold
  - Hurricanes
- Production or Supply Variations
  - Market Forces
  - Curtailments
  - Labor Disputes
  - Import or Export Restrictions
  - Cyber attacks
- Regulatory Changes
  - Environmental
  - Labor
  - Tax Structure
- Energy Price Changes
- Reports or Alerts from Energy Providers
- Terrorism Warnings or Actions
- Pathogenic Threats

Kentucky disaster events

According to FEMA, in the past two decades Kentucky has declared disasters for 23 severe storms, 7 flooding events, 2 fire events, 2 tornado events, 2 snowstorms, 3 severe ice storms, 2 biological events, and 1 hurricane, that resulted in significant damages to critical infrastructure across the state and billions in damages. Significant disaster events to Kentucky are listed below.

On January 26, 2009, precipitation began as light freezing drizzle and freezing rain over an entire area but changed into sleet then snow overnight. Up to 9 inches of snow and two inches of ice accumulated over the 2-day event. Subsequent high winds delivered the second half of the one-two punch that paralyzed much of Kentucky and created a dangerously beautiful "Frozen State". The storm caused Kentucky's largest power outage on record, with 770,000 homes and businesses without power and widespread property damage due to falling trees, large tree limbs and power lines weighed down by ice, totaling over 1 billion in damages. Electric and heat went out for days and even weeks in some of the state. Such basics as food, water, and gas were difficult to obtain. The commonwealth lost 36 citizens and for the first time, the entire Kentucky National Guard was deployed.

Fort Knox, the United States Bullion Depository, is a fortified vault building operated by the United States Department of the Treasury, and stores over half the country's gold reserves, was caught completely off guard and unprepared as they went without power and water for up to 10 days. Leadership at that time vowed to never allow a crisis of this type to reoccur. With that decision came the need for a surge of installation-wide strategic thinking focusing on energy and infrastructure resilience.

Fort Knox partnered with Nolin Rural Electric Cooperative Corporation (RECC) to deliver an energy security micro-grid project that incorporates 44 MW of new power generation, comprised of 8 MW of Compressed Heat and Power (CHP) natural gas generators, 16 MW of peak-shaving natural gas generators, and 20 MW of diesel emergency backup generators. The newly installed CHP generators are deployed at three different sites on post, chosen for being critical infrastructure and prime locations for the thermal load produced by the CHP systems. Natural gas is partially supplied from the Devonian Shale that lies underneath Fort Knox, through a utility privatization contract held by Nolin RECC. This allows for the capability to operate independently from external power sources.

Fort Knox, Kentucky, is a uniquely capable installation that even has the ability to produce its own power and water. The installation is the foundation for military readiness and resilient infrastructure, ensuring our forces are ready when called upon. Fort Knox learned the hard way in regard to resilience but has emerged as a leader within the Department of Defense (DOD).

On December 10, 2021, a violent, long-track tornado entered western Kentucky shortly before 9:00 p.m. CST. The EF-4 tornado reached speeds of 190 mph and covered over 165 miles in about three hours, claiming 81 lives and injuring over 500 people in eight counties. The tornado was the deadliest in U.S. history to occur in the month of December. Its path length of 165 miles was the ninth longest tornado path ever recorded in the U.S. It's documented that 3,000 structures were damaged and 1,800 destroyed, including an entire factory in the City of Mayfield, resulted in damage costs up to $315 million.

Peak statewide electric outages reached 100,000 + with three utilities unable to report due to catastrophic damage to communication systems. Both generation and transmission cooperatives, two IOU's, TVA and multiple electric utilities were heavily impacted due to critical transmission damage to over 10,000 utility poles, numerous transmission lines down, and extensive damage to power distribution systems. The City of Mayfield substation and water tower were heavily damaged, along with its historic district and city water systems.

With the power grid compromised and critical facilities and services without power, multiple requests for generators poured in from across this state. Due to catastrophic damaged to the energy infrastructure, restoration was prolonged and the request for emergency fuel quickly followed. The SEO-EEC and KYEM coordinated with the Kentucky Petroleum Marketers Association (KPMA) for emergency fuel procurement contracts.

This event exercised the states capability to develop and procure a Statewide Master Agreement with an emergency fuel provider so counties can request fuel deliveries during an emergency directly from supplier.

Between December 23-26, 2022, dangerous winter weather conditions swept over the majority of the Central and Eastern U.S., bringing the coldest recorded Christmas in decades to major cities. By December 25, more than 55 million were under wind chill alerts. The storm, known as Winter Storm Elliott and the freezing temperatures led to a surge in heating demand that pushed utilities and grid operators to the brink across the Commonwealth. Friday, Dec. 23rd, was the coldest day of the year in Louisville at negative 5 degrees, according to the National Weather Service of Louisville. The demand for home heat broke many utilities' records for daily total energy usage. PJM issued an Emergency Load Management Reduction Action and a NERC level EEA2 was issued. PJM utilities in Kentucky include Duke Energy, Kentucky Power, and East Kentucky Power Cooperatives. This resulted in demand response actions and voluntary energy conservation measures from customers.

For the 1st time in their existence, as a result of generator and natural gas system failures, the Tennessee Valley Authority and LG&E/ KU were among the utilities that engaged in rolling blackouts to avert significantly more widespread power outages. Winter Storm Elliott highlighted the vulnerabilities of Kentucky's natural gas infrastructure and the impact of a regional weather that strains capacity of neighboring utilities. FERC and Regional Grid Operators along with all impacted utilities have initiated after action and reliability measures to protect against a future event.

On March 3, 2023, an intense low-pressure system produced severe weather and historic gradient winds to the Lower Ohio Valley. Wind gusts of 60-80 mph produced widespread wind damage and snapped more than 1,000 utility poles and threw trees and other debris on power lines. The peak outage was approximately 550,000 statewide. All 26 of Kentucky's electric cooperatives sustained damage in this event, with the smallest co-ops reporting damages totaling 1 million alone. This is the third-most significant weather event in 20 years in terms of total system impact and the number of customers affected, ranking behind the 2009 ice storm and 2008 windstorm. While significant and historic, restorations efforts highlighted how response and restoration activities have improved with repeated exercises and events. Mutual aid crews poured in from 60 sister co-ops in 11 states to support power restoration, which occurred over 4 days rather than over weeks as experienced a decade earlier.

Specific threats to the energy sector are illustrated below.

Threats and Potential Impacts to Energy

Hazard	Power	Natural Gas Liquid Fuels
Cyber Incident	Informational technology and operational technology systems can be impacted; this can include company data, payment and scheduling systems, sensors, and control systems.	
Drought	Reduced hydroelectric generation due to low water levels. Reduced efficiency at thermoelectric generation facilities if there are constraints on steam or cooling.	May limit drilling activity if alternative water supply is not available. Impacts to biofuel feed stocks from low moisture in soil. Low water levels can prevent barge traffic on inland waterways. May limit drilling and refineries operations if alternative water supply is not available.
Dam Failure	Damage to downstream infrastructure due to flooding and debris. Hydroelectric power generation may be disrupted, which may also reduce black start capabilities.	Unearthing and rupturing of pipelines. Unearthing and rupturing of pipelines.
Earthquake	Damage to infrastructure.	

	Examples: power generation facilities, transmission poles, etc.	Examples: pipeline rupture, processing plants, well sites, compressor stations. Examples: pipeline rupture, refineries, well sites, pumping stations.
Equipment Malfunction	Line arcing, power surges, corrosion, or moisture on equipment can cause equipment to malfunction or go offline.	Corrosion, material failure, excess pressure buildup, or control malfunctions can cause supply disruptions,
Extreme Heat	Increased demand for cooling. Depending on the available capacity, this can cause ISOs to operate below reserve margins. Increased risks of wildfires from power lines.	Can reduce efficiency at refineries.
Flood	Damage to equipment exposed to water and debris. Examples: power generation equipment, control center buildings, transmission lines.	Examples: processing plant units, LNG export facilities, underground pipelines. Examples: refinery process units, tanks underground pipelines.
Landslide	Damage to nearby infrastructure due to debris or foundation impacts.	
Man-made Damage	Deliberate physical attacks on or takeovers of infrastructure. Human error can cause facilities to run outside of designed parameters. Transmission lines may be impacted by individuals hitting power poles, cutting trees down, or striking underground wires.	Third-party strikes of pipelines can rupture lines.
Pandemic	Shifts in demand and reduced worker availability. Damage to infrastructure from high winds, debris, and flooding.	
Tropical Cyclone	Examples: power generation facilities, transmission poles, etc.	Examples: pipeline pumps, tanks. Examples: pipeline pumps, tanks. Production facilities and refineries may shut down ahead of storm for personnel safety. Shoaling in ports can prevent ship and barge traffic to terminals.
Thunderstorm and Lightning	Blown transformers and downed trees may impact power lines.	Power outages may impact select electric compressor operations. Power outages may impact refinery, terminal, or pumping operations.
Tornado	High winds can cause damage to power lines and power generation facilities.	High winds can cause damage to processing plants, compressor stations, metering and regulating stations, and other above-ground facilities. High winds can cause damage to refineries, terminals, and other above-ground facilities.

Wildfire	Damage to power lines and power generation facilities. Utilities may shut off power to prevent wildfires (e.g., high temperatures and high winds).	Combustible material if exposed, primarily impacting above-ground infrastructure.
Winter Storm and Extreme Cold	Freezing in cooling towers preventing electric generation. Rail freezing impacting feedstock to power generation (e.g., coal). Increased demand for heating can add strain to available capacity causing RTOs/ISOs to operate below reserve margins.	Freezing may impact non-weatherized equipment, which can cause production shut-ins. Increased demand for heating can strain capacity. Freezing for non-weatherized equipment (including frozen product within the piping system), malfunctioning flow control equipment, flaring, and production shut-ins. Increased back-up generator demand.

Figure 31: Threats and Potential Impacts to Energy

5.3.5 Energy Modeling

The SEO-EEC relies on a number of external models developed by outside entities to perform more advanced or specialized data analysis needed by the Cabinet, including but not limited to:

- State and Local Planning for Energy (SLOPE) Platform from the National Renewable Energy Laboratory
- Engage from the National Renewable Energy Laboratory
- Greenhouse Gas Inventory from the Environmental Protection Agency
- The Jobs and Economic Development Impact models from the National Renewable Energy Laboratory

The data and modeling team at the SEO-EEC is constantly evaluating and discovering new applications from trusted entities like the nation's national laboratories to better inform and serve stakeholders within the state. The SEO-EEC goal is to integrate the latest technology and modeling techniques to achieve the strategic goals as outlined in the state energy strategy and the EEC strategic plan.

5.4 Energy Supply Disruption Tracking

This section describes the process by which the SEO-EEC will maintain a historical record of energy disruption events. Through observing and recording the type and duration of disruptions,

the responding organizations, and the specific restoration efforts, a historical perspective on the factors behind disruptive events can be ascertained. Over time, this information will be evaluated to identify trends and vulnerabilities and to refine response methods and mitigation plans.

The Energy Disruption Tracking process is viewed as a collection of energy disruption events, with details of each individual disruption. It should be noted that tracking individual disruptive events in detail is one of the primary functions delineated in the KYESP and referenced in the tracking log described below. The ESP establishes the procedure for the identification of disruptions or emergency events and describes the process for the compilation of situational reports. Collectively, these events create a chronological record of the factors that contribute to energy supply disruption and restoration efforts; therefore, they can be utilized to make improvements to both specific energy sectors and the overall energy system.

To recognize threats that may lead to an energy disruption event, it is important to understand the normal status of energy systems and continually monitor events that affect the energy system stability. The SEO-EEC staff created and maintain an Energy Profile to define the normal condition and monitor news, weather reports, industry publications, and other sources to identify situations that may impact energy deliverability in the Commonwealth.

If irregularities or concerns arise, the SEO-EEC will contact trade groups, membership organizations, energy suppliers, transporters, and brokers to determine the potential impact to system operations.

Each time a threat is identified, and the ESF 12 is activated, the SEO-EEC will record pertinent data in the energy disruption log. If the threat escalates into a significant disruption event, a detailed situational report will be developed. After each event is closed, the SEO-EEC will analyze the log and prepare an After-Action Report (AAR). If the threat is minimal, only a basic log entry is necessary for situational awareness.

5.4.1 Energy Disruption File Log

The ability to effectively respond to and facilitate the restoration of energy systems during disasters relies on the ability of local, state, and federal government agencies and private sector electricity and fuel providers to have access to timely, accurate, and actionable information about the status and potential impacts of energy sector disruptions. This information can be accessed through DOE EAGLE-I system and the National Pipeline Mapping system. Refer to Section 2.9.

While monitoring the overall energy network is a deliberate and continuous process that is critical to an ESP, emergency event disruption tracking is usually related to a precise event or explicit incident.

To ensure that all energy disruptions are documented, the SEO-EEC Energy Security Coordinator will log each one based on procedures established in the ESP, detailing the circumstances surrounding the event. This will allow the SEO-EEC to examine the causes of outages over time in an effort to determine if there are similar causal characteristics. It will also allow for continuity in program operation and performance through staff changes. Once the disruption has been identified and mitigated, the situational report will be filed along with the disruption-tracking log.

The disruption file log will be utilized to better understand the "triggers" most often responsible for the initiation of interruptions. The list below is not meant to be exhaustive; however, it will serve as a guide in determining events that warrant increased monitoring efforts. Ultimately, the SEO-EEC will rely on best judgment to decide when to heighten the monitoring effort. See Appendix E, Kentucky Energy Profile 2023.

Disruptive events may differ in magnitude and impact, yet for tracking purposes, each one will be treated with equal significance. Information gathered by the SEO-EEC can differ by situation, but at a minimum, will include the commodity type or transmission mode affected; the geographic area or location affected, if identifiable; the disruption cause; the time of the occurrence; the expected duration the event; and the rectifying actions undertaken. The energy disruption log can be found in Appendix F.

The PSC-regulated electric utilities will be tracked in a separate system that is maintained by the PSC. A sample PSC outage log is also attached at the end of this chapter.

Regulated electric utilities as defined in KRS 278.010 are required under 807 KAR 5:006(27) to report any outages that affect more than 500 customers and last more than four hours to the PSC. KRS 278.010 defines a retail electric supplier in Kentucky as "any person, firm, corporation, association, or cooperative corporation, excluding municipal corporations, engaged in the furnishing of retail electric service. Therefore, the Tennessee Valley Authority by nature and their associated local power companies are not regulated by the PSC.

These outage reports will be submitted daily until service is restored. Reporting will normally be submitted through the "PSC Outage Reporting System" but may also be submitted by email or telephone. Specific information in the report includes the name of the utility, a specific contact, time of the incident, geographic area involved, the number of customers affected, a description of restoration efforts, and an estimated completion time. Once the service is restored, the provider must submit a report detailing the causes of the problem, efforts taken in restoration, and future mitigation efforts.

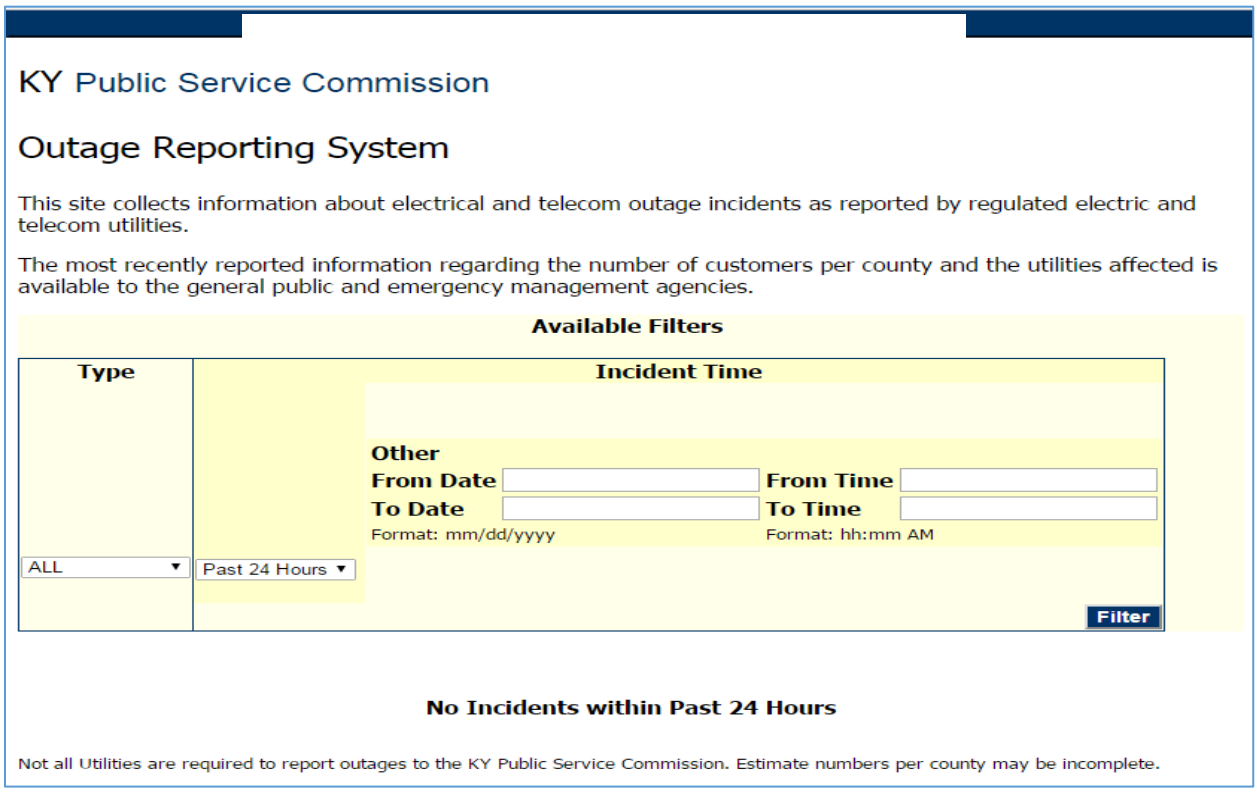


Figure 32: Public Service Commission Outage Reporting Screen

Outage information from non-regulated utilities is tracked via EAGLE-I and through routine communication via ReadyOp and the public private sector partners. In addition, the PSC and SEO-EEC coordinate outage information to form a statewide outage assessment.

5.4.2 Situational Reports

For minor disruptions, a file memorandum or email notation may be all that is necessary to properly identify and document the occurrence. In this case, the SEO-EEC will simply place this information in the ESF-12 file log. There will be particular incidences, however, that will require

more in-depth investigation and data collection. Normally these will be large-scale events affecting many people or significant geographic areas or lasting for extended durations. For these events, a separate and more descriptive situational report will be compiled.

The report will follow the same format as required for tracking disruptions in the file log but will collect and compile the information on a much more in-depth basis. As established in the ESP. In addition, this summary will actively seek out information pertaining to the event from related sources such as news reports, email communication, emergency first responders, etc. The situational report will assist the SEO-EEC in determining a course of action in the initial emergency response and will be logged in WebEOC during an SEOC activation.

5.4.3 After Action Report

Additionally, further examination of the data will be conducted by the SEO-EEC to conclude whether response measures were administered correctly and to determine if there are actions that can be taken to mitigate possible future problems or occurrences and ultimately long-term energy disruptions. The SEO-EEC evaluates the strengths and accomplishments as well as the challenges and barriers of the objectives listed below and suggests mitigation measures or partnership opportunities to minimize future long term energy disruptions.

- Monitor, collect, analyze, and disseminate information on energy networks with the Commonwealth.
- Access information on existing state and federal databases regarding energy supplies and demand.
- Develop and maintain relationships with all public and private energy industry personnel.
- Establish contact with and request information on supply and demand from producers, distributors, or trade organization of the energy commodity experiencing the disruption.
- Establish contact with county emergency management agencies in the affected areas; obtain information on current energy utilization conditions and needs.
- Communicate energy policies and directives, established because of an energy emergency, to energy sector partners.
- Communicate the needs and interests of ESF-12 energy sector partners during the event.
- Serve as liaison to national or regional organizations dealing with the same energy issue.
- Work with other ESFs on energy interdependencies and assist in policy development.

The AAR will be distributed through the chain of command, to the Secretary of the EEC and KYEM after each activation is closed.

5.4.4 Trade Groups

Trade groups, membership organizations, and professional associations most often represent large cross sections of energy providers, whose members most often have a diverse set of interests. These groups will often foresee potential energy delivery problems and can be a great asset for energy security. The SEO-EEC will stay in close contact with these groups through ReadyOp as a necessary aspect of monitoring issues on the energy forefront in Kentucky and around the world.

These groups' primary mission is generally dedicated to the promotion of increased market representation of a particular commodity; however, they are also customarily extremely knowledgeable about other issues related to that commodity. Industry and regulatory concerns have typically been cleared through the organization's membership prior to public disclosure; therefore, they can provide an expanded perspective derived from a large number of interests.

From an energy commodity-tracking standpoint, this allows the eyes and ears observing the energy environment to increase dramatically. The SEO-EEC will utilize its positive working relationships with these groups and associations to comprehensively monitor the Commonwealth's energy networks. Contact information can be found in Appendix C.

5.4.5 Energy Providers

Almost all energy in the Commonwealth is provided by private businesses. Utility companies and other energy generators, transmitters, and distributors offer invaluable first-hand information on the current state of energy affairs. Their insights provide an accurate depiction of the prevailing issue, especially from the supplier's perspective. More importantly, providers can relay the information on issues in real time from a front-seat perspective. These companies also have the knowledge and assets needed to mitigate and correct energy disruptions. The SEO-EEC and the Public Service Commission (PSC) will actively utilize existing relationships with the generation, transmission, and distribution companies that serve the state to gain an accurate representation of energy disruption events as they occur.

6.0 Energy Commodities and Contacts

The term “energy commodities” encompasses a range of resources such as coal, oil, natural gas, biofuels, and petroleum-derived products, with electricity being a derived commodity and are critical to our essential daily societal functions. Energy has attracted attention from investors as they seek to profit from the world’s abundance of energy.

6.1 Electricity Supply

Process:

Electricity in Kentucky is provided to customers by PSC-regulated utilities, municipally owned utilities, and the Tennessee Valley Authority (TVA) and its distributors. All 26 electric Cooperatives in Kentucky are members of both the Kentucky Electric Cooperatives and the National Rural Electric Cooperative Association (NRECA): There are 24 distribution cooperatives that deliver electricity directly to member consumers and two “generation and transmission” cooperatives (G&T’s) supply power to the distribution co-ops. Collectively, the electric cooperatives of Kentucky power the lives of 1.5 million people in 117 of 120 counties.

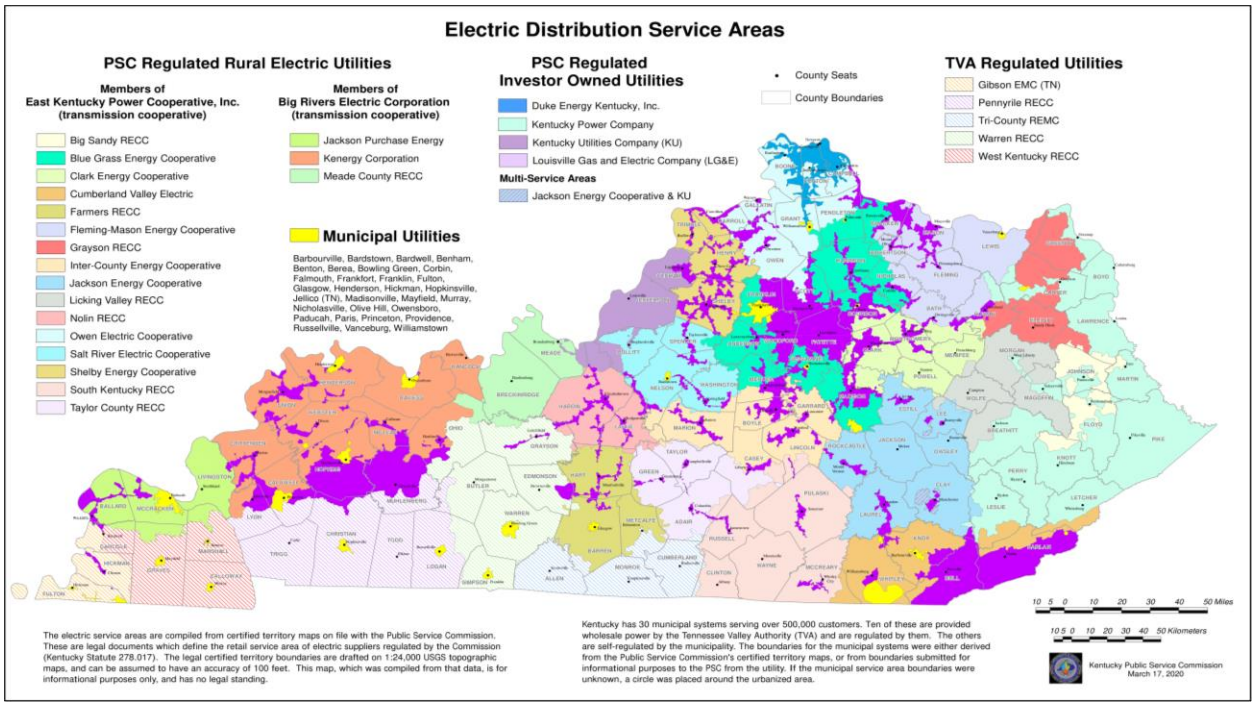


Figure 33: Kentucky Utility Service Map

6.1.1 PSC-Regulated Electric Utilities

Electric utilities that are regulated by the PSC fall into two categories: Investor-Owned Utilities (IOUs) and Rural Electric Cooperative Corporations (RECCs). There are four investor-owned electric utilities that operate in Kentucky: **Duke Energy Kentucky**, **Kentucky Power Company** (a.k.a. American Electric Power), **Kentucky Utilities**, and **Louisville Gas & Electric**. Each of these companies generates the power to meet its respective customers' electricity demands.

Nineteen RECCs are regulated by the PSC. These "distribution" cooperatives typically receive power from their respective "generation and transmission" cooperatives at substations in the distributors' service territories. Sixteen of these RECCs jointly own and purchase power from **East Kentucky Power Cooperative:**

- Big Sandy RECC
- Blue Grass Energy Cooperative
- Clark Energy Cooperative
- Cumberland Valley Electric
- Farmers RECC
- Fleming-Mason Energy Cooperative
- Grayson RECC
- Inter-County Energy
- Jackson Energy Cooperative
- Licking Valley RECC
- Nolin RECC
- Owen Electric Cooperative
- Salt River Electric Cooperative
- Shelby Energy Cooperative
- South Kentucky RECC
- Taylor County RECC

The remaining three jointly own and purchase power from **Big Rivers Electric Corporation:**

- Jackson Purchase Energy Corporation
- Kenergy Corporation
- Meade County RECC.

6.1.2 TVA-Regulated Electric Utilities

The Tennessee Valley Authority (TVA) is a federally owned electric utility corporation in the United States. There are five electric cooperatives and eleven municipal utilities serving ratepayers in Kentucky that secure all of their electricity from the TVA. These cooperatives and municipal utilities then resell and distribute electricity to customers within their service territories. TVA regulates the rates and services of these utilities. Separately, the TVA also serves several large industrial customers directly.

TVA Electric cooperatives:

- Gibson Electric Membership Corporation
- Pennyrile RECC
- Tri-County Electric Membership Corporation (TN)
- Warren RECC
- West Kentucky RECC
-

TVA Municipal Utilities:

- Benton Electric System
- Bowling Green Municipal Utilities
- Franklin Electric Plant Board
- Fulton Electric System
- Gibson Electric Membership Corporation
- Glasgow Electric Plant Board
- Hickman Electric System
- Hopkinsville Electric System
- Mayfield Electric & Water Systems
- Murray Electric System
- Russellville Electric Plant Board

6.1.3 Self-Regulated Municipal Electric Utilities

Municipal electric utilities either self-generate electricity (by owning and/or operating generating facilities) or purchase power from various sources other than the TVA. There are 21 self-regulated Municipal electric utilities, and they are self-regulated by their respective municipal governments.

- Barbourville Utilities
- City of Bardstown
- Bardwell City Utilities
- Benham Power Board
- Berea Municipal Utilities
- City Utilities Commission of Corbin
- City of Falmouth
- Frankfort Plant Board
- Henderson Municipal Power & Light
- Madisonville Municipal Utilities
- Madison Electric Dept.
- Morehead Utilities
- Nicholasville Public Utilities
- City of Olive Hill Utilities
- Owensboro Municipal Utilities
- Paducah Power System
- City of Paris Combined Utilities
- Princeton Electric Plant Board
- City of Providence
- Electric Plant Board of the City of Vanceburg
- City of Williamstown

6.1.4 Interstate Electricity Market

Kentucky participates in two wholesale marketers: the Midcontinent Independent System Operator (MISO) and PJM Interconnection. Both are operators of regional transmission systems and provide access to interstate wholesale power markets. These markets set reliability rules to ensure that a continuous and reliable power supply is provided to consumers by securing commitments from generators to meet customer demand on the power grid.

PJM coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia. PJM's long-term regional planning process provides a broad interstate perspective that identifies the most effective and

cost-efficient improvements to the grid to ensure reliability and economic benefits on a system-wide basis.

MISO is an independent, not-for-profit organization that delivers safe, cost-effective electric power across 15 states, including Kentucky. Electricity price and supply problems in Kentucky are referred to the PSC for jurisdictional companies. Problems with municipally owned systems should be taken to that municipality and the representing trade association.

PJM and MISO capacity market delivery year starts June 1 and ends the following year on May 31. Both markets allow for bilateral transactions and the self-scheduling of resources to lower the amount of capacity that must be purchased through the capacity market mechanisms. When the products' costs are too high or too low, each operator initiates discussions with stakeholders for potential solutions. Once a solution is finalized, it is submitted for approval to the Federal Energy Regulatory Commission (FERC), which regulates the interstate transmission of electricity.

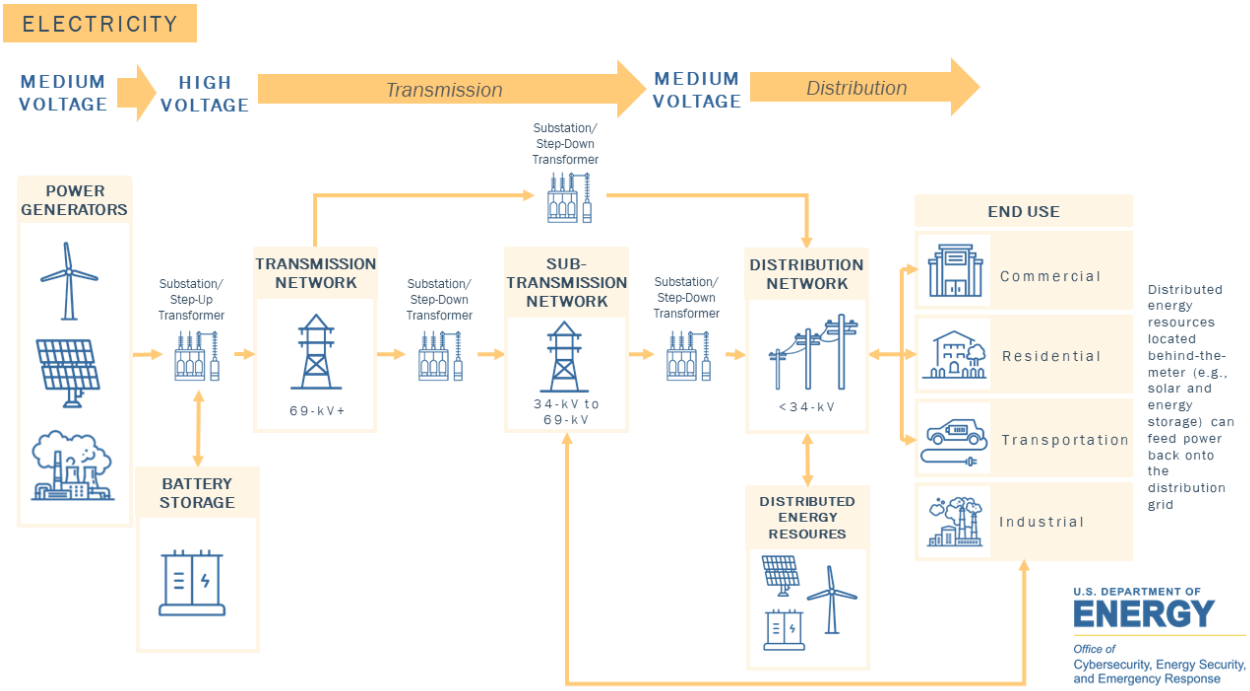


Figure 34: Electric Supply Chain

State Government:

Public Service Commission - https://psc.ky.gov/
Division of Consumer Services - https://psc.ky.gov/home/complaint/

Federal Government:

Federal Energy Regulatory Commission - https://www.ferc.gov/
Tennessee Valley Authority - http://www.tva.gov/

Industry:

Kentucky Municipal Utilities Association - http://www.kymua.org/
Kentucky Electric Cooperative Association - https://kyelectric.coop/

6.2 Electric Transmission

Process:

The electric transmission system in Kentucky has been designed for the primary purpose of moving electricity from generation sources within the state to customers within the state or to external markets and other utilities via bi-lateral agreements. The transmission systems of the Generation and Transmission Utilities are interconnected so as to allow the flow of electricity among utilities and other generators both in state and out of state. The Midcontinent Independent System Operator (MISO) and PJM Interconnection (PJM) are the two interstate transmission operators for the Commonwealth. Refer to section 6.1.4 for details.

In addition, the TVA and Louisville Gas and Electric and Kentucky Utilities (LGEE) operate respective transmission systems as they are not members of PJM or MISO. The balancing authorities in Kentucky ensure that power system demand and supply are always balanced, which maintains safe and reliable operation of the power system. The balancing authorities in Kentucky include PJM, MISO, LGEE, and the TVA.

Transmission lines, for the purpose of Kentucky Energy Security and emergency management, are defined as lines operating at 69 kilovolts (kV) or more. Typical voltages include 69 kV, 138 kV, 169 kV, 345 kV, 500 kV, and 765 kV. Generally, the higher the voltage of the line, the more electricity the line carries to more customers.

Electric transmission lines are almost exclusively built aboveground for cost considerations and are thus subject to damage from windstorms, ice loading, vegetation, and other outside agents. When a transmission line is forced out of service, it can result in thousands of customers losing electricity. The time to repair a single transmission line and restore service can take from several hours to a few days. Events such as large ice accumulations or tornadoes can damage multiple

transmission lines at once. When multiple transmission lines are out of service, full restoration can take weeks.

In the event of an electricity generation shortage, the transmission system can be utilized to import electricity from other utilities and other states. The number of imports is limited by the interconnections between the utilities.

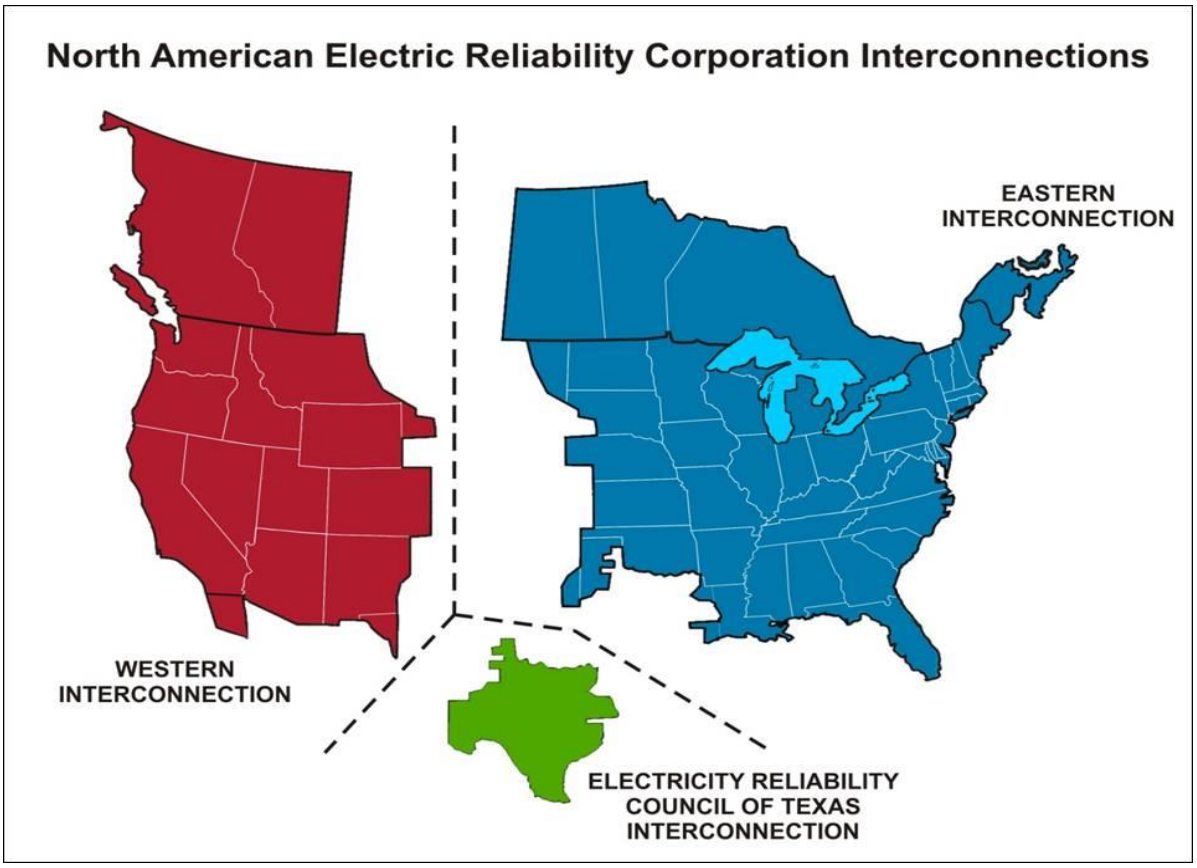


Figure 35: North American Electric Reliability Interconnections

Kentucky's Electrical system is interconnected with all of the other systems within the Eastern Interconnection.

State Government:
Public Service Commission - http://psc.ky.gov/
Division of Consumer Services - http://psc.ky.gov/Home/Complaints
http://psc.ky.gov/Home/Consumer_Intra
Industry:
Kentucky Power - https://www.kentuckypower.com/

Duke-Kentucky - https://www.duke-energy.com/
LGE, KU - https://lge-ku.com/
East Kentucky Power - https://www.ekpc.coop/
Big Rivers - https://www.bigrivers.com/
TVA - https://www.tva.com/
MISO - https://www.misoenergy.org/
PJM - https://www.pjm.com/about-pjm

6.3 Natural Gas Supply

Process:

Natural gas–a colorless, odorless, gaseous hydrocarbon. It breaks to the surface with additional gases and liquids. Processing plants have to separate natural gas from oil. Removing the additional gases makes natural gas purer. The cryogenic expansion process refines natural gas to its final form. In general, natural gas processing includes the following steps:

- Condensate and Water Removal
- Acid Gas Removal
- Dehydration – moisture removal
- Mercury Removal
- Nitrogen Rejection
- Natural Gas Liquids (NGL) Recovery, Separation, Fractionation, and Treatment of NGL

Kentucky has 32,741 miles of natural gas, hazardous liquids, and hydrocarbon gas liquids pipelines, 20 active natural gas storage areas, and two processing plants. Kentucky has over 2,500 fuel distributors including approximately 240 propane distributors.

Natural gas may be stored in a number of different ways. Most commonly, it is held in an underground reservoir, under pressure in three types of facilities. These underground facilities are depleted reservoirs in oil and/or natural gas fields, aquifers, and salt cavern formations. Sedimentary basins trap huge reservoirs of natural gas. In order to gain access to these natural gas reservoirs, a hole (sometimes called a well) must be drilled through the rock to allow the gas to escape and be harvested.

Some industrial and large commercial or institutional customers buy their gas directly from wellhead producers or gas marketers, and the gas is delivered to the customer by interstate pipelines (regulated and inspected by the Federal Energy Regulatory Commission (FERC) and

Pipeline and Hazardous Material Safety Administration (PHMSA)) and the customer's local distribution company.

Compressor stations are an integral part of the natural gas pipeline network that moves natural gas from individual producing well sites to end users. As natural gas moves through a pipeline, distance, friction, and elevation differences slow the movement of the gas and reduce pressure. Compressor stations are placed strategically within the gathering and transportation pipeline network to help maintain the pressure and flow of gas to market.
Natural gas usage in the state is evenly divided by volume between residential and industrial users. The PSC regulates distribution rates and service terms for all investor-owned natural gas providers in the state. Municipally owned utilities systems are not subject to PSC regulation of rates and services. Both regulated and non-regulated natural gas providers are, however, inspected for pipeline safety pursuant to state and federal pipeline safety regulations.

Natural gas price and supply problems should be referred to the PSC for jurisdictional companies. Problems with municipally owned systems should be addressed directly by the municipality.

The EEC Division of Oil and Gas's mission is to regulate the crude oil and natural gas industry in the Commonwealth; protect the correlative rights of mineral owners, freshwater zones, and minable coal seams; and conserve and protect oil and gas reserves in Kentucky. The statutes and regulations of the Division of Oil and Gas require a permit to be obtained prior to any drilling activity. Please refer to the Oil and Gas Operator's Manual for all of the division's requirements regarding the drilling, producing, and plugging of oil and gas wells in the Commonwealth.

The Division of Oil and Gas maintains a well history database for each well containing data relative to the permit, operator, well location, pertinent dates, and well completion. Currently, there are 158,507 wells stored online. This information is shared with the Kentucky Geological Survey (KGS) to assist in the compilation of oil and gas data.

See Appendix J for Natural Gas Transmission Capacity and Appendix K for Natural Gas Distribution Utilities.

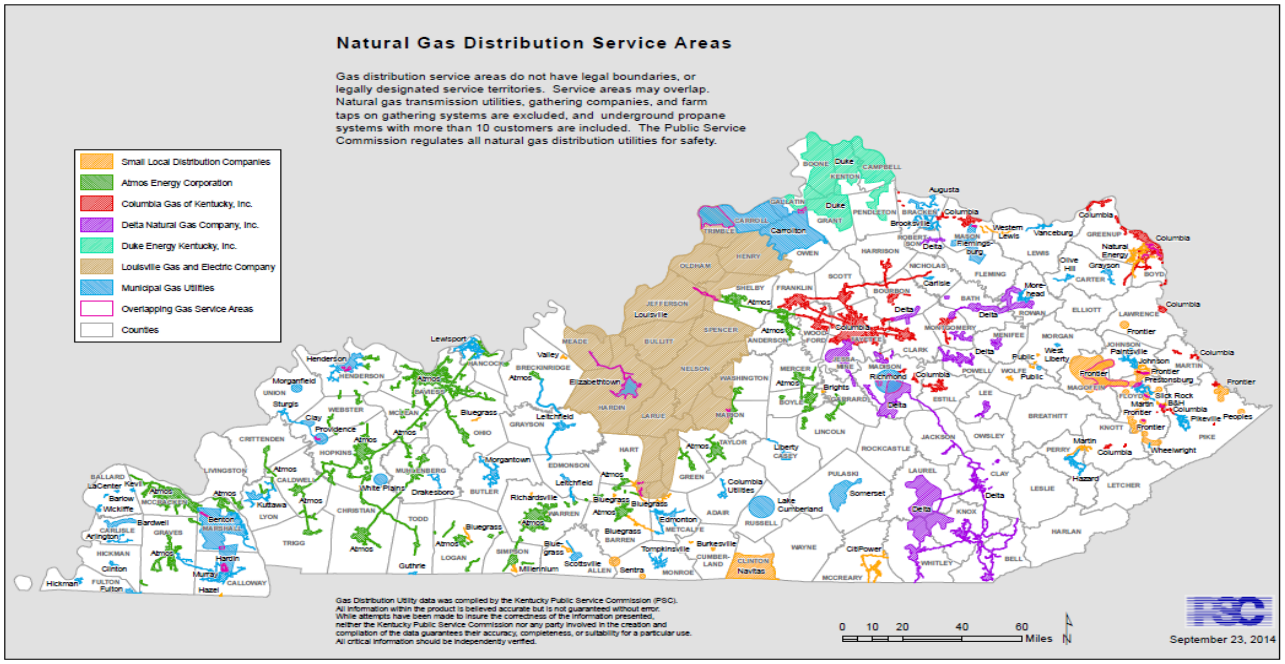


Figure 36: Kentucky Natural Gas Distribution Map

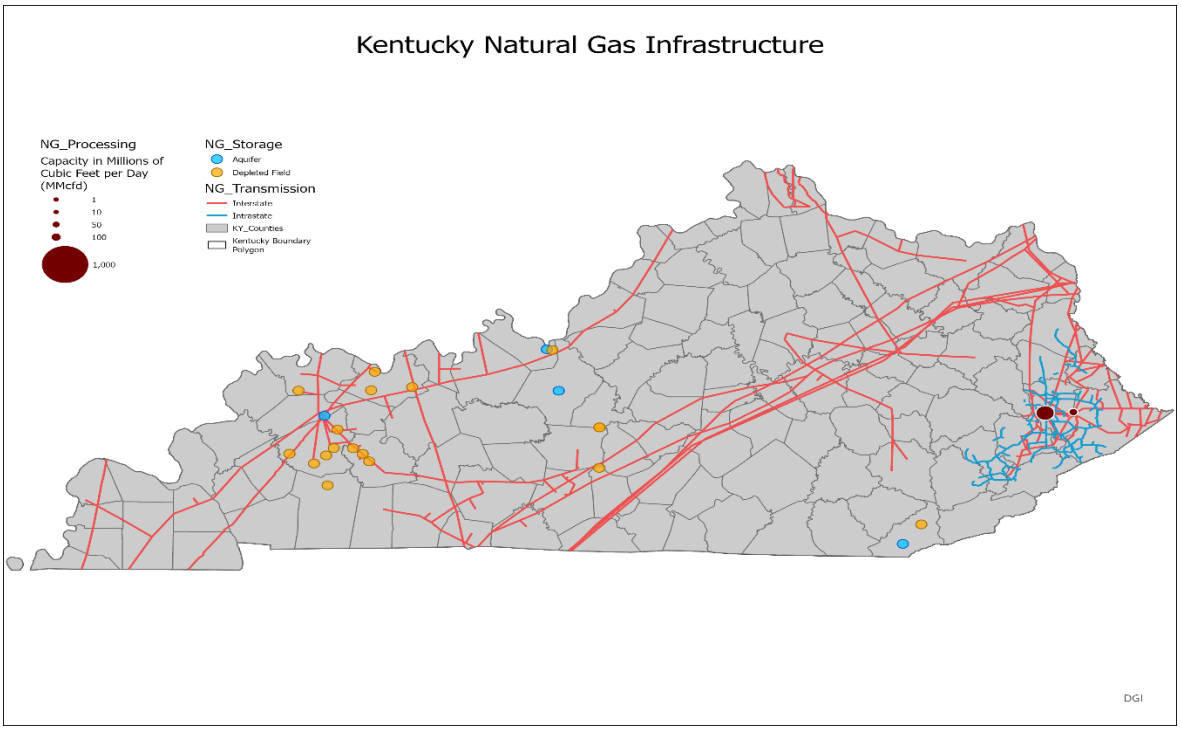


Figure 37: Kentucky Natural Gas Master Map

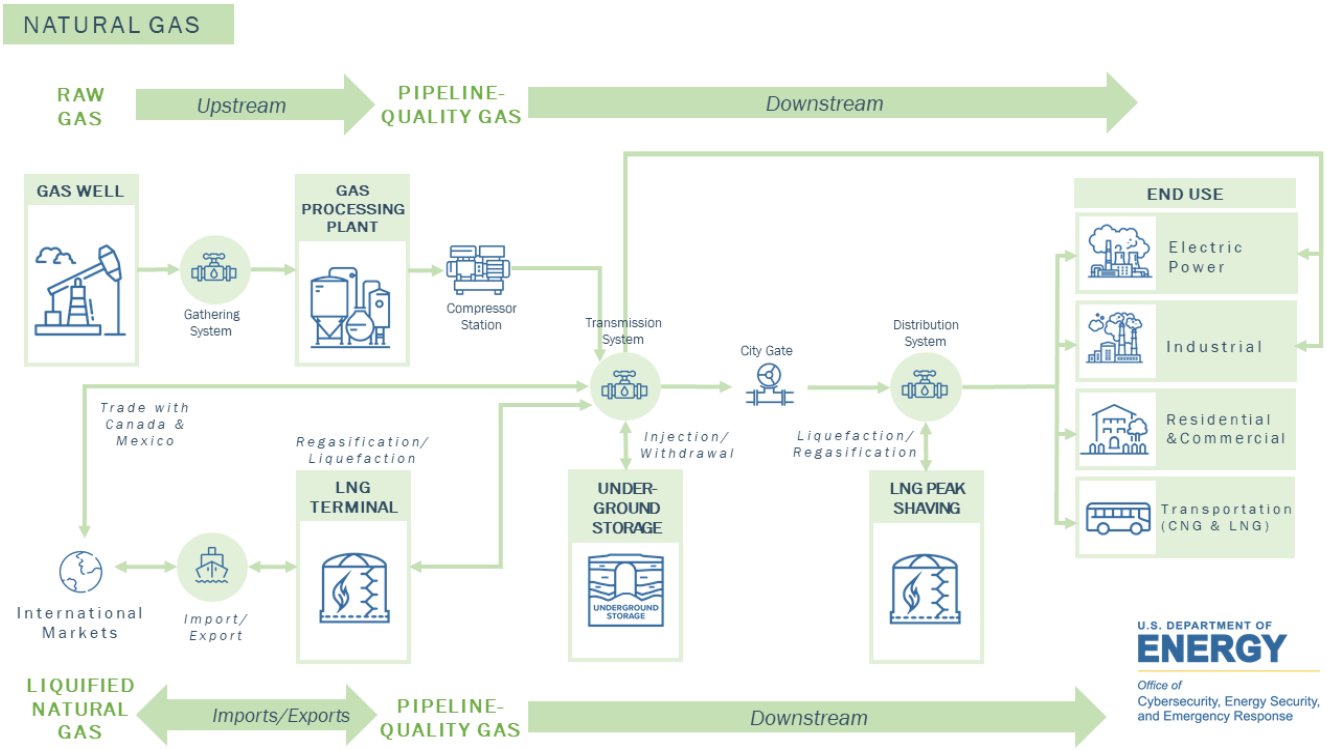


Figure 38: Kentucky Natural Gas Supply Chain

State Government:
Kentucky Public Service Commission - https://psc.ky.gov/
Division of Consumer Services - https://psc.ky.gov/home/complaint
Federal Government:
Federal Energy Regulatory Commission (FERC) - https://www.ferc.gov/
Pipeline and Hazardous Material Safety Administration (PHMSA) - https://www.phmsa.dot.gov/
National Response Center - https://www.epa.gov/emergency-response/national-response-center
FERC's Public Information Reference Room - https://www.ferc.gov/public-reference-room
DNR Oil and Gas - https://eec.ky.gov/Natural-Resources/Oil-and-Gas/Pages/default.aspx
Industry:
The American Gas Association - https://www.aga.org
Kentucky Gas Association - https://kygas.org
Kentucky Oil and Gas Association - https://members.kyoilgas.org/site_home.cfm

6.4 Coal

Process:

Kentucky's coal industry produced approximately 24.5 million tons of coal in 2020 and employed an average of 4,076 miners. Kentucky produces coal from two major fields: the Appalachian basin in the eastern part of the state and the Illinois basin in the western part of the state. Eastern and western Kentucky mines each produce roughly half of the state's coal.

Coal is used to generate 69% of the electricity in Kentucky and 22% of the electricity in the nation as a whole. Since it is one of the lowest cost means of producing electricity available, continued use of coal helps keep electricity prices down. About 54% of the coal mined in Kentucky is exported to other states.

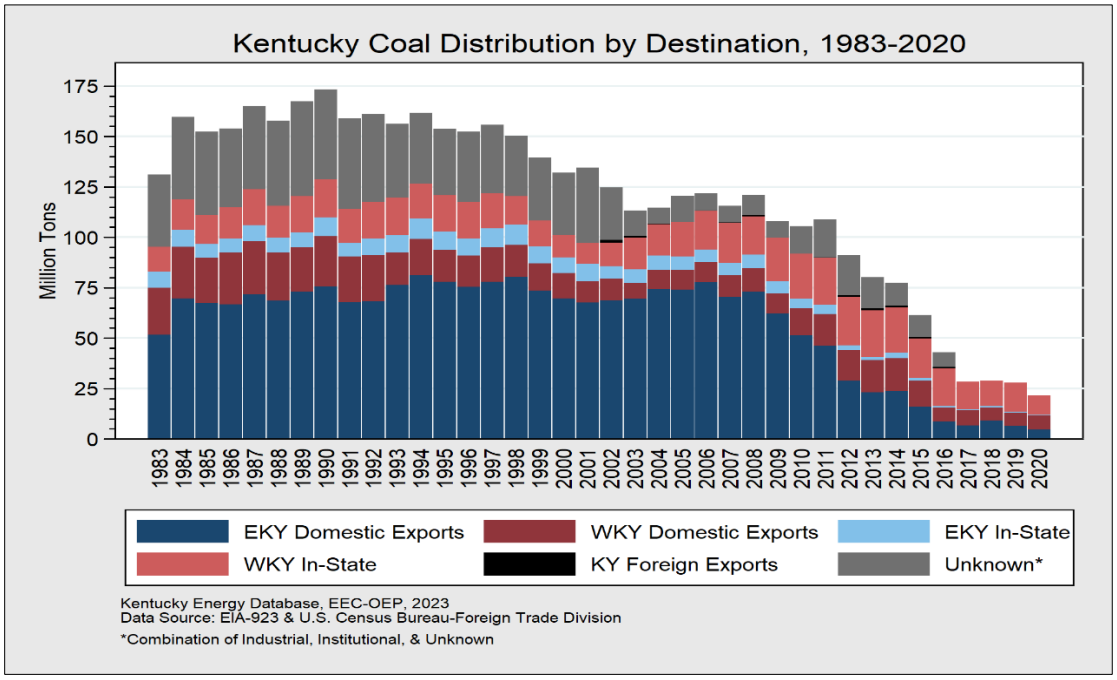


Figure 39: Kentucky Coal Distribution, 1983-2020

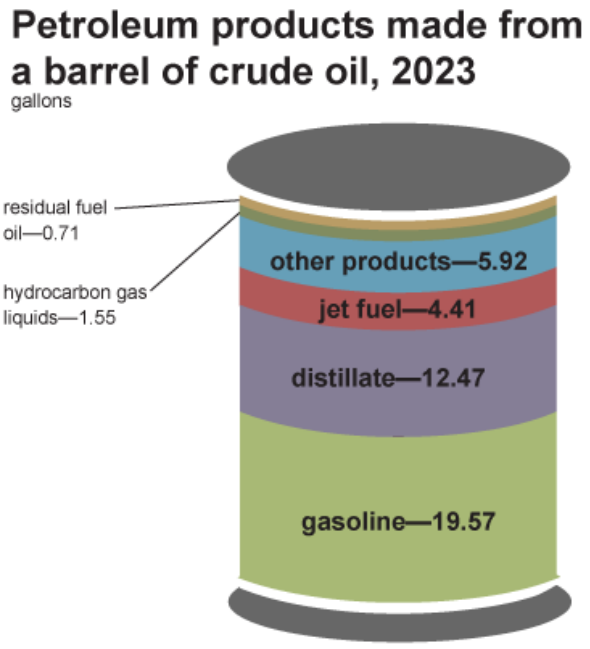
State Government:
The Energy and Environment Cabinet State Energy Office (SEO-EEC) - https://eec.ky.gov/
Kentucky Department of Natural Resources - https://eec.ky.gov/
Industry:
Kentucky Coal Association - http://www.kentuckycoal.org/

6.5 Petroleum and Natural Gas Liquids

Process:

Crude oil is turned into petroleum products through a refining process. Crude oil is called "sweet" or "sour" depending on the amount of sulfur it contains. High-sulfur crude is called sour. It is also called "light" and "heavy" crude depending on the molecular weight. As the name implies, light crude flows easily while heavy crude has a heavier, tar-like consistency.

Crude oil is transported by pipeline, barge, and tanker to refineries where it is distilled into various petroleum. The unit measurement for crude oil is in barrels (bbls). A barrel of crude equals 42 U.S. gallons. In a non-intuitive occurrence, a refined barrel of crude produces 44 U.S. gallons of finished petroleum products. While the finished product produced differs depending on the type of crude used, on average, gasoline, diesel, and jet fuel are the largest finished components by volume.



Data source: U.S. Energy Information Administration, *Petroleum Supply Monthly*, March 2024, preliminary data
Note: A 42-gallon (U.S.) barrel of crude oil yields about 45 gallons of petroleum products because of refinery processing gain. The sum of the product amounts in the image may not equal 45 because of independent rounding.

In 2023, 33% of the crude oil consumed in the United States was imported. Kentucky imports nearly 98% of crude oil

Figure 40: Products Made from a Barrel of Crude Oil 2023

Marathon Petroleum Corporation is an integrated downstream energy company headquartered in Findlay, Ohio. The company operates the nation's largest refining system with more than 3 million barrels per day of crude oil capacity across 16 refineries, including Kentucky.

Crude oil is processed at Kentucky's single refinery. The refinery is in the city of Catlettsburg in northeastern Kentucky on the western bank of the Big Sandy River and can process 291,000 barrels of crude oil per calendar day to processes sweet and sour crude oils into motor gasoline, distillates, asphalt, heavy fuel oil, and propane.

A smaller facility sited near Somerset, Kentucky is engaged in soybean oil processing and serves as a regional petroleum fuel terminal. In 2021, this site added capacity to produce biodiesel and biofuel blending operations.

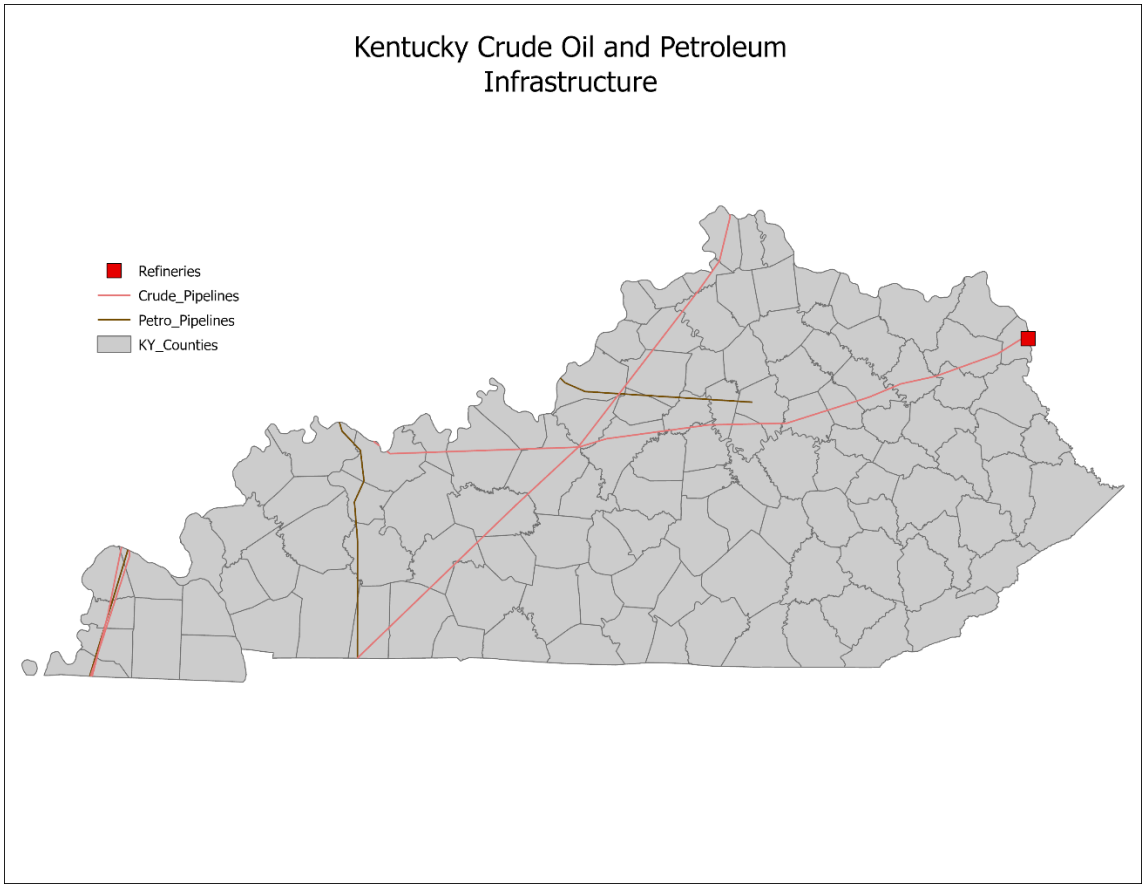


Figure 41: Kentucky Crude Oil Pipelines 2021

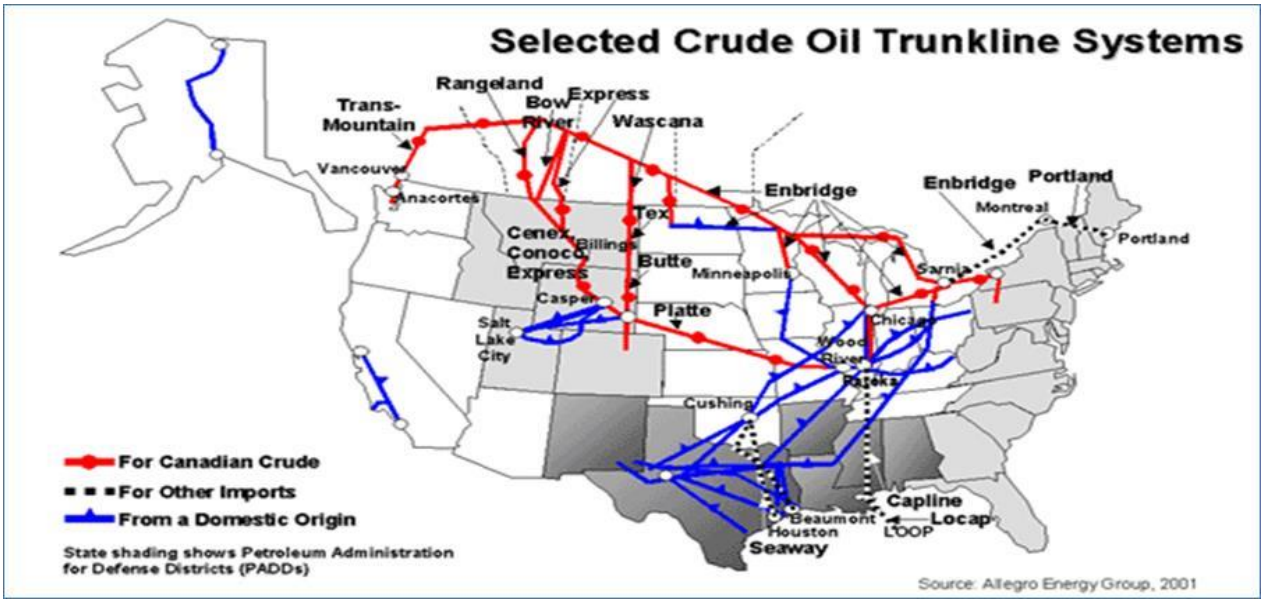


Figure 42: Selected Crude Oil Trunk line Systems

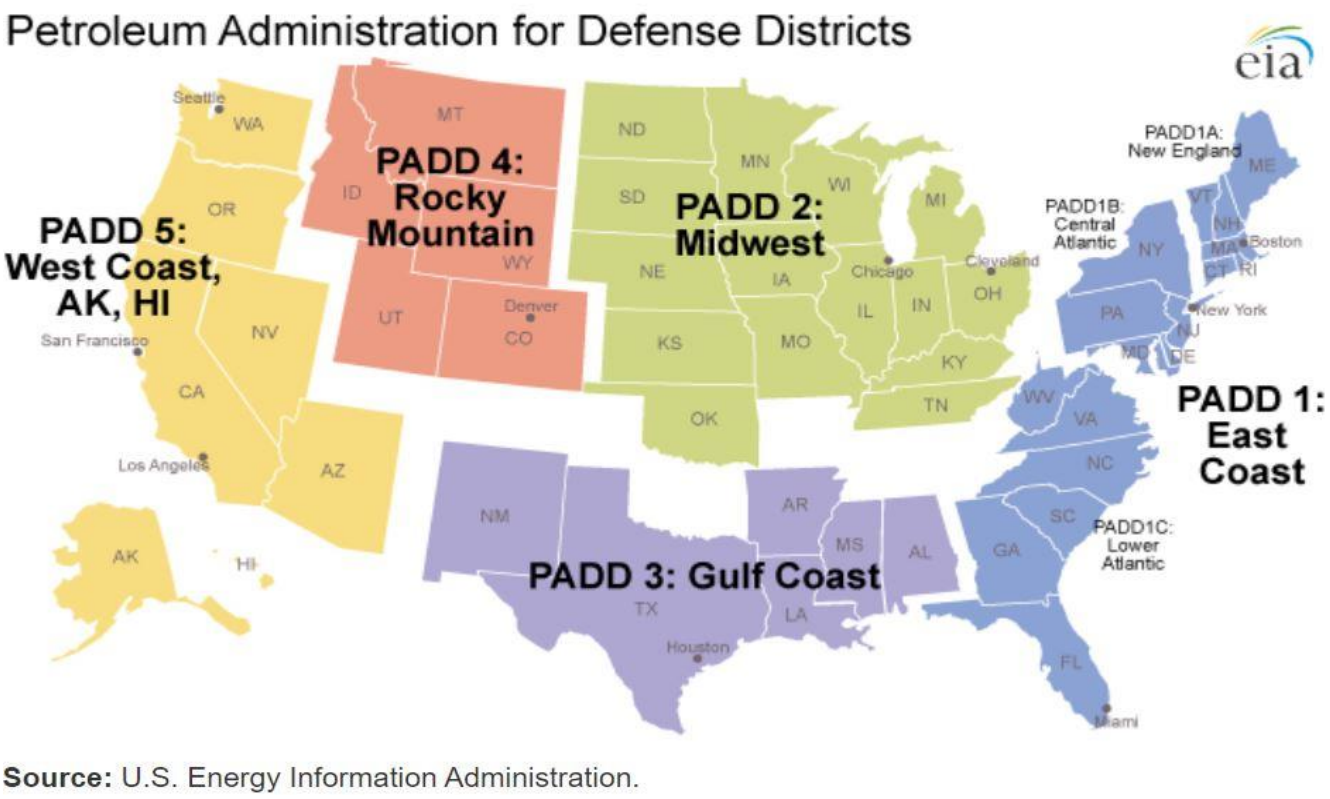


Figure 43: PADD Regions

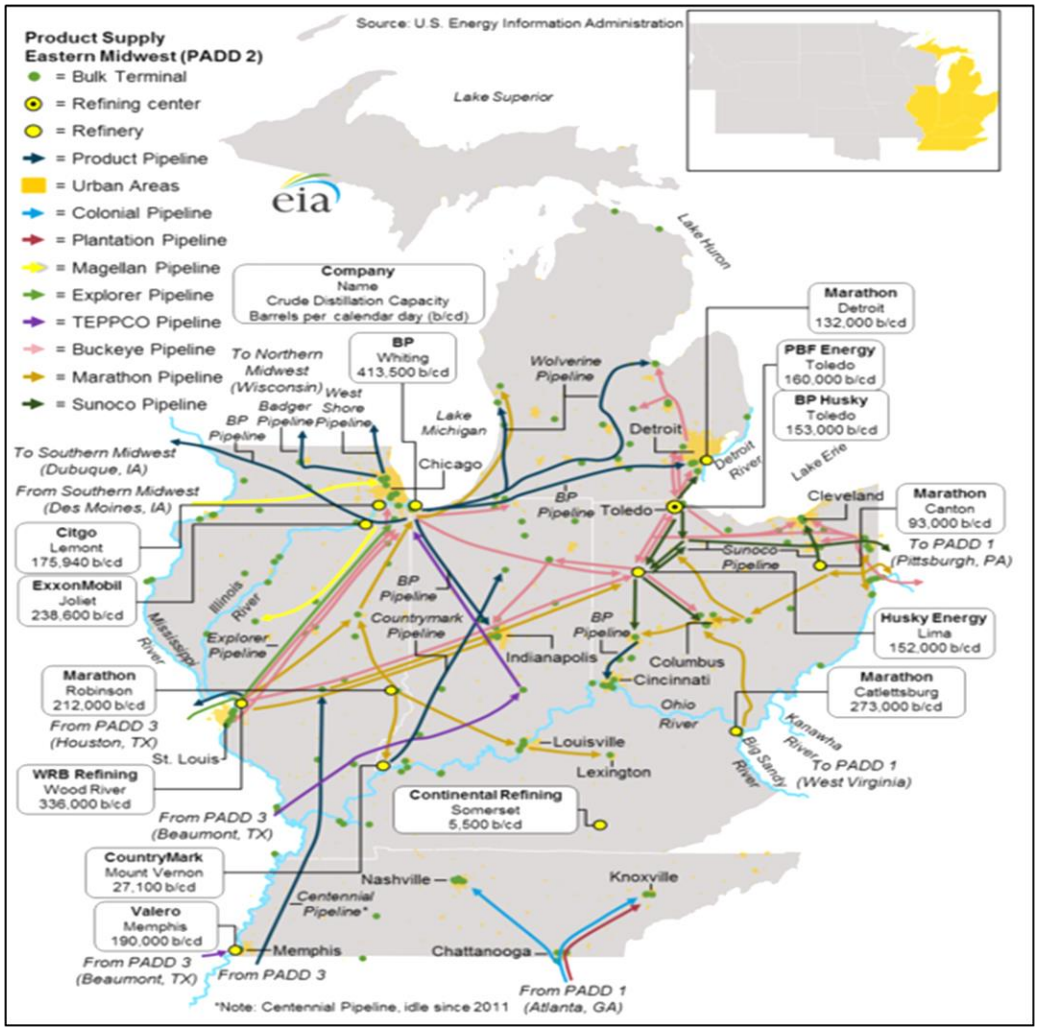


Figure 44: PADD 2 Petroleum Product Flow

In the event of a petroleum emergency, such as a pipeline break, cyber-security attack, or other such event, the SEO-EEC will activate the Kentucky Petroleum Shortage Annex (found in Appendix H).

State Government:
The Energy and Environment Cabinets State Energy Office (SEO-EEC) - http://eec.ky.gov/Energy/
Federal Government:
Pipeline and Hazardous Material Safety Administration (PHMSA) - https://www.phmsa.dot.gov/

Industry:
Kentucky Petroleum Marketers Association - https://kpma.org/
American Petroleum Institute - https://www.api.org/

6.5.1 Gasoline

Process:

After gasoline is refined from crude oil, it must be shipped from the refinery to be distributed to consumers. Gasoline is shipped to terminal locations by pipeline, barge, rail, and truck. Gasoline is the most used transportation fuel in the state. In 2020, on average, each Kentuckian consumes 1.12 gallons of gasoline every day.

Terminals may accept gasoline from one or many sources making it nearly impossible for the consumer to distinguish where their product was produced.

From the main storage terminals, transport trucks move gasoline to jobbers or smaller marketing terminals. Jobbers and marketers ship gasoline to retail outlets, industry, and individuals where it sold as branded or unbranded. Branded outlets sell only the name-brand product while unbranded outlets may sell any brand. As mentioned earlier, the branded name does not necessarily mean the gasoline was produced by the company's refinery. The major difference in brands is in the additives that are generally mixed in at the terminal. Gasoline also changes with the season; vapor pressure increases in the winter to aid in vehicle starting. Shortages may occur when refiners are seasonally converting fuels.

Reformulated gasoline (RFG) is gasoline blended to burn more cleanly than conventional gasoline and to reduce smog-forming and toxic pollutants. The RFG program was mandated by Congress in the 1990 Clean Air Act amendments. RFG is required in cities with high smog levels and is optional elsewhere. RFG is currently used in 17 states and the District of Columbia. About 25 percent of gasoline sold in the U.S. is reformulated. In Kentucky, RFG covered areas based on being classified ozone nonattainment areas at the time that the state requested to opt into RFG under 42 U.S.C. 7545(k)(6)(A)(i) include Jefferson, Bullitt, and Oldham counties.

State Government:
The Energy and Environment Cabinet State Energy Office (SEO-EEC) - http://eec.ky.gov/Energy/
Kentucky Department for Environmental Protection - http://eec.ky.gov/Energy/

Kentucky State Fire Marshal - ksfm.ky.gov
CHFS - Hazardous Materials - https://chfs.ky.gov/agencies/dph/dphps/Pages/default.aspx
Industry:
Kentucky Petroleum Marketers Association - http://www.kpma.org/
Energy Marketers of America - http://www.pmaa.org/
American Petroleum Institute - http://www.api.org/
B.P. America - http://www.bp.com
Chevron Corporation - http://www.chevron.com
Phillips 66 - https://www.phillips66.com/
Gulf Oil - https://www.gulfoil.com/
ExxonMobil Corporation - https://corporate.exxonmobil.com/
Marathon Petroleum Company LP - https://www.marathonpetroleum.com/
Catlettsburg Refinery - https://www.marathonpetroleum.com/Operations/Refining/Catlettsburg-Refinery/
Shell Oil Company - https://www.shell.us/
Marathon Pipeline - https://www.marathonpipeline.com/
Kentucky Grocers and Convenience Store Association - https://kgcsa.com/
Valero - https://www.valero.com/sites/default/files/valero-documents/US%20Pipelines%20and%20Terminals%20Overview.pdf

6.5.2 Diesel Fuel/Heating Oil

Process:

Diesel fuel and heating oil are closely related products. Together they are generally referred to as distillates. The primary difference is sulfur content. High-sulfur distillate is generally what is used for heating and often referred as “heating oil”. Residential heating systems use both types of distillates. For homes and businesses that rely on heating oil, timely supply is essential. Occasionally, severe weather may make it difficult for retail heating oil dealers to service individual homes and businesses. This supply and demand issue has caused heating oil prices to vary greatly throughout the year, generally being higher in the winter reflecting the greater demand.

Diesel fuel is the primary petroleum product used in the transportation, agriculture, and manufacturing industries. Semi-trucks, trains, boats, barges, tractors, combines, bulldozers, and other large vehicles and machinery use diesel engines. Diesel engines are also used to power electric generators for utility peaking and for industrial, commercial, and institutional backup.

While some agricultural and off-road construction equipment can use high-sulfur diesel, on-highway transportation vehicles must use a distillate fuel with a sulfur content of less than 0.05 percent (referred to as low-sulfur diesel). These same standards are slowly being phased in for off-road engines in mining, farming, rail, and marine industries. Low-sulfur diesel currently makes up about 95 percent of the total distillate sold.

Pipelines and barges are used to transport refined petroleum products to terminals where transport trucks move the product to jobbers or marketer terminals. Jobbers and marketers provide delivery services to their customers. Customers include service stations, industry, and private individuals.

See Appendix L for a list of Prime Supplier Contacts and Appendix M for a list of Motor Fuel Retailers.

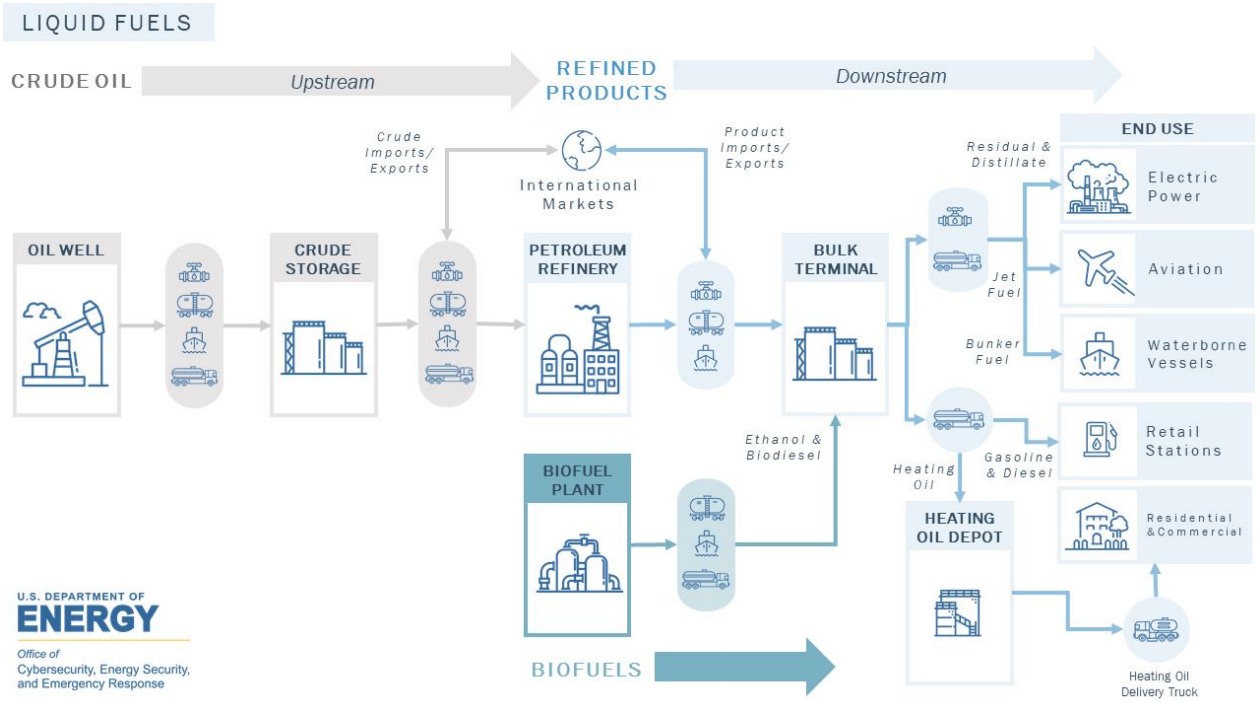


Figure 45: Liquid Fuels Supply Chain

State Government:

The Energy and Environment Cabinet State Energy Office (SEO-EEC) - http://eec.ky.gov/Energy/

Kentucky State Fire Marshal - ksfm.ky.gov

Industry:

Kentucky Petroleum Marketers Association - http://www.kpma.org/
Energy Marketers of America - http://www.pmaa.org/
American Petroleum Institute - http://www.api.org/
B.P. America - http://www.bp.com
Chevron Corporation - http://www.chevron.com
Phillips 66 - https://www.phillips66.com/
Gulf Oil - https://www.gulfoil.com/
ExxonMobil Corporation - https://corporate.exxonmobil.com/
Marathon Petroleum Company LP - https://www.marathonpetroleum.com/
Catlettsburg Refinery - https://www.marathonpetroleum.com/Operations/Refining/Catlettsburg-Refinery/
Shell Oil Company - https://www.shell.us/

6.5.3 Kerosene/Jet Fuel

Process:

Kerosene is used as a home and agricultural heat source. It is mainly used for space heaters and cook stoves. It can also be used as an energy source in lamps.

A more refined kerosene product is called jet fuel. Jet fuel is used in the aviation industry to power jet aircraft and rocket engines.

Truck, pipelines, and barges transport kerosene. It is shipped to terminals where smaller transport trucks move it to customers. Customers include airports, grocery stores, service stations, industries, and individuals.

See Appendix N for a list of Oil and Aviation Distributors.

State Government:
The Energy and Environment Cabinet State Energy Office (SEO-EEC) - http://eec.ky.gov/Energy/
Kentucky State Fire Marshal - ksfm.ky.gov
Industry:
Kentucky Petroleum Marketers Association - http://www.kpma.org/
Energy Marketers of America - http://www.pmaa.org/
American Petroleum Institute - http://www.api.org/
B.P. America - http://www.bp.com

Chevron Corporation - http://www.chevron.com
Phillips 66 - https://www.phillips66.com/
Gulf Oil - https://www.gulfoil.com/
ExxonMobil Corporation - https://corporate.exxonmobil.com/
Marathon Petroleum Company LP - https://www.marathonpetroleum.com/
Catlettsburg Refinery - https://www.marathonpetroleum.com/Operations/Refining/Catlettsburg-Refinery/
Shell Oil Company - https://www.shell.us/

6.5.4 Propane

Process:

Propane (liquefied petroleum gas) is used in approximately 10 percent of Kentucky homes. It is also used in home appliances such as air conditioning units, cook stoves, water heaters, fireplaces, generators, clothes dryers, and gas grills. Numerous industries use propane as a catalyst to heat industrial processes. Propane is the third-largest source of motor fuel in the U.S. and an approved clean fuel source used to power cars, trucks, buses, forklifts, lawnmowers, and other vehicles used in both on- and off-road applications. Propane is a major source of fuel for agricultural applications including heat for livestock buildings and greenhouses, irrigation pumps, crop drying, and weed control.

Pipelines and petroleum refineries provide propane supply. Distribution from these supply sources is by truck transport (approximately 9,000 gallons) or by rail car (approximately 30,000 gallons) to retail marketers. Marketers maintain storage facilities that support a regional customer base usually within a 50-75 air-mile radius. Marketers deliver propane to their customers using a delivery vehicle called a bobtail. These bobtails hold approximately 2,800 gallons of fuel and deliver to stationary customer storage tanks. Propane can also be transported in smaller (typically 20-, 33-, or 100-pound) cylinders.

Propane is stored under pressure in liquid form. Special operating and safety procedures are required for the storage and handling of propane gas.

Propane in Kentucky exhibits regionality within our agriculture, residential, and transportation sectors. In terms of agriculture, there are ~850 large-scale poultry farms in 44 counties. This represents critical local industries that maintain lifeline services for the food sectors. The dependence of this sector on propane for heating is a critical energy dependency in the state.

Propane motor fuel markets are expanding rapidly whether school buses, government fleets, industrial use, or off-road applications. Propane provides reduced emissions, fuel flexibility and diversity. See Appendix O for a list of Propane Distributors.

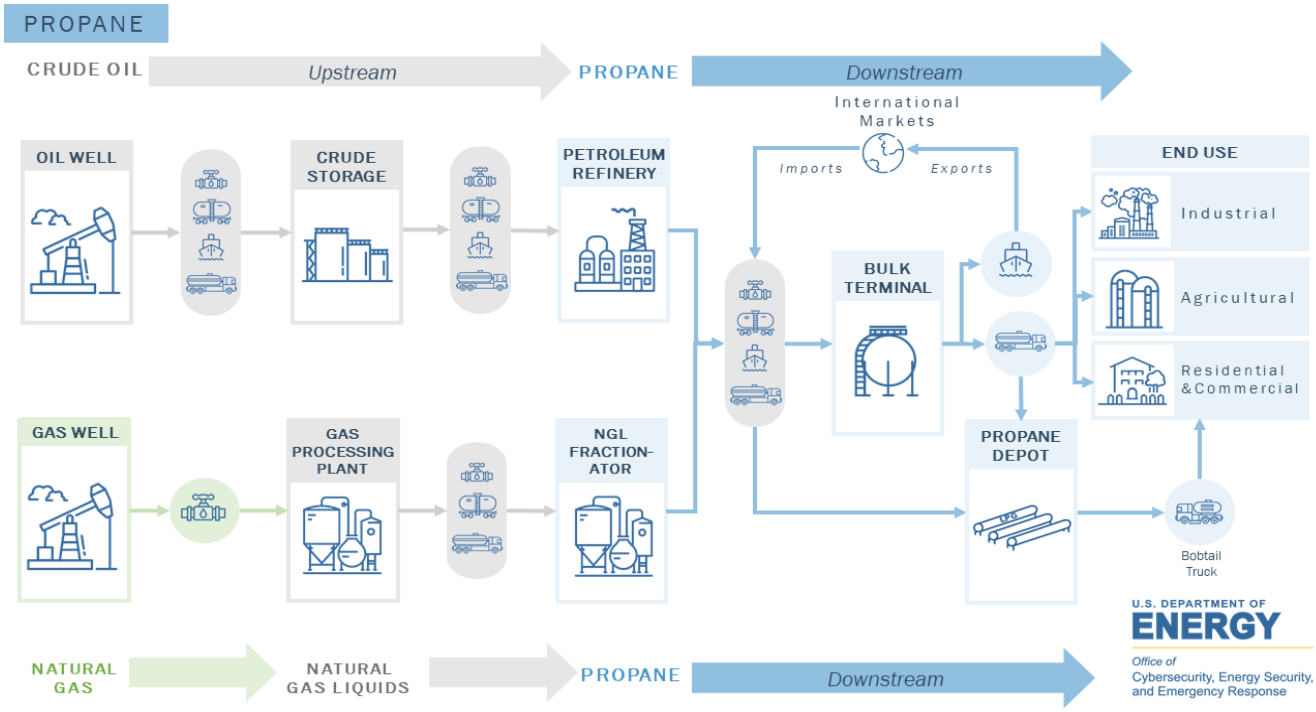


Figure 46: Propane Supply Chain

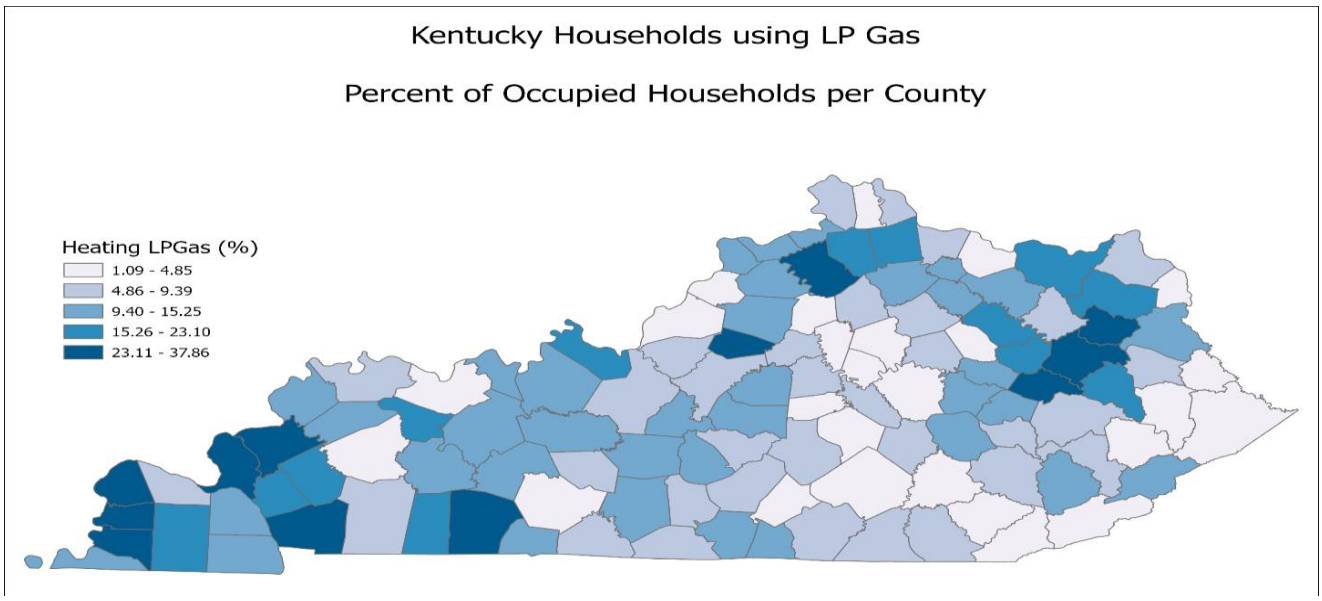


Figure 47: Kentucky Propane Households

State Government:
The Energy and Environment Cabinet State Energy Office (SEO-EEC) - http://eec.ky.gov/Energy/
Kentucky Transportation Cabinet - https://transportation.ky.gov/Pages/Home.aspx
Kentucky Emergency Management - https://kyem.ky.gov/Pages/default.aspx
Kentucky State Fire Marshal - ksfm.ky.gov
Industry:
Kentucky Propane Gas Association - http://www.kypropane.org/
National Propane Gas Enterprise Products Operating LLC - https://www.enterpriseproducts.com/
Todhunter Terminal - http://www.usa.com/frs/enterprise-todhunter-terminal.html

6.6 Biomass and Biofuels

Process:

Biomass (organic matter) can be used to provide heat, make fuels, chemicals, and other products, and generate electricity. Wood, the largest source of bioenergy, has been used to provide heat for thousands of years. However, there are other types of biomass that can be used to produce fuels, chemicals, and power. These include plants, agriculture, and forestry residues and the organic component of municipal and industrial wastes.

6.6.1 Biofuels

Process:

Biofuels are fuels made from biomass or its derivatives after processing. Biofuels such as ethanol and biodiesel offer a renewable alternative to oil for liquid transportation fuels. They can be made from virtually any plant-derived organic matter, agricultural crop, or from recycled materials like restaurant grease and sewage sludge.

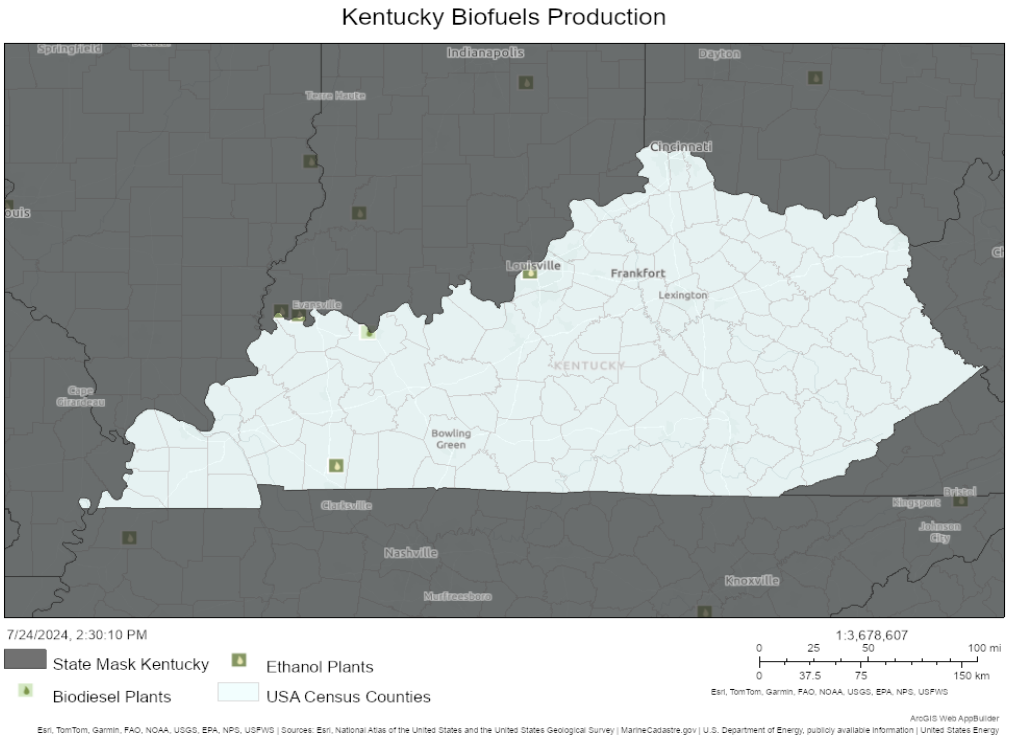


Figure 48: Kentucky Biofuels Production

State Government:
The Energy and Environment Cabinet State Energy Office (SEO-EEC) - http://eec.ky.gov/Energy/
Kentucky Department of Agriculture Weights and Measures - https://www.kyagr.com/consumer/weights-and-measures.html
Industry:
Kentucky Clean Fuels Coalition - http://www.kentuckycleanfuels.org/
Renewable Fuels Association - https://ethanolrfa.org/
Advanced Biofuels Association - http://advancedbiofuelsassociation.com/
Continental Refining - https://www.conrefco.com/
Producers:
Commonwealth Agri-Energy - http://www.commonwealthagrienergy.com/
Parallel Products - https://www.parallelproducts.com/
Owensboro Grain - https://owensborograin.com/

6.6.2 Bio-based Products

Process:

Bio-based products are produced from renewable plant and animal sources and are generally presumed to be more environmentally benign than their petroleum-based counterparts. They are usually biodegradable and can be returned to the earth at the end of their useful life or recycled and used again.

The Renewable Chemical Production Tax Credit is a nonrefundable and nontransferable credit available for tax years 2021 through 2024 that may be applied against income taxes imposed by KRS 141.020 (individual income tax), or KRS 141.040 (corporation income tax) and the limited liability entity tax (LLET) imposed by KRS 141.0401 in an amount certified by the Department of Revenue.

State Government:
The Energy and Environment Cabinet State Energy Office (SEO-EEC) - http://eec.ky.gov/Energy/
Division of Forestry - https://eec.ky.gov/Natural-Resources/Forestry/Pages/default.aspx
Kentucky Department of Revenue's Renewable Chemical Production Tax Credit - https://revenue.ky.gov/Business/Pages/RenewableChemicalProductionTaxCredit.aspx
Federal Government:
U.S. Department of Agriculture - https://www.biopreferred.gov/BioPreferred/faces/pages/BiobasedProducts.xhtml
Industry:
Kentucky Forest Industry Association - https://www.kfia.org/
Producers:
Bioproducts, LLC - http://www.bioproductsllc.com/
RedLeaf Biologics - https://redleafbiologics.com/
Smartwood USA - https://www.smartwood.world/

6.7 Transportation

6.7.1 Natural Gas and Hazardous Material Pipeline

Process:

Pipelines are an efficient method of transport for natural gas, petroleum fuels, and other chemicals. Almost all of the state's crude oil supply enters via pipeline. Finished petroleum products (gasoline, diesel, kerosene, jet fuel, and propane) are also most commonly transported

into and out of the Commonwealth by pipeline. The other major commodity exclusively transported by pipeline is natural gas.

To aid supply reliability, crude oil and petroleum products can be received from areas that are north and south of the state. For the most part, transport lines have excess capacity. Only in periods of extreme winter conditions are there sometimes short-term propane supply lines allocations. Pipeline supply and distribution could be a major concern during a natural disaster such as an earthquake or hurricane that limits operation.

Several natural gas pipelines move natural gas within the Commonwealth. The PSC is under contract with the US Department of Transportation, Pipeline Hazardous Materials Safety Administration (PHMSA) to regulate safety issues related to intrastate hazardous materials pipelines. The PSC's responsibilities include natural gas distribution lines, oil and gas collection lines, and two finished petroleum product lines. The PHMSA retains primary responsibility for all interstate pipelines located in the state.

In the event of an intrastate pipeline disruption resulting from a leak, rupture, or explosion (Appendices J and Appendix K), the Kentucky PSC, the Energy and Environment Cabinet's Emergency Response Team (ERT), and the Fire Marshall are notified immediately. Depending on the emergency, these agencies will coordinate and respond accordingly. If the disruption involves an interstate pipeline, PHMSA is the primary agency in control, however, the PSC may be asked to assist until PHMSA officials can arrive at the location.

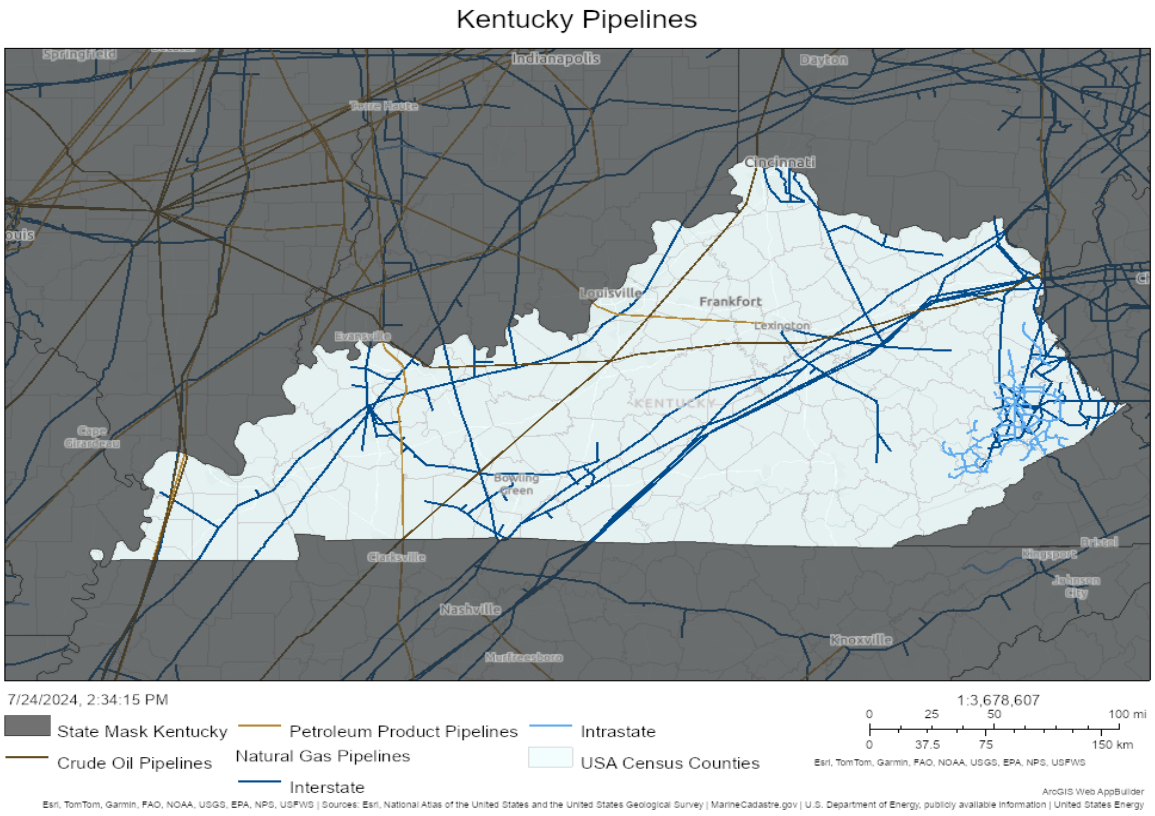


Figure 49: Kentucky Master Pipeline Map

State Government:
Public Service Commission - https://psc.ky.gov/
Energy and Environment Cabinet's Environmental Response Branch - https://eec.ky.gov/Environmental-Protection/Waste/Pages/EmergencyResponseBranch.aspx
Kentucky State Fire Marshal - ksfm.ky.gov
The Energy and Environment Cabinet State Energy Office (SEO-EEC) - http://eec.ky.gov/Energy/
Federal Government:
US Department of Transportation - https://www.transportation.gov/
Pipeline Hazardous Materials Safety Administration -www.phmsa.dot.gov
Emergency Call - (800) 424-8802
Industry:
Enterprise Products Operating LLC - https://www.enterpriseproducts.com/
MarkWest Energy Partners - http://www.markwest.com/
Marathon Petroleum Company LP - https://www.marathonpetroleum.com/

6.7.2 Motor Carrier

Process:

Motor Carrier is a common method of transport for many energy commodities. Finished petroleum products, coal, propane, and biofuels are all regularly transported by truck. Tractor-trailers will normally haul tanker loads up to 65,000 pounds (fuel and truck must not exceed 85,000 pounds). Carriers with special permits in Kentucky allow coal trucks to haul up to 120,000 pounds. These carriers often deliver the finished products to terminals where smaller trucks will in turn move products to the service facilities or the consumer.

The major energy issue related to motor carrier transportation is the safe and reliable delivery of fuels to end users. The primary agency responsible for developing standards for regulation of the trucking industry is the Federal Motor Carrier Safety Administration (FMCSA).

Federal regulations on public protection related to driver qualification and safety issues can be found at 49 CFR Parts 390 through 399.

Natural disasters and adverse weather conditions are the most common factors that cause delays in the delivery of fuels and therefore the main cause of concern for the energy industry and the population in general. Historically, adverse weather conditions have affected transport driver hours in the most dramatic way. Truck drivers, by regulation, are limited by the number of hours they can drive without a break and by the number of hours they can drive over a given period. High fuel demand and poor road conditions often magnify the effect of these restrictions during the winter months. These conditions can be especially true during winter snow or ice storms. Long waits at terminals, slow load times, and poor driving conditions can quickly deplete allowed hours.

The government has attempted to address this issue through FMCSA regulations that allow for waivers of Hours of Service (HOS) restrictions in order to provide fuel in times of need. Provisions are established for both local and regional emergencies and allow extended service hours anywhere the driver travels to support the identified emergency. In Kentucky, the process begins with a hauler or trade association requesting an extension either to the SEO-EEC, KYDOT, or directly to FMSCA. The full HOS procedure is contained in Appendix G of this document.

State Government:
Transportation Cabinet - http://transportation.ky.gov/
Department of Vehicle Regulation - https://drive.ky.gov/
Kentucky State Police - http://kentuckystatepolice.org/
Commercial Vehicle Enforcement Division - https://kentuckystatepolice.org/commercial-vehicle-enforcement/
The Energy and Environment Cabinet State Energy Office (SEO-EEC) - http://eec.ky.gov/Energy/
Federal Government:
Federal Motor Carrier Safety Administration (FMCSA) - http://www.fmcsa.dot.gov/
Industry:
Kentucky Motor Trucking Association - https://kytrucking.net/

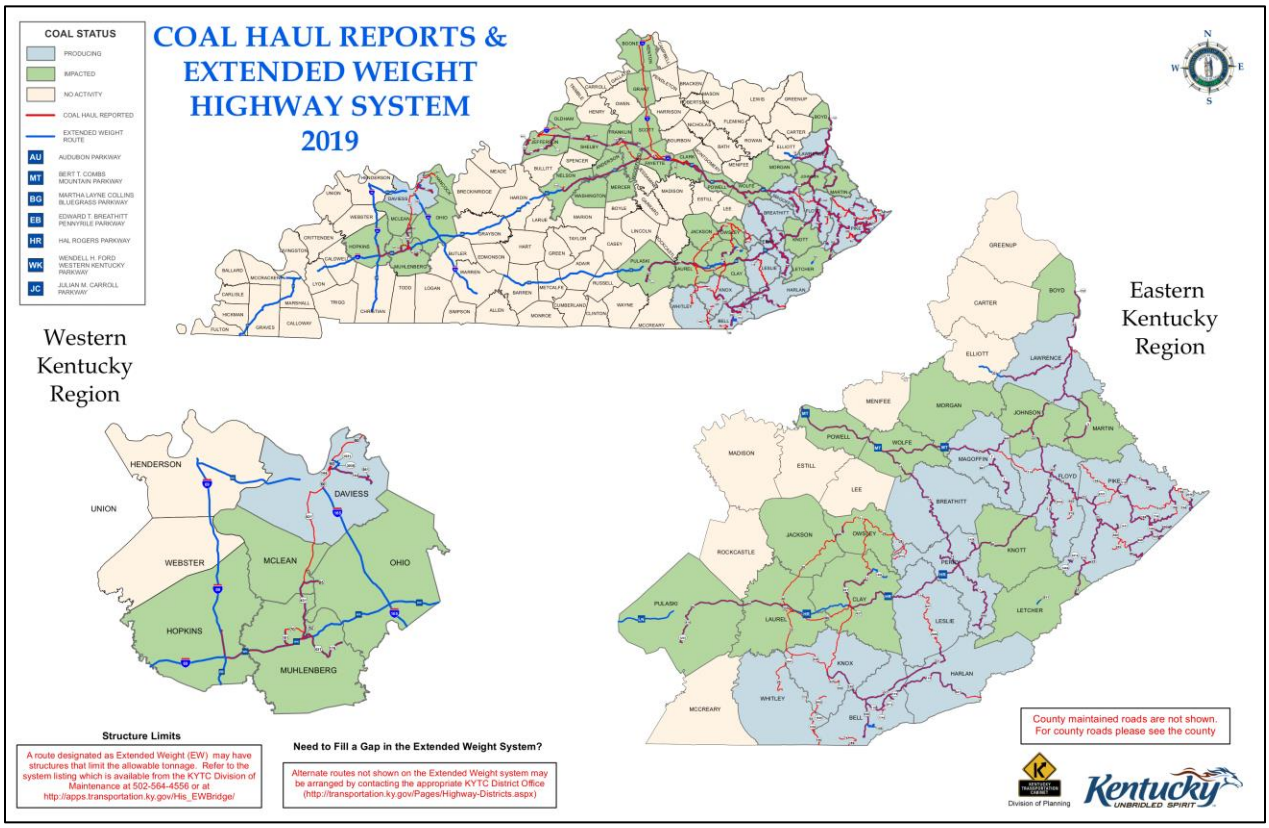


Figure 50: Kentucky Coal Haul Highway System Map, 2019

Source: **https://transportation.ky.gov/Planning/Pages/Coal-Haul-Highway-System.aspx**

6.7.3 Rail

Process:

Rail shipment is generally an energy-efficient and safe means of land transport, but it is highly capital-intensive. The efficiency of rail shipment depends on the commodity being transported. Most energy commodities are high-density materials, and therefore when moved in bulk, rail provides an ideal method of shipment when available.

Rail ships energy commodities in open-topped cars and tank cars. Coal, petroleum, and wood pellets are all ideal goods for rail shipment when possible. A typical rail car will hold around 115 tons of material with a typical train pulling at least 100 cars. Uploading, or transferring materials typically takes place at specific locations known as "tipples" for coal and at a "refinery" for petroleum products. Offloading will be at power plants and distribution terminals.

Railroad class is identified by the Surface Transportation Board (STB) based on annual gross revenue. For freight, railroads are listed as either Class I, II, or III.

See Appendix Q for Kentucky's Active Railroads. Contact the Kentucky Transportation Cabinet for additional information.

State Government:
Kentucky Transportation Cabinet - https://transportation.ky.gov/MultimodalFreight/Pages/Railroads.aspx
Division of Planning - https://transportation.ky.gov/Planning/
Multimodal Freight: Railroads - https://transportation.ky.gov/MultimodalFreight/Pages/Railroads.aspx
Federal Government:
Surface Transportation Board - https://prod.stb.gov/
Federal Railroad Administration (Atlanta Region) - http://www.fra.dot.gov/
Industry:
Kentuckians for Better Transportation - http://www.kbtnet.org/

6.7.4 Barge

Process:

Kentucky has 1,600 miles of navigable inland waterways. Transporting materials by water is an extremely efficient method of shipment. It requires far less energy to ship by barge than other

methods of shipment. A gallon of fuel can move a ton of material 514 miles by barge, whereas that one gallon of fuel would only move that ton of material 59 miles by truck and 202 miles by train.

This efficiency is related directly to the tonnage hauled by the vessel. A single barge can haul 1,500 tons of material, a jumbo hopper rail car can hold approximately 115 tons of material, and a larger semi-trailer can move 26 tons of material. Stated differently, a 15-ton barge (a normal bulk load on the Ohio River) can carry the equivalent load of 870 semi-trailers. This makes barge shipment extremely efficient for bulk materials over long distances.

Kentucky ranks among the top five states in the shipment of domestic waterborne tonnage. Coal represents the bulk of the tonnage by far at over 47 percent of the total volume shipped. Petroleum and other related energy commodities also account for another 12 percent of the goods moved.

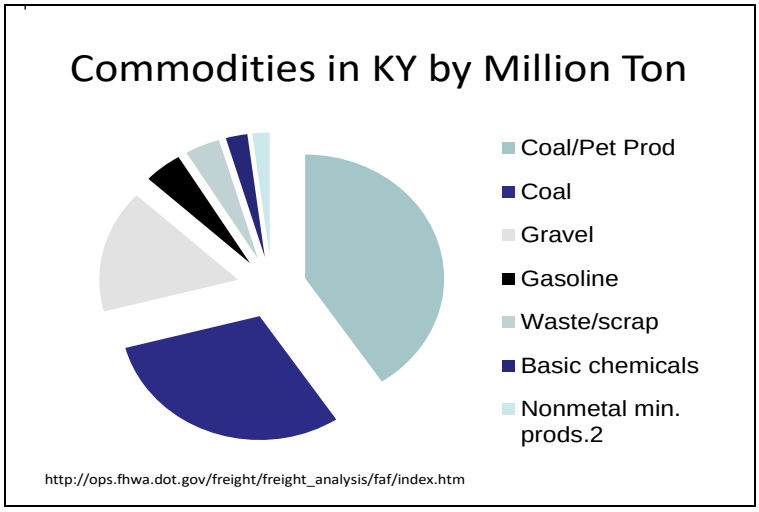


Figure 51: Commodities in Kentucky (MMTons)

Kentucky is located at the hub of the nation's inland waterway system. Its central location makes it an integral link between Canada, Mexico, and the ports in New Orleans and Mobile, AL. This proximity to United States and world markets makes the state especially attractive for the processing and distribution of energy commodities in all phases of production.

Kentucky has 10 public river ports; seven of these are operating ports with the other three under development. Each port serves the individual county where it is located, the area at large, and the entire state. Some facilities are quite mature while others are still in their infancy. In

addition to the public ports, there are also several private ports in the state. Some of these serve one specific facility while others are for general commerce.

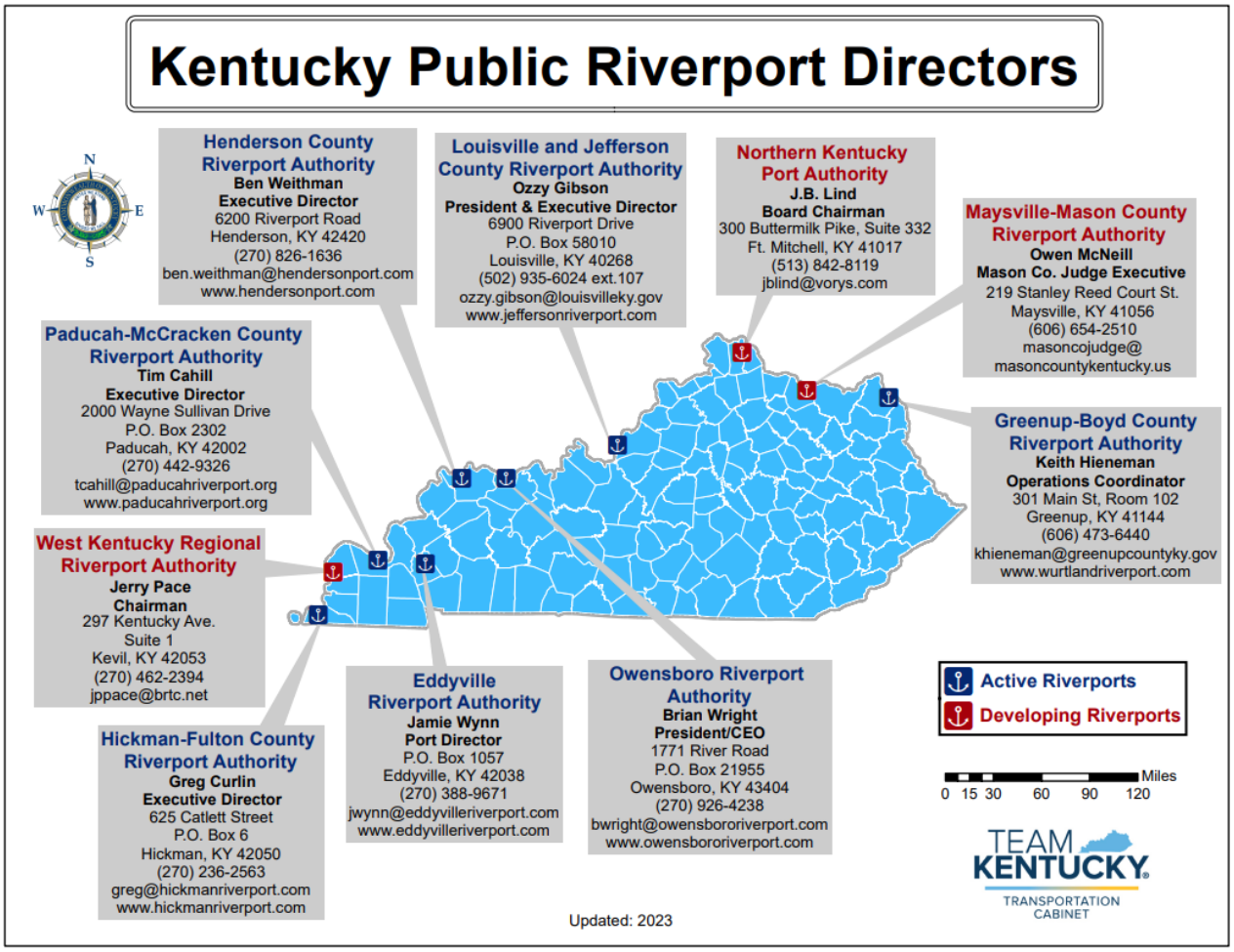


Figure 52: Kentucky Public River Port Directors 2023

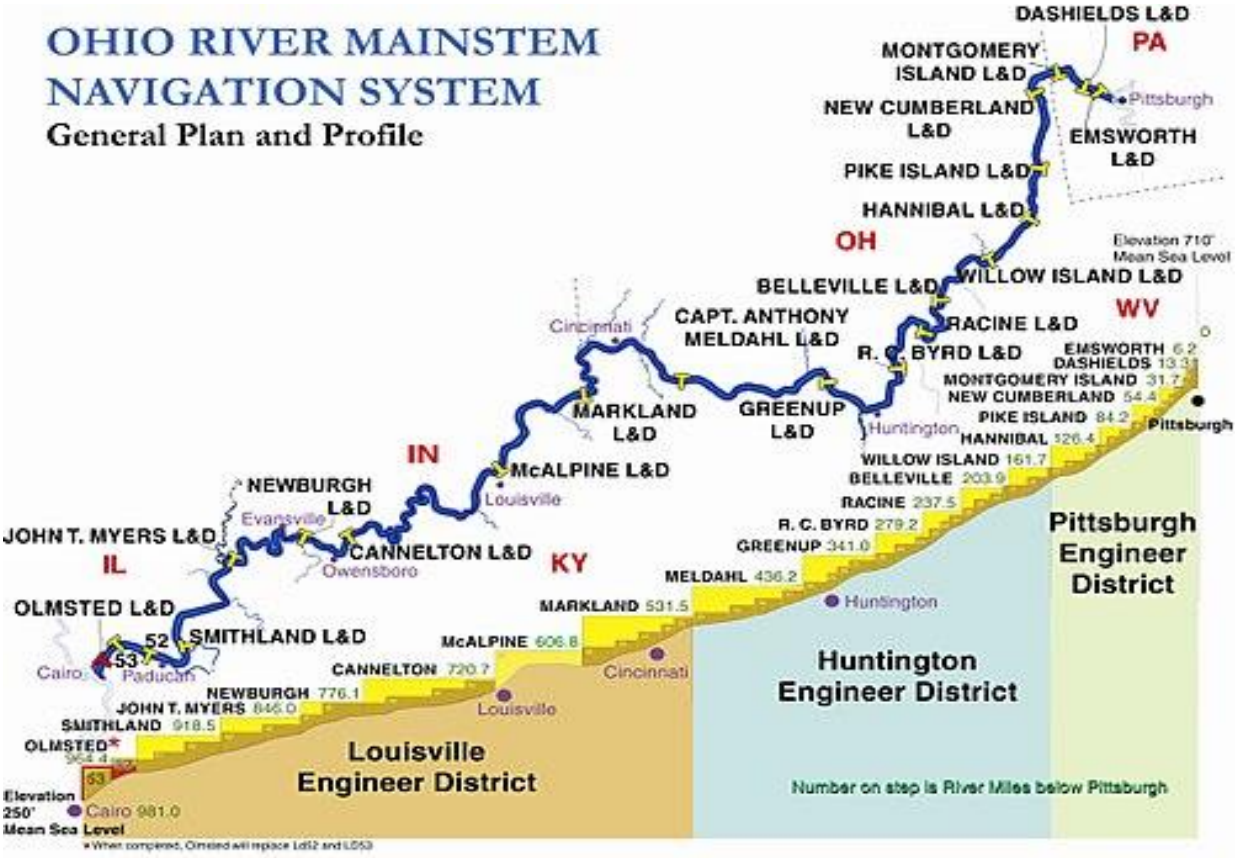


Figure 53: Map of Locks & Dams on the Ohio River

State Government:
Transportation Cabinet - http://transportation.ky.gov/
Division of Planning - https://transportation.ky.gov/Planning/
Federal Government:
U.S. Army Corp of Engineers - https://www.usace.army.mil/
Huntington District - https://www.lrh.usace.army.mil/
Louisville District - https://www.lrl.usace.army.mil/
Nashville District - https://www.lrn.usace.army.mil/
Industry:
Kentuckians for Better Transportation - http://www.kbtnet.org/

7.0 Energy Mitigation Strategies

7.1 Mitigation Strategy

Hazard mitigation planning reduces loss of life and property by minimizing the impact of disasters. It begins with state, tribal and local governments identifying natural disaster risks and vulnerabilities that are common in their area. After identifying these risks, they develop long-term strategies for protecting people and property from similar events. Mitigation plans are key to breaking the cycle of disaster damage and reconstruction.

All events start local, and it is the experience of the SEO that local jurisdictions in Kentucky are able to and have support for developing and implementing actions/measures mitigating the effects from natural hazard events. Kentucky's Area Development Districts (ADDs), the Division of Emergency Management (KYEM), and other state, regional, and nonprofit organizations provide significant and targeted direct support to local jurisdictions in developing natural (and human-caused) mitigation actions/measures. Consequently, a driving issue for the SEO is the additional identification and/or prioritization of mitigation measures that include energy, either as the reason to identify or a component of prioritize energy resilient investment actions in mitigation planning.

Previous sections of this document depict the procedures to be followed in monitoring the energy environment and responding to emergencies. This section identifies specific actions (risk mitigation measures) that the state intends to pursue in the short-, medium-, and long-term. These actions neither are exhaustive nor time sensitive. These actions will enhance energy infrastructure security primarily by lessening the impact of a disruption event and mitigate the effects from long-term power outages for communities pursuing these actions.

7.1.1 KYE3

Governor Andy Beshear, on October 20, 2021, in collaboration with the Energy and Environment Cabinet, announced Kentucky's energy strategy for a transitioning energy landscape. The strategy is known as KYE3: Designs for a Resilient Economy. KYE3 is an energy strategy wrapped in economic development and focused on resilience. KYE3 stands for energy, environment, and economic development, three issues that are inextricably linked.

KYE3 represents a long-term strategic vision for Kentucky's energy landscape and articulates overarching goals and objectives. The vision for KYE3 is an economy built on our past, answering the needs of today, and equipped for tomorrow's opportunities.

- KYE3 Addresses our energy sector in a holistic and integrated manner and promotes the utilization of all of Kentucky's energy resources, including energy efficiency and conservation. It recognizes that economic prosperity is linked to the availability, reliability, sustainability and affordability of consumer energy supplies, and supports the commercialization of innovative energy technologies.
- KYE3 Increases the resilience of the Commonwealth though our local communities' and energy sector's ability to anticipate, prepare, mitigate, respond, and recover quickly from threats or disruptions to our energy infrastructure.
- KYE3 Ensures that Kentucky's regulatory oversight provides safe, reliable and adequate energy services at reasonable prices, yet provides for the financial stability of and supports the operational competence of energy providers.

The benefits of our approach can only be realized by listening to all voices across the Commonwealth and engaging in partnerships that build actions to create success across our energy, environment and economic development landscape. Clearly defined goals and strategies will form the framework for the rest of the ESP's design and guide decisions about what actions (including policies, programs, and projects) will be proposed. Goals and strategies also help communicate the specific value of efforts to key audiences and provide a basis for tracking and measuring progress.

7.1.2 Kentucky Energy Mitigation Approach

The SEO-EEC is responsible for enhancing the energy resilience and security of the Commonwealth by identifying opportunities to increase the ability to respond effectively to an energy disruption and to recover quickly. The SEO-EEC is a non-regulatory entity that works closely with local, state and private industry stakeholders to identify areas of the state that are vulnerable to long term energy disruptions and pursue funding to mitigate these threats and hazards.

The SEO-EEC, representing ESF 12, have been activated to the KY SEOC twenty-three times since 2020. In this time KY has experienced eleven major DR declarations, all of which had an impact to our energy infrastructure and utility services across the state. Regardless of the nature of the

event, ESF-12 after action reports have produced trends that our office has identified and intend to pursue. The SEO-EEC has committed time and coordination with several agencies to secure grant funding to mitigate for long term energy disruptions and some of these activities are listed below.

FEMA Building Resilient Infrastructure Communities (BRIC)

The KY SEO-EEC were awarded a 2020 FEMA Building Resilient Infrastructure Communities (BRIC) project scoping grant to contract with KY's 15 Area Development Districts (ADD), legislative entities responsible for regional planning and economic development, and more specifically local hazard mitigation plans for FEMA funding.

The SEO-EEC and the ADDs will conduct project scoping activities with local governments and planners throughout the 120 counties and the 500 + cities to survey critical facilities for backup generation capabilities and identify what areas and services in the community are vulnerable to energy disruptions, map what hazards and threats enhance the likelihood of long term power outages and identifying future mitigation projects that will result in data collection and analysis intended to increase the capability of and build the capacity for local governments to propose, and to complete mitigation project applications that either wholly or partially address power and general energy needs and infrastructure needs.

New local hazard mitigation plan guidance (effective April 19, 2023) requires a vulnerability assessment, along with a capabilities assessment from each county. It further clarifies that hazard mitigation plan may no longer just list assets (critical facilities) without context (interdependencies) along with the capabilities to pursue and complete the proposed mitigation actions.

This grant will produce a vulnerability assessment that will assist communities in identifying areas in their region that are susceptible to long term power outages. The data will enhance each ADDs local hazard mitigation plans, mitigation strategy section, to include mitigation actions for energy resilient investments, i.e. "problem statements". Identifying one or more problem statements for each county and, as a best practice, for each city, will lead to and justify mitigation projects that are needed to enhance back up generation for critical facility types generally, or a "system-wide" problem which one or more or one "mega"/multi-faceted mitigation project could be directed.

The project deliverable for each county (and, potentially, city) does not have to result in strictly "backup power" mitigation actions, however, minimally, a "problem statement" will lead to justifying the purchase of additional generators and or larger capacity generators. The discussion of alternative/less well-known backup power energy mitigation actions will end up going beyond the "minimum." After all, in order to justify the purchase of a nano- or micro-grid, the deliverable will first address why simply purchasing generators is not a sufficient mitigation action.

At a minimum the BRIC grant allows the opportunity for local governments to identify critical facilities in their region, assess the back up generation capabilities of these facilities, and to enhance Kentucky's local hazard mitigation plans to focus on mitigating for long term energy disruptions.

FEMA Hazard Mitigation Grant Program (HMGP)

Kentucky's electric grid is unique in that the state has two wholesale marketers (PJM & MISO), four Investor-Owned Utilities (Duke, LG&E, KY Utilities and American Power), 26 co-ops served by 2 G/T Cooperation (EKPC & Big Rivers), 21 Self-Regulated Municipal Electric Utilities, five co-ops and 11 municipal utilities regulated by the Tennessee valley Authority (TVA). A detailed list is located in section 6.1.

With all this infrastructure, coordinating and communicating with this robust network can prove challenging during black sky events, especially considering that only 96% of KY's electric utilities are being tracked with publicly accessible websites, leaving a 4% gap in ESF 12 situational awareness during an energy emergency. The 4% gap represents 14 municipal utilities that do not have an Outage Management System (OMS). An outage management system (OMS) is a utility network management software application that models network topology for safe, efficient field operations related to outage restoration. Major functions usually found in an OMS include:

- Prediction of location of transformer, fuse, recloser or breaker that opened upon failure.
- Prioritizing restoration efforts and managing resources based upon criteria such as locations of emergency facilities, size of outages, and duration of outages.
- Providing information on extent of outages and number of customers impacted to management, media and regulators.
- Calculation of estimation of restoration times.
- Management of crews assisting in restoration.

- Calculation of crews required for restoration.

The SEO is coordinating efforts with the Kentucky League of Cities (KLC) and Electric Associations, to assist with utilities apply for funding through the Hazard Mitigation Grant Programs, Initiative funding, for the purchase and installation of an OMS system. Once OMS systems are in place the SEO-EEC will integrate with DOE Eagle-I. Kentucky's goal is 100% electric outage reporting coverage.

DOE Infrastructure Investment and Jobs Act (IIJA)

The 40101(d) Formula Grant Program from the Department of Energy (DOE) aims to provide states and tribes with aid to help improve the resiliency of their electric grids. The SEO-EEC will use this grant funding to strengthen grid infrastructure within Kentucky's state parks and at select municipal and electric cooperatives. The Kentucky State Parks system is used during emergencies as mass sheltering for displaced residents as well as for staging areas for utilities first responders, if needed. Currently, the grid infrastructure of the state parks is not reliable enough to provide power during minor weather events let alone during a severe storm; this issue serves as both a safety risk and an energy risk.

Out of the 44 state parks in Kentucky 14 of them have state owned electric distribution systems. The SEO-EEC is considering 6 of the 14 state owned parks for this grant opportunity:

- Barren River Lake State Resort Park
- Carter Caves State Resort Park
- Greenbo Lake State Resort Park
- Kenlake State Resort Park
- Kentucky Dam Village State Resort Park
- Lake Barkley State Resort Park

In recent years parks have communicated issues regarding reliability for their current electric infrastructure. Maintenance for the infrastructure becomes very difficult and inconsistent. The lack of resources for maintenance has placed the infrastructure in a poor and hazardous state which has reduced reliability in the electrical system. This poses a risk since parks are used for displaced communities during emergencies. On average, Kentucky experiences 2 presidentially declared natural disasters every year and if these disasters were to place communities in one of these state parks with poor infrastructure that can pose a safety risk to those citizens.

There are several threats to these systems. The most prevalent is the natural ecosystem and weather events. The current infrastructure is so vulnerable to these risks that minor events like a windy day could shut the whole electrical system down. Furthermore, since parks primarily serve as tourism revenue for the state the current status of the electrical system poses safety risks to the general public.

The first two years of funding will be used to bring the state park infrastructure up to modern standards and in essence "hardening the grid". This will be carried out, but not limited to, updated infrastructure that meets utility standards by updating older equipment, replacing wires, smart grid improvements, improving distribution lines and vegetation removal.

Once the state park infrastructure has been updated to be at utility standards the long-term maintenance and oversight is expected to revert back to the serving electric utility, as the utility is more equipped than parks to service the system during times of disruption. These efforts will require coordination with local, state, federal and private partners in the commonwealth.

DOE State Energy Program (SEP) Annual

The 2021 ice storm highlighted yet again the need for energy resilience in Kentucky's public water and wastewater systems. Drinking water outages closely follows the loss of power which quickly complicates emergency response efforts as critical customers such as health care facilities are affected. This can be easily offset by auxiliary power; however, most water pump stations are not fortified with a transfer switch that allows for a quick and safe connection to a generator. The inability to connect to auxiliary power extends the water outage, creates more bottled water demand, and increases the likelihood of evacuating critical facilities.

Data extracted from the Water Resources Information System shows that 1,700 (85%) of drinking water facilities and 3,938 (75%) of wastewater facilities do not have auxiliary power. Based on our experience of coordinating generator deliveries during disasters, it is estimated the (95%) of the 5,600 pumping facilities in Kentucky without auxiliary power also do not have transfer switches installed that allow for a safe and quick connection to a generator.

	Total Facilities	with AUX Power
Wastewater Treatment Plants	243	85
Wastewater Lift Station	3695	1220
Drinking Water Plants	209	82
Pump Stations	1491	211

The SEO-EEC worked with Kentucky Rural Water Association (KRWA) on a 2023 transfer switch grant funded that resulted in 41 utilities submitting applications for 93 facility retrofits. The requests totaled $640,300.

The SEO-EEC has continued efforts with Kentucky's wastewater utilities to improve robustness, redundancy and rapid detection of their critical facilities with 2024 SEP funding. The SEO-EEC is working with the Kentucky Division of Water, (KDOW) and the Smart Electric Power Alliance (SEPA) to conduct feasibility studies to identify WWTP for future WW optimization/nutrient reduction nano-grid project to promote energy efficiency and conservation on up to three (3) WWTP, using data from the 2021 KY Microgrid Deployment Study. Efforts will include working with key decision makers to identify critical loads and resilience needs, assessing site availability, conducting preliminary benefit-cost analysis, and suggesting next steps for project implementation. The objective of conducting these feasibility studies is to serve as a primer to pursue applications for energy and grid resilience improvement funding through the DOE SEP BIL.

DOE SEP Biden Infrastructure Law (BIL)

The SEP BIL Grant Program from the Department of Energy (DOE) provides funding to implement projects that will promote energy efficiency and conservation, develop training programs for new energy technologies and continue to work with underserved communities on energy affordability issues.

The SEO-EEC will use this grant to research the development of micro-grids at colleges and universities and nano-grid technology at wastewater treatment facilities to demonstrate the availability and feasibility of the technologies, to enhance local system and community resiliency.

Using the findings of the University feasibility study, seed funding will be provided to assist in the development of two strategically selected universities or colleges to demonstrate the design, building and operations of an emergency micro-grid to serve as critical facilities areas such as physical plant process and student centers. The project will ensure that within the micro-grids are one or more kinds of distributed energy (solar panels, storage, combined heat and power,

generators) that produce its power. All of the micro-grids will be local, independent, and intelligent systems operating to enhance campus and community resilience.

The Wastewater Energy Efficiency study project will provide studies on up to three (3) sites preselected by the SEO and key stakeholders. This grant will promote energy efficiency and conservation at local wastewater treatment facilities statewide and provide at least one nano-grid demonstration project to showcase that technology for resiliency at these facilities. The training objectives are to continue the education and outreach project to additional local facilities.

DHS Regional Resiliency Assessment Program (RRAP)

The KY SEO-EEC was selected to conduct a Regional Resiliency Assessment, (RRAP), of its petroleum product terminals, in bound. This project will study the resiliency of Kentucky's petroleum distribution and transportation fuel networks and the supply chain with focus on dependency on supporting electric power infrastructure. Specifically, characterize the petroleum infrastructure, examine the potential hazards and threats for key refined fuels facilities, identify cross sector interdependencies and capturing study data to inform planning because the ability of the Commonwealth to restore the petroleum system to normal is very dependent on the ability to restore critical sectors to normal operational level.

This RRAP will provide the state with information on specific petroleum knowledge gaps and help stakeholder's understanding of the petroleum infrastructure and product distribution systems in Kentucky.

- Kentucky petroleum supply chain is critically dependent on electric utility systems and dependent on truck, pipeline, and river systems. The Louisville terminal operations are critical and, in some instances, a sole pathway into the state. An assessment of mitigation measures around terminal operations, statewide infrastructure needs and transport modes are essential to our energy security programs.
- Critical petroleum infrastructure servicing Kentucky is especially vulnerable to winter storms, flooding, tornados and earthquake hazards.
- Identifying vulnerabilities to Kentucky's petroleum infrastructure and systems.
- Petroleum infrastructure is critically dependent on information technology and operating technologies such as supervisory control and data acquisition (SCADA); and,
- Fostering information-sharing relationships between petroleum sector elements and Kentucky state agencies would improve emergency fuel planning and response.

This analysis will also inform the management of risks to that system that will ultimately be used to support and assist the development of a state emergency master fuel plan.

KYEM THIRA

The KY SEO-EEC will work with KYEM to determine current capability metrics and develop a capability target for Power Restoration. This work includes a power restoration gap analysis focusing on challenges relating to planning, organization, equipment, training, and exercises as well as developing a strategic vision for improvement focusing on priorities and initiatives to address gaps and move closer to achieving target metrics. This information will be used to help the Commonwealth assess the impacts of our most catastrophic threats and develop plans to help response and mitigation efforts.

Nuclear

Kentucky takes an "all of the above approach" in regard to its energy infrastructure. However, with the increasing transition away from firm, baseload power like coal power generation, Kentucky's utility portfolios are becoming less diverse while at the same time increasing the reliability and resilience risk. A mitigation strategy to this risk is adding nuclear power generation to Kentucky's electricity generation portfolio.

The 2022 Winter Storm Elliott highlighted the vulnerability of Kentucky electric power generation portfolio and the added benefits of having nuclear power generation in the mix of technologies. The TVA along with LG&E and Kentucky Utilities, deployed for the first time in Kentucky history, rolling 15-minute outages because of generation failure to perform during the extreme cold event. The two serving Regional Transmission Organizations in Kentucky all implemented voluntary energy conservation measures.

With increasing threats to the power generation infrastructure, the 2023 General Assembly passed Senate Joint Resolution 79, which established Kentucky's Nuclear Energy Development Workgroup. The directive of the workgroup is to develop recommendations for the formation of a permanent nuclear energy development commission and identify barriers to nuclear energy deployment in the Commonwealth. Adding advanced nuclear power generation in Kentucky is a long-term mitigation measure to extended power outage event.

Hydrogen

As the world shifts to fossil-fuel alternatives in response to a growing call to reduce greenhouse gas emissions hydrogen has emerged as a strong substitute especially for hard to decarbonize industries e.g. the transportation industry. Hydrogen supports fuel diversity and increases resilience at the local level with fuel availability opportunities and reduces risk from fuel disruptions. These efforts come to fruition in the U.S. National Clean Hydrogen Strategy and roadmap.

In addition, there has been federal funding to support efforts to form regional hydrogen hubs in the US. These hubs serve to be localized areas for hydrogen production, storage, and demand. Currently Kentucky resides in two of those hubs: Appalachian (ARCH2), & Midwest (MachH2), Kentucky's doesn't participate in the same manner for each hub. Kentucky has a formal role on ARCH2's advisory board – The Energy and Environmental Cabinet serves in this role. There is no such role with MachH2 however there are Kentucky based stakeholders that participate in the Midwest hub (The University of Kentucky, Big Rivers Electrical Cooperative, and NiSource.)

Low carbon hydrogen as a fuel source is a solution for hard to decarbonize sectors that also service as critical facilities within manufacturing, transportation, and energy sectors. While there are infrastructure challenges in the short term, low carbon hydrogen production, distribution, storage and use provide a long-term mitigation strategy. The timeline for the low carbon hydrogen ecosystem is expected to be 10-12 years.

For the sake of hazard mitigation and grid reliability – hydrogen is still being developed as a fuel source nationally. Through that development stakeholders are continually learning the benefits and costs over each use of hydrogen. With some uses being more salient than others e.g., Transportation and heavy industry.

Electric Vehicles

Fleet fuel diversification is also a core mitigation strategy for the Commonwealth. The SEO works with three main types of funding as it relates to increasing electric vehicles and charging stations across the state. The Kentucky Transportation Cabinet (KYTC) in coordination with the Energy and Environment Cabinet (EEC), the Public Service Commission (PSC), the Federal Highway Administration (FHWA), and several other State Cabinets developed Kentucky's Electric Vehicle (EV) Infrastructure Deployment Plan (Plan). This plan is a requirement to obtain EV

infrastructure funding through the National Electric Vehicle Infrastructure (NEVI) Formula Program from the 2021 Infrastructure Investment and Jobs Act (IIJA).

In addition, the SEO is the agency designated for implementation of the Environmental Mitigation Plan for the Volkswagen Settlement. On October 18, 2016, a Partial Consent Decree was finalized between the U.S. Justice Department, and the Volkswagen (VW) Corporation. An Environmental Mitigation Trust has been established as part of the Consent Decree (CD) that provides funds to the states to mitigate the air quality impacts from higher vehicle emissions. Kentucky's initial allocation from the Trust is $20,378,649.58. A portion of this funding has been set aside for electric vehicle infrastructure to complement the NEVI funding.

EPA Solar for All (SFA)

The EPA's $7B Solar for All grant was designed to lower energy bills for millions of Americans through residential solar installations and catalyze transformation in markets serving low-income and disadvantaged communities. Kentucky's program will include community solar for Low Income Home Energy Assistance Program (LIHEAP) participants; solar installations on homes recently weatherized through the Weatherization Assistance Program (WAP); and bulk purchasing solarize campaigns in urban areas. It will also feature two resilience focused projects:

A key community resilience mitigation measure is the addition of solar + storage installations in Kentucky's "high ground" and tornado disaster recovery communities which will increase the resilience of those disaster- prone areas. The 2021 tornado outbreak in Western Kentucky and 2022 flooding in eastern Kentucky devastated those regions and left many without homes. As Kentucky rebuilds these communities, there is a focus on "building back better" in a way that provides resilience, safety, and affordable energy efficient housing for those survivor families. The construction of new high ground communities provides us with the opportunity to leverage recovery funding to enable deployment of clean, resilient energy solutions.

In addition, the demonstration of Community Solar Resilience Hub will show how solar plus storage can enhance the local grid's resilience by providing support to local circuits that serve a high proportion of electric dependent medical device populations according to HHS data. These populations strain the resources at a state level when experiencing a long-term electricity disruption. ESF-12 must coordinate with other ESFs to ensure communities services are provided for these population. Grid support in these areas ensures community lifelines remain viable.

EPA announced Kentucky's application was selected in April 2024, and is expected to be awarded ~$63M in September 2024.

7.1.3 Energy Mitigation Response Action

Energy emergencies can occur for many different reasons. They can be the result of natural disasters, accidents, political disputes, or terrorist activities. Disruptions may be large in scope affecting nations and all industries, or they may be much smaller affecting only a small geographic region or a specific industry.

This variability makes it difficult to construct a precisely designed set of actions that can be predetermined to address all potential emergencies. This does not mean, however, that the development of specific response plans is without merit. Since the promptness of response can often be the most critical factor in mitigating an emergency, it is vital to have response plans and procedures that have been developed and tested before an actual emergency.

Previous sections of this document depict the procedures to be followed in monitoring the energy environment and responding to emergencies. This section identifies specific short and long-term actions that may be taken to alleviate or lessen the impact of a disruption events for mitigating energy burden and long-term power outages in the Commonwealth.

These actions/risk mitigation measures listed below, are organized according to energy interdependencies and illustrates the state's approach/strategy to increase energy reliability and end-use resilience.

Electric Power

Conservation:	**Regulatory :**	**Ratepayer Protection:**
Develop and implement a public education and information program regarding electric power conservation. Curtail use by and/or impose electric power conservation goals on state government facilities and operations. Develop and impose an electric power-rationing scheme	Aid in securing variances to air pollution regulations so facilities that are equipped to burn coal may do so. Temporarily suspend or waive enforcement of state-mandated rules and regulations to allow use of alternative fuels	Impose temporary price controls on the state regulated retail costs of electricity. Impose criteria and/or guidelines for prohibitions on curtailment of electricity supply to local critical uses and/or other high priority electricity users.

(voluntary or mandatory) for the impacted area based on time of day, type of use, or similar criteria. Require implementation of a time of day/day of the week pricing scheme to reduce peak demand for the duration of the event where the necessary technology is available.	and/or alternative operating conditions. Request or require modification to scheduled electric generating unit maintenance outages pending resolution of electric energy shortages. Promote substitution of other fuels where feasible.	Temporarily halt electricity service disconnections for non-payment.

Subsidies:

- Provide, arrange, or subsidize financial incentives for electric power conservation for homes and businesses.
- Subsidize purchase of additional electric power on the wholesale market by the state's utilities.
- Subsidize purchase and installation costs of, or temporary provision of, standby generators for public and private sector critical facilities.
- Temporarily provide electric generators to key employers and important community facilities to sustain operations and to mitigate losses in revenue generated or employment.
- Provide low-interest or interest-free loans on an emergency basis to support businesses and industries in the impacted areas.
- Provide cost subsidies for purchase of fuels for electric power generation.
- Provide subsidies, loans, grants, or similar financial support to financially disadvantaged families for payment of higher electric costs.

Electric Mitigation Measures

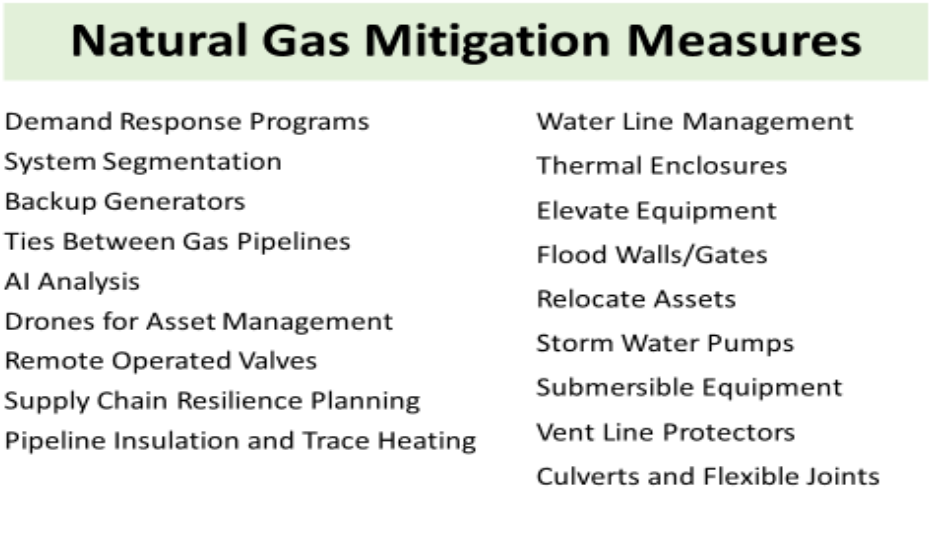
- Backup Generators (fixed/portable)
- Utility Line Burial
- Demand Response Programs
- System Segmentation
- Battery Storage
- Microgrid Deployment
- Advanced Distribution Management Systems
- AI Analysis
- Distribution Automation
- Drone Asset Inspection
- LiDAR Analysis for Vegetation Management
- Advanced Metering Infrastructure
- Supply Chain Resilience Planning
- Thermal Enclosures
- Advanced water-cooling Technologies
- Dry Colling
- Storm Water Pumps
- Vented Manhole Covers
- Fire Resistant Poles

Natural Gas

Conservation:	**Regulatory:**	**Ratepayer Protection:**
Develop and implement a public education and information program regarding natural gas conservation. Promote substitution of other fuels where feasible. Curtail use by and/or impose gas conservation goals on state government facilities and operations. Provide for allocation or non-essential use prohibitions in the impacted areas.	Aid in securing variances to air pollution regulations so facilities that are equipped to burn coal may do so. Temporarily suspend or waive enforcement of state-mandated rules and regulations to allow use of alternative fuels and/or alternative operating conditions. Recommend that interruptible service plans be initiated. Assess customers on interruptible tariffs to determine immediately available for curtailment.	Provide subsidies, loans, grants, or similar financial support to financially disadvantaged families for payment o higher natural gas costs. Impose temporary price controls on the state regulated retail costs of natural gas. Impose criteria and/or guidelines for prohibitions on curtailment of natural gas supply to local critical uses and/or other high priority natural gas users. Temporarily halt natural gas service is connections for non-payment.

Subsidies:

- Provide, arrange, or subsidize financial incentives for natural gas conservation for homes and businesses.
- Fund increased domestic natural gas production.
- Purchase and/or subsidize purchase on the wholesale market of natural gas redistribution to the impacted areas.
- Provide subsidies, loans, grants, or similar financial support to financially disadvantaged families for payment of higher natural gas costs.
- Purchase gas for delivery to critical facilities in the impacted areas.



Propane

Conservation:	**Regulatory:**	**Consumer Protection:**

Develop and implement a public education and information program regarding propane conservation. Promote substitution of other fuels where feasible. Curtail use by and/or impose propane conservation goals on state government facilities and operations. Provide for allocation or non-essential use prohibitions in the impacted areas.	Temporarily suspend or waive enforcement of state-mandated rules and regulations to allow use of alternative fuels and/or alternative operating conditions. Recommend that interruptible service plans be initiated. Coordinate transportation regulation waivers (e.g. hours of service) with the Transportation Cabinet.	Provide subsidies, loans, grants, or similar financial support to financially disadvantaged families for payment of higher propane costs. Impose temporary price controls on the retail and/or wholesale costs of propane.

Supplies:

Locate available supplies of fuel for emergency response and critical facilities.

Subsidies:

- Provide, arrange or subsidize financial incentives for home heating conservation for homes and businesses.
- Purchase and/or subsidize purchase on the wholesale market of propane for redistribution to the impacted areas.
- Provide subsidies, loans, grants, or similar financial support to financially disadvantaged families for payment of higher propane costs.
- Purchase gas for delivery to critical facilities in the impacted areas.

Petroleum Fuels

Conservation:	**Regulatory:**

Develop and implement a public education and information program regarding liquid fuels conservation. Curtail use by and/or impose liquid fuels conservation goals on state government facilities and operations. Promote employer-based car-pool programs that provide car-pool information and matching services to employees. These programs could be supplemented by an outside agency assisting employers in setting up these services or expanded solely by employer initiative. Increase rural car-pool parking lots that can be built on major commuter routes along state trunk lines outside urban areas. Existing lots that are being used at near capacity could also be enlarged to provide convenient, free parking to commuters. Establish area-wide car-pool programs that provide car-pool matching by local ride-sharing offices to area residents on request. Promote public vanpool programs. Provide vanpool information and matching services to interested participants and make the necessary arrangements to provide vans to qualified vanpool groups. Vanpooling could be encouraged as part of the Public Information Program. Establish preferred parking for employee carpools. Reserved parking in state government	Coordinate transportation regulation waivers (e.g. hours of service, weight restrictions) with the Transportation Cabinet. Promote substitution of other fuels where feasible. Aid in securing variances to air pollution regulations. Provide for mandatory reallocation of liquid fuel supplies from various regions within the state to the areas impacted by the shortage. Request lower speed limits on highways and roads in the Commonwealth with the Transportation Cabinet. Establish purchase plans by restricting gasoline purchases to every fourth day, based on the vehicle owner's license plate number. Operators of vehicles with license plate numbers ending in 00 to 24 could purchase gasoline on the first day of the plan, 25 to 49 on the second day, 50 to 74 on the third day, and 75 to 99 and personalized plates on the fourth day. Beginning on the fifth day, the rotation would repeat. This procedure for purchasing gasoline every four days could be extended to a longer interval if the emergency became more severe. Vehicles with commercial license plates would be exempt. Exemption tickets that would allow a one-time purchase per ticket on a non-purchase day would also be sold by the state. Impose “alternate (even-odd) days” motor vehicle refueling restrictions. Temporarily suspend or waive enforcement of state-mandated rules and regulations to allow

and business complexes could be offered to employees as a ride-sharing incentive. Recommend the Governor direct State department directors to reduce expenditures for vehicle travel. Encourage employers to offer telecommuting and/or flextime scheduling options to their employees to facilitate ride sharing and the use of public transit. Use school buses for public transportation to augment bus fleets. School buses could be used in tandem with transit buses along transit routes that are redesigned to respond to an increase in demand for public transit.	use of alternative fuels and/or alternative operating conditions. Provide for liquid fuels rationing or non-essential use prohibitions in the impacted areas. Purchase liquid fuels for delivery to critical facilities in the impacted areas. Participate in appropriate state role if the federal government imposes price or allocation controls on energy sources. Implement federally mandated fuel allocation or rationing programs.

Supplies:

Locate available supplies of fuel for emergency response and critical facilities.

Subsidies:

- Provide subsidies, loans, grants, or similar financial support to financially disadvantaged families for payment of higher heating fuel costs.
- Provide, arrange or subsidize financial incentives for liquid fuels conservation for residents and businesses.
- Purchase and/or subsidize purchase of liquid fuels for redistribution to the impacted areas.

Liquid Fuel Mitigation Actions

System Segmentation
Backup Generators
AI Analysis
Drone Asset Inspection
Remote-Operated Valves
Supply Chain Resiliency Planning
Pipeline Insulation and Trace Heating
Water Line Management
Flood Walls/Gates
Relocate Assets
Storm Water Pumps
Submersible Equipment
Culverts
Flexible Joints
Thermal Enclosures
Elevate Equipment

Coal

Conservation:	**Regulatory:**	**Transportation:**
Develop and implement a public education and information program regarding electric power conservation. Curtail use by and/or impose electric power conservation goals on state government facilities and operations. Develop and impose an electric power-rationing scheme (voluntary or mandatory) for the impacted area based on time of day, type of use or similar criteria.	Coordinate transportation regulation waivers (e.g. hours of service) with the Transportation Cabinet. Facilitate the scheduling of alternative methods of transportation for coal delivery. Provide additional staff resources to process coal mine permits.	Request the assistance of local and state agencies in road clearing activities during periods of snow and ice. (This may include the clearing of private driveways if necessary for delivery of fuel supplies for protection of life and property.) Request, through transportation companies or appropriate federal agencies, the priority movement of petroleum products, coal, or other fuels on rail, waterways, pipelines or other means. Work with appropriate state and federal agencies to remove

Require implementation of a time of day/day of week pricing scheme to reduce peak demand for the duration of the event where the necessary technology is available.		restrictions on highway transportation (e.g., weight limits, hours of service, route restrictions, etc.) without causing safety or other problems. Assist suppliers and consumers in locating transportation for petroleum products, coal or other fuels.

7.1.4 All Hazards Mitigation Strategy Summaries

The measures summarized on the subsequent pages are categorized into two main groups: "All Hazards" measures that can apply to a range of threats and "Hazard-Specific" measures that are designed to mitigate a specific threat or risk, such as cold weather or wildfires. All Hazard measures are divided into categories that align with three of the "infrastructural qualities" outlined in the Department of Homeland Security's Resilience Framework:

1) Robustness – measures that strengthen a system to withstand external hazards without degradation or loss of functionality.

2) Redundancy – measures that allow for alternate options, choices, and substitutions when a system is under stress.

3) Rapid Detection/Recovery – measures that shorten the time it takes to overcome a disruption and restore energy services.

The last two sections provide general resources on ways to increase the resilience of energy systems and resources related to specific risk mitigation measures.

All Hazards Risk Mitigation Measures:

- Robustness
- Redundancy
- Rapid Detection/Recovery

Hazard-Specific Risk Mitigation Measures:

- Cold Weather
- Extreme Heat and Drought Resistance
- Flooding
- Seismic
- Wildfire
- Wind

All-Hazards Risk Mitigation Measures

Robustness

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

Redundancy

Measure	Description	Sector
Backup generators	Fixed or portable backup generators can provide backup power to critical facilities when grid-supplied power is interrupted. Backup generators may be designed to power emergency functions, such as emergency lighting, fire suppression, or stormwater removal, or may be designed to power some or all of a facility's operational functions. Mobile generators can power utility or emergency responder base camps (sites where response personnel and equipment are staged). Backup generators require adequate fuel supply to operate.	

Measure	Description	Sector
Battery storage	Battery energy storage can be used to provide backup power during electric grid outages. Batteries can be deployed at utility-scale as front-of-the-meter systems, providing services like utility load peak shaving or behind-the-meter by customers. Batteries are often paired with solar photovoltaic systems and included in microgrid designs.	
Microgrids	A microgrid is a group of interconnected loads and distributed energy resources that acts as a single controllable entity with respect to the grid. It can connect and disconnect from the grid to operate in grid-connected or island mode. Microgrids can improve customer reliability and resilience to grid disturbances.	
Ties between gas pipelines	Natural gas system operators can add ties between gas distribution lines or "mains" to diversify the transmission system and allow additional pathways to route natural gas in the event some sections of transmission mains are damaged.	

Rapid Detection/Recovery

Measure	Description	Sector
Advanced distribution management systems	Advanced distribution management systems integrate numerous utility systems and provide automated outage restoration and optimization of distribution grid performance. These functions improve the resilience of the distribution system and decrease the length of customer outages.	
Artificial intelligence analysis	Artificial intelligence analysis can augment the abilities of subject matter experts to prioritize transmission line operations, identify defects, and update asset management systems.	  
Distribution automation	Distribution automation uses digital sensors and switches with advanced control and communication technologies to automate feeder switching; voltage and equipment health monitoring; and outage, voltage, and reactive power management.	
Drones for asset inspection	The use of drones to inspect pipelines, transmission lines, or other assets allows for safer and more frequent inspections, enhanced asset information, reduced operational costs and failure rates, and extended asset lifetimes.	  

Measure	Description	Sector
LiDAR for vegetation management	Vegetation is the primary cause of overhead power line outages. "Light Detection and Ranging" (LiDAR), is remote-sensing technology that can measure how close vegetation is to power lines. LiDAR units can be deployed on the ground, drones or aircraft, to enable more effective vegetation management reducing the impact of storms on electric infrastructure.	
Remote-operated valves	Remote-operated valves more efficiently isolate systems during disruptions or peak event load management (e.g., temporarily disconnecting gas customers).	 
Advanced Metering - Infrastructure	Advanced metering infrastructure (AMI) is an integrated system of smart meters, communications networks, and data management systems that enables bi-directional communication between utilities and customers. Smart meters can provide near-real-time visibility into customer outages and help utilities allocate resources and restoration activities more efficiently.	
Supply chain resilience planning	Assessing current supply chains and working with relevant stakeholders to strategically plan for the continuity and rapid restoration of those supply chains after major disruptions improves supply chain resilience.	  

Hazard-Specific Risk Mitigation Measures

Cold Weather Protection Measures

Measure	Description	Sector
Pipeline insulation & trace heating	Fiberglass insulation used to enclose piping can protect against freezing. Additionally, an electrical heating element installed along the length of a pipe and covered by thermal insulation can be used to maintain or raise the temperature of the pipe during cold weather.	 
Water line management	Draining water lines prevents rupturing that would otherwise be caused by the freezing water caught inside. Water lines that cannot be drained can be set to drip. The small amount of flow caused by the steady drip can help prevent the water inside the lines from freezing and rupturing the lines.	 

Measure	Description	Sector
Heating & pitch adjustment for wind turbines	Wind turbine blades and lubricant housings can be fitted with heating elements that prevent ice accumulation that would otherwise impair operations. Wind turbines can also be configured to operate in winter ice operation mode, which changes the pitch of the blades to allow continued operation as they accumulate ice.	
Thermal enclosures	Instrumentation can be enclosed and heated to ensure functionality and operational continuity during extreme cold conditions.	

Extreme Heat & Drought Resistance Measures

Measure	Description	Sector
Advanced water-cooling technologies	Power plants require significant volumes of water for thermoelectric cooling. Asset owners can employ approaches to reduce their water use to make them more resilient to drought conditions. Alternative approaches include recirculating cooling, dry cooling (highlighted below), and wet-dry hybrid cooling technologies. Cooling equipment capable of using alternative water sources (e.g., brackish water, wastewater) can reduce the impact of droughts.	
Dry cooling	Nearly all thermal generation, including nuclear and coal-fired power plants, requires large quantities of water for cooling. Extreme heat can lead to water shortages or make the water used for cooling too warm, forcing power plant operators to curtail electricity output. Dry cooling technologies use air-cooled heat exchangers and other technologies to significantly reduce water use.	
Hydropower reservoir capacity	Increasing reservoir storage capacity at hydroelectric power plants can offset the effects of precipitation variability.	
Turbine efficiency	Higher-efficiency hydroelectric turbines require less water per unit of electricity generated and are more resilient to drought.	

Flood Protection Measures

Measure	Description	Sector
Elevate equipment	Elevating equipment located in low-lying areas can protect it from flooding that would otherwise damage or destroy it.	

Measure	Description	Sector
Environmental management	Preserving certain kinds of natural habitats (e.g., coastal wetlands) provides a natural barrier to lessen the impact of storm surge.	
Flood walls/gates	Installing flood walls, gates, and/or barriers can protect essential equipment in flood prone areas from water intrusion and avoid restoration delays after major storms and floods.	
Relocate assets	Relocating energy assets away from flood-prone areas can reduce or eliminate their exposure to flooding and inundation threats.	
Stormwater pumps	Stormwater pumps can remove flood water and help prevent equipment from being submerged.	
Submersible equipment	Equipment located in flood-prone areas, such as underground power distribution systems in low-lying areas, can be modified or replaced with equipment that is designed to continue functioning when subjected to flooding from water containing typical levels of contaminants such as salt, fertilizer, motor oil, and cleaning solvents.	
Vent line protectors	A vent line protector (VLP) protects gas regulator vent lines from encroaching water. The VLP is usually open, but if water enters the vent line via the VLP, a float will seal the vent line shut. The float will drop when the water recedes, re-opening the vent to its normal position.	
Vented manhole covers	In flooding scenarios, manhole covers can dislodge, and the exposed manhole creates a hazard for pedestrians and vehicles. Proper vent design can allow for the flow of excess water without dislodging the cover.	

Seismic Protection Measures

Measure	Description	Sector
Base isolation transformer platform	Substation transformers can be placed on platforms designed to absorb the shaking from earthquakes that would otherwise damage the equipment.	

Measure	Description	Sector
Culverts	Placing fuel pipelines within buried concrete trenches, called culverts, significantly reduces the fracturing, buckling, and other damage caused to buried pipelines during an earthquake.	
Flexible joints	Flexible joints between steel pipe segments absorb the deformations caused during an earthquake and lessen the damage caused to pipeline infrastructure.	

Wildfire Protection Measures

Measure	Description	Sector
Covered conductors	To mitigate wildfire risk, utilities can replace bare wire overhead conductors on high-voltage transmission lines with conductors that have a plastic covering (also called tree wire). Covered conductors greatly reduce the number of faults, and the risk of ignition. Similar products include spacer cables and aerial cables.	
Fire-resistant poles	Wood poles can be replaced with ones made from fireproof materials, or wrapped in fireproof sheaths (e.g., wool-ceramic fiber).	
Line-break-protection systems	Automated monitoring equipment, called phasor measurement units, installed on transmission lines can detect a voltage change associated with the breakage of a power line. The system can respond in near real-time by de-energizing that segment of the transmission line so that the broken power line does not spark a fire as it falls to the ground.	
Pre-treat assets in path of fire	Pre-treating infrastructure (e.g., by applying flame retardant coatings or wrapping assets such as utility poles in flame retardant sheaths) decreases wildfire damage and expedites restoration of service.	
Reconductoring	Reconductoring is the process of installing new conductor wires on existing towers to increase transmission capacity, thus reducing propensity for high loads and line sag, which can cause ignition. Reconductoring typically involves replacing traditional steel-reinforced lines with composite core lines.	

Wind Protection Measures

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

Figure 54: ALL Hazards Risk Mitigation Measures

General Resources

Mitigating impacts from hazards to the energy system is a topic that is constantly being reevaluated, and the guidance for best practices is ever-changing. The following reports focus on ways to increase the resilience of energy systems. Note: this is not a comprehensive list of resources.

Institute of Electrical and Electronics Engineers (IEEE). 2020. *Resilience Framework, Methods, and Metrics for the Electricity Sector*.

This report provides an overview of resilience definitions (including its relationship with reliability), the existing frameworks for holistically defining resilience planning and implementation processes, and the metrics to evaluate and benchmark resilience. It also evaluates technologies, tools, and methods to improve electrical system resilience.

National Renewable Energy Laboratory. 2019. *Energy Resilience Assessment Methodology*.

This report presents a replicable energy resilience assessment methodology for sites, military bases, and campuses to assess energy risks and develop prioritized solutions to increase site resilience.

National Renewable Energy Laboratory. 2019. *Power Sector Resilience Planning Guidebook: A Self-Guided Reference for Practitioners***.**

This guidebook introduces policymakers, power sector investors, planners, system operators, and other energy sector stakeholders to the key concepts and steps involved in power sector resilience planning.

U.S. Climate Resilience Toolkit. 2019. *Building Resilience in the Energy Sector*

This toolkit examines climate change challenges for the energy sector, possible actions to mitigate risk and links to resources.

U.S. Department of Homeland Security. 2019. *National Mitigation Investment Strategy.*

The National Mitigation Investment Strategy ("NMIS"), developed by the Mitigation Framework Leadership Group, is a single national strategy for advancing mitigation investment to reduce risks posed by natural hazards and increasing the nation's resilience to natural hazards. This report outlines the investment strategy and how federal and non-federal partners can coordinate community mitigation investments.

National Academies of Sciences, Engineering, and Medicine. 2017. *Enhancing the Resilience of the Nation's Electricity System***.**

This report focuses on identifying, developing, and implementing strategies to increase the electric system's resilience in the face of events that can cause large-area, long-duration outages: blackouts that extend over multiple service areas and last several days or longer.

U.S. Dept. of Energy. 2016. *Climate Change and the Electricity Sector: Guide for Climate Change Resilience Planning***.**

This report provides basic assistance to electric utilities and other stakeholders in assessing vulnerabilities to climate change and extreme weather, and in identifying an appropriate portfolio of resilience solutions.

Electric Power Research Institute (EPRI). 2016. *Electric Power System Resiliency***.**

This report describes innovative technologies, strategies, tools, and systems that the electricity sector is developing and applying to address resiliency. The report explores three elements of resiliency: damage prevention, system recovery, and survivability.

Argonne National Laboratory. 2016. *Front-Line Resilience Perspectives: The Electric Grid***.**

This report summarizes how states and local utilities approach all-hazards resilience in planning, construction, operations, and maintenance of the electric system as well as challenges faced when addressing all-hazards resilience.

U.S. Dept. of Energy. 2014. *United States Fuels Resiliency Volume III: U.S. Fuels Supply Infrastructure Vulnerabilities and Resilience*.

This study evaluates the ability of the nation's oil and natural gas transportation, storage, and distribution infrastructure to respond to and recover from natural disasters and intentional acts, system chokepoints and interdependencies, and other supply interruptions.

U.S. Dept. of Energy. 2010. *Hardening and Resiliency: U.S. Energy Industry Response to Recent Hurricane Seasons*.

This report examines the storm hardening and resilience measures that refiners, petroleum product pipeline operators, and electric utilities in the Gulf Coast area took in response to the 2005 and 2008 hurricane seasons. It focuses on the segments of the energy industry that contribute most to the delivery of gasoline and diesel to the Southeast U.S.

7.2 Environmental Justice and Emergency Response Planning

Under-resourced or under-served communities are often the most exposed to disasters and the least able to recover after disasters strike. As severe weather becomes more frequent, the role of state agencies significantly increases to help communities prepare, respond, and recover from natural and mad made disasters. Proactively understanding community demographics and characteristics is a primary role of emergency management agencies in terms of addressing environmental and energy justice issues.

On February 11, 1994, through Executive Order 12898, the federal government took action and directed all federal agencies to identify and address environmental justice in their programs and focus on reducing and addressing disproportionate impacts. Environmental Justice can be defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

The fundamental principle of environmental justice is that all stakeholders should have meaningful and informed participation in all aspects of environmental decision-making that could affect their community; this includes disaster response and recovery efforts. Affected communities must have the ability to effectively collect data and other information in order to

be informed and active participants in decision-making processes. A community that is environmentally and energy aware and is an active participant in decision-making serves as the best source for environmental protection and energy awareness and preparedness.

Building off the tenets of environmental justice, energy justice refers to the concepts of equity, affordability, accessibility, and participation in the energy system and energy transition regardless of race, nationality, income, or geographic location.

On January 21, 2021, through Executive Order 14008, the President directed the Director of the Office of Management and Budget (OMB), the Chair of the Council on Environmental Quality (CEQ), and the National Climate Advisor, in consultation with the White House Environmental Justice Advisory Council (WHEJAC), to jointly publish guidance on how certain Federal investments might be made toward the goal that 40 percent of the overall benefits of such investments flow to disadvantaged communities – the Justice40 Initiative. This includes federal resources directed for emergency preparedness, response, and recovery efforts.

Kentucky's statutes and regulations do not expressly refer to environmental or energy justice, but public outreach and engagement is an integral part of Kentucky's energy and environmental programs. The EEC is committed to the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies. The SEO role is to analyze energy consumption data, pricing, and revenue data to identify trends or issues by sectors and at the geospatial level to provide policy support to management and the PSC. This is especially relevant to identifying vulnerable and disadvantaged communities and the energy trends or events affecting those populations.

The SEO-EEC functions as one of three ESFs during an emergency within the EEC: ESF-3, 10, and 12 dealing with hazardous materials, water and wastewater infrastructure, and energy issues, respectively. When looking at response and recovery after a man-made or natural disaster or environmental incident, communities affected by these releases, disasters, or incidents often include those with high environmental justice indicators. Awareness, training, and modification of existing plans is needed to ensure that marginalized and vulnerable communities in Kentucky are able to provide participation and have necessary access and the ability to recover from such incidents requiring emergency response or Energy Security planning.

In addition to ESF-12 responsibilities, the SEO serves as a non-regulatory agency inside the EEC assisting all citizens, businesses, and organizations throughout the Commonwealth on all energy-related issues. Central to this assistance is the provision of energy education across the Commonwealth. The Office strives to design programs and collaborate with partners to reach those areas of Kentucky identified as having significant environmental justice indicators. The SEO is facilitating an Energy Affordability Workgroup comprised of private, public and nonprofit entities across the state to tackle the complex issues that encompass energy affordability and energy burden for our most vulnerable Kentuckians.

The SEO-EEC has been spotlighted as a DOE case study on the use of the Low-Income Energy Affordability Data Tool (LEAD). The LEAD Tool has enabled the SEO-EEC to both identify geographical areas of the state with above average energy burden (percentage of income spent on energy) and direct grant funding to partner organizations in those areas to help address the issue. In addition, the SEO-EEC has a robust geospatial and data capacity to identify under-resourced and underserved areas that may be adversely impacted by natural or man-made events. Using the FEMA Hazard Risk Indices, the SEO-EEC can identify those areas that rank high for social vulnerability and low for community resilience. Working across all ESFs, ESF-12 helps coordinate appropriate resource support to these areas.

In order to better meet government responsibilities related to the protection of public health and the environment, the federal EPA has developed a new environmental justice (EJ) mapping and screening tool called EJSCREEN. It is based on nationally consistent data and an approach that combines environmental and demographic indicators in maps and reports. In the future, EJSCREEN will be utilized during disruption events to identify those vulnerable populations across the Commonwealth, thereby aiding in enhanced communication, outreach, and engagement.

In January of 2021, President Biden issued Executive Order 14008. The order directed the Council on Environmental Quality (CEQ) to develop a new tool. This tool is called the Climate and Economic Justice Screening Tool. The tool has an interactive map and uses datasets that are indicators of burdens in eight categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. The tool uses this information to identify communities that are experiencing these burdens. These are the communities that are disadvantaged because they are overburdened and underserved.

8.0 Citizen Service Programs

8.1 Energy Pricing Concerns and Complaints

Process:

The Attorney General's Office of Rate Intervention serves as a watchdog for consumers detecting and protecting against unreasonable, gas, water, sewer, electric, and telephone rates. Since its creation in 1974, the Office has helped to make the rate application process open and understandable to the consumers of the Commonwealth.

State Government:
Office of the Attorney General - https://www.ag.ky.gov/Pages/default.aspx
Office of Rate Intervention -https://ag.ky.gov/about/Office-Divisions/ORI/Pages/default.aspx
Consumer Protection Division - https://www.ag.ky.gov/about/Office-Divisions/OCP/Pages/default.aspx

Process:

The Public Service Commission (PSC), Division of Consumer Services provides informal complaint resolution for the state's regulated utility customers. Customers may contact the PSC by telephone, fax, e-mail, letter, or in person. Use of the toll-free number or e-mail allows the complaint to be handled with the greatest speed and efficiency.

The staff assist in resolving a wide range of utility problems including improper termination of service, unauthorized or incorrect charges on utility bills, problems reading meters, customer deposits for utility services, poor quality of service, and problems with delayed connection of services.

Although the PSC cannot resolve every complaint to the customer's satisfaction, investigators take prompt action on all complaints and resolve them appropriately, as determined by the statutes and regulations that apply to the utilities under the PSC jurisdiction.

State government:
Public Service Commission - http://psc.ppr.ky.gov
Division of Consumer Services - http://psc.ky.gov/agencies/psc/consumer/info_idx.htm
psc.consumer.inquiries@ky.gov

8.2 Low Income Home Energy Assistance Program (LIHEAP)

Process:

LIHEAP is a federally funded heating assistance program administered by the Kentucky Cabinet for Health and Family Services and contracted to Community Action Kentucky for service delivery in each of the state's 120 counties. The program provides heating assistance to eligible low-income households. Community Action Kentucky provides these services through the association's network of 23 community action agencies blanketing the Commonwealth.

State government:
Kentucky Cabinet for Health and Family Services - https://chfs.ky.gov/
Department for Community Based Services - https://chfs.ky.gov/agencies/dcbs/Pages/default.aspx
Community Action Kentucky - https://www.capky.org/

8.3 Weatherization Assistance Program (WAP)

Process

The Federal Government funds the Weatherization Assistance Program (WAP), which provides money to assist qualifying low-income households improve the energy efficiency of their homes by measures such as sealing leaks, adding insulation, and upgrading heating and cooling equipment. The program is administered by Kentucky Housing Corporation (KHC) on behalf of the Finance and Administration Cabinet (FAC), the state recipient of these funds. Kentucky Housing Corporation contracts with the Community Action Kentucky, which subcontracts with 23 Community Action Agencies and one local government to operate the program throughout Kentucky's 120 counties.

State Government:
Kentucky Finance and Administration Cabinet - https://finance.ky.gov/
Kentucky Housing Corporation - https://www.kyhousing.org/
Community Action Kentucky - https://www.capky.org/

8.4 Energy Legal Assistance

Process:

The Office of the Attorney General (OAG) Consumer Protection Division as well as non-governmental agencies can provide assistance with unfair, false, misleading, or deceptive acts or practices in the conduct of any trade or commerce.

State Government:
Consumer Protection Division - http://ag.ky.gov/family/consumerprotection/Pages/default.aspx

Local Government:
Louisville Metropolitan Area (Jefferson and Bullitt Counties) - Consumer Protection Division, Frankfort Office - https://ag.ky.gov/about/Office-Divisions/OCP/Pages/default.aspx

Non-governmental agencies:
Access to Justice Foundation

The Better Business Bureau may be able to provide information about the history of a company or whether a particular charity meets certain voluntary guidelines. They have offices in Louisville and Lexington.

8.5 Local Government Assistance

Process:

There are approximately 40 municipalities throughout the Commonwealth that are not serviced by a major local distribution company for their natural gas and/or electrical service. Municipalities experiencing difficulties financing energy supply may qualify for assistance from the Department for Local Government (DLG). DLG, under the Office of the Governor, provides financial help through grants and loan assistance to local governments. Federal grant funds are awarded on a competitive basis for construction and improvement of infrastructure and public facilities through the Community Development Block Grant Program (CDBG). Additionally, state grant funds for construction and improvement of infrastructure may be available through the Local Government Economic Development Fund (Coal Severance) Program.

State Government:
Department for Local Government - http://kydlgweb.ky.gov/
Community Development Block Grant Infrastructure Branch - https://kydlgweb.ky.gov/FederalGrants/16_CDBG.cfm
Kentucky Association of Counties (KACO) - https://www.kaco.org/

Kentucky League or Cities (KLC) - https://www.klc.org/
Kentucky Municipal Utility Association - https://www.kymua.com/

8.6 Emergency Shelter/ Warming Center Support

Process:

Extreme winter conditions may force Commonwealth citizens from their homes or lodging. If such extreme weather conditions prevail, state agencies can coordinate temporary shelters or warming centers. Support for these centers can be provided by both governmental and non-governmental agencies.

State Government:
Kentucky Division of Emergency Management - http://kyem.ky.gov/Pages/default.aspx
(OPS) Hotline - 1-800-255-2587
American Red Cross - https://www.redcross.org/
Non-Governmental agencies:
Community Action Kentucky - http://www.kaca.org/
Homeless & Housing Coalition of Kentucky - http://www.hhck.org

8.7 Disaster Food Benefits

Process:

Authority to operate a Disaster Supplemental Nutrition Assistance Program, (D-SNAP) is found in the Robert T Stafford Disaster Relief and Emergency Assistance Act. The Act provides the Secretary of Agriculture with the authority to operate D-SNAP when affected areas have received a presidential disaster declaration and when commercial channels of food distribution are available. The Food Stamp Act of 1977, as amended, provides the Secretary of Agriculture with the authority to establish temporary emergency standards of eligibility for households who are victims of a disaster that disrupts commercial channels of food distribution after those channels have been restored.

The Food and Nutrition Service (FNS) oversees the D-SNAP and approves the operation under the Stafford Act when affected areas have received a presidential declaration of major disaster and a declaration for individual assistance (IA). FNS provides food assistance in three ways:

- Providing food for shelters and mass feeding sites.
- Providing food for distribution directly to households.
- Providing disaster food benefits.

The Department for Community Based Services (DCBS) has the primary responsibility for providing emergency food assistance in Kentucky. DCBS is responsible for the design of a food benefit disaster plan, evaluation of the need for disaster food benefits or other feeding programs during a disaster, making a request to FNS to operate and implementing the D-SNAP, conducting post-disaster reviews, and reporting the findings to FNS.

D-SNAP is separate than regular SNAP, so when we issue D-SNAP benefits, that's only to non-SNAP recipients. Services we can provide to ongoing SNAP recipients include:

- Replacement benefits for food lost when the disaster hit, and
- Supplemental benefits for the disaster month so they get the same benefit amount as households receiving D-SNAP

Replacement benefits can happen anytime there is an adverse event for a household, like a fire, flood, or power outage lasting 4 hours or more. Most of those power outages don't rise to the level of federally declared disasters with individual assistance, but sometimes many, many households are impacted.

In "normal times", households have 10 days to request a replacement. For larger events, the State may request a waiver of that 10-day limit (typically extended to 30 days), which does not require a disaster declaration for approval.

This is where data from the power companies along with the DOE Eagle-I is vital to emergency response. DCBS can use power outage data from utility and government sources to verify their food loss, saving time and effort for the recipient and DCBS workers.

State Government:
Department for Community Based Services - https://chfs.ky.gov/
Cabinet for Health and Family Services - https://chfs.ky.gov/

9.0 APPENDICES

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10.0 FIGURES

11. ACRONYM

ADD – Area Development Districts
AMI- Advanced Metering Infrastructure
API- American Petroleum Institute
APPA- American Public Power Association
ARCH2- Appalachian Regional Clean Hydrogen Hub
BBL- Barrel
BCF- Billion Cubic Feet
BIL- Bipartisan Infrastructure Law
BOEMRE- Bureau of Ocean Energy Management, Regulation, and Enforcement
BPA- Bonneville Power Administration
BPCD- Barrels per Calendar Day
BRIC- Building Resilient Infrastructure and Communities
BSEE- Bureau of Safety and Environmental Enforcement
C2M2- Cybersecurity Capability Maturity Model
CBP- U.S. Customs & Border Protection
CDBG- Community Development Block Grant
CED- Cabinet for Economic Development
CESER- Cybersecurity, Energy Security, and Emergency Response
CEQ- Council on Environmental Quality
CHFS- Cabinet for Health and Family Services
CHP- Combined Heat and Power
CISA- Cybersecurity and Infrastructure Security Agency
CISO- Chief Information Security Officer
CJIC-Commonwealth Joint Information Center
CMV- Commercial Motor Vehicles
COOP- Continuity of Operations
DAIL- Department of Aging and Independent Living
DCBS- Department for Community Based Services
DCS- Distributed Control Systems
DEP- Department for Environmental Protection
DER- Distributed Energy Resources
DHS- Department of Homeland Security
DLG- Department for Local Government
DNG- Downstream Natural Gas
DNR- Department of Natural Resources
DOC- Department of Commerce
DOD- Department of Defense
DOE- Department of Energy
DOI- Department of the Interior
DOJ- Department of Justice
DPH- Department for Public Health
D-SNAP- Disaster Supplemental Nutrition Assistance Program
EAGLE-I- Environment for Analysis of Geo-Located Energy Information
EEAC- Energy Emergency Assurance Coordinator
EEAG- Energy Efficiency Advisory Group
EEC- Energy and Environment Cabinet
EIA- Energy Information Administration
EJ- Environmental Justice
EKPC- East Kentucky Power Cooperative
EPRI- Electric Power Research Institute
ERT- Emergency Response Team
ESF- Emergency Support Function
ESP- Energy Security Plan
EPA- Environmental Protection Agency
EV- Electric Vehicle
EVIDP- Electric Vehicle Infrastructure Deployment Plan
FAC- Finance and Administration Cabinet
FBI- Federal Bureau of Investigation
FCO- Federal Coordinating Officer
FEMA- Federal Emergency Management Agency
FERC- Federal Energy Regulation Commission
FHWA- Federal Highway Administration
FMCSA- Federal Motor Carrier Safety Administration
FNS- Food Nutrition Service
FOUO- For Official Use Only
GDP- Gross Domestic Product
GHG- Green House Gas
GII- Geospatial Information Infrastructure
GIS- Geographic Information System
HIFLD- Homeland Infrastructure Foundation-Level Data
HMGP- Hazard Mitigation Grant Program
HOS- Hours of Service
HQ- Headquarters
ICS- Incident Command Structure
IEEE- Institute of Electrical and Electronics Engineers
IIJA- Infrastructure Investment and Jobs Act
IMAT- Incident Management Assistance Team
IMT- Incident Management Team
IOU- Investor-Owned Utilities
IRS- Internal Revenue Service
ISAC- Information Sharing and Analysis Centers
ISERnet- Infrastructure Security and Energy Restoration

IT- Information Technology
JFO- Joint Field Office
JIC- Joint Information Center
KACO- Kentucky Association of Counties
KAR- Kentucky Administration Regulation
KDA- Kentucky Department of Agriculture
KHC- Kentucky Housing Corporation
KIFC- Kentucky Intelligence Fusion Center
KLC- Kentucky League of Cities
KOAG- Kentucky Office of the Attorney General
KOHS- Kentucky Office of Homeland Security
KRS- Kentucky Revised Statutes
KV- Kilovolts
KYNG- Kentucky National Guard
KYNG JOC- Kentucky National Guard Joint Operating Center
KYTC- Kentucky Transportation Cabinet
KYEM- Kentucky Emergency Management
KMUA- Kentucky Municipal Utilities Association
LGEKU- Louisville Gas and Electric Company and Kentucky Utilities
LIHEAP- Low-Income Home Energy Assistance Program
LEAD- Low-Income Energy Affordability Data
LiDAR- Light Detection and Ranging
LLET- Limited Liability Entity Tax
LPG- Liquefied Petroleum Gas
MACHH2- Mid-Atlantic Clean Hydrogen Hub
MISO- Midcontinent Independent System Operator
MOC- Manager on Call
MS ISAC- Multi State Information Sharing and Analysis Centers
MW- Megawatts
MWPSR- Midwest Petroleum Shortage Response Collaborative
NASEO- National Association of State Energy Officials
NARUC- National Association of Regulatory Utility Commissioners
NEMA- National Electrical Manufactures Association
NERC- North American Electric Reliability Corp
NEVI- National Electric Vehicle Infrastructure
NGA- National Governors Association
NGL- Natural Gas Liquids
NIMS- National Incident Management System
NIPP- National Infrastructure Protection Plan
NMSZ- New Madrid Seismic Zone
NOAA- National Oceanic & Atmospheric Administration
NRC- Nuclear Regulatory Commission
NRCC- National Response Coordination Center
NRECA- National Rural Electric Cooperative Association
NRF- National Response Framework
OAG- Office of the Attorney General
OCP- Office of Consumer Protection
OMB- Office of Management and Budget
OMS- Outage Management System
ONG- Oil and Natural Gas
OOC- Office of Communications
OPS- Office of Pipeline Safety
OSC- Operating Section Chief
PA- Public Assistance
PADD- Petroleum Administration for Defense Districts
PCI- Pipeline Cybersecurity Initiative
PHMSA- Pipeline and Hazardous Material Safety Administration
PII- Personal Identifiable Information
PIO- Public Information Officer
PJM- Pennsylvania, New Jersey, and Maryland
PMA- Power Marketing Administrations
PSC- Public Service Commission
PUC- Public Utility Commission
PV- Photovoltaics
RC3- Rural Cooperative Cybersecurity Capabilities
RDUP- Rural Development Utilities Program
RECC- Rural Electric Cooperative Companies
RRAP- Regional Resiliency Assessment Program
RSF- Recovery Support Functions
RVP- Reed Vapor Pressure
SCADA- Systems and Supervisory Control and Data Acquisition
SEDS- State Energy Data System
SEOC- State Emergency Operations Center
SEO-EEC- Kentucky Energy and Environment Cabinet's State Energy Office

SEOP- State Emergency Operations Plan
SEP- State Energy Program
SEPA- Smart Electric Power Alliance
SIT REP- Situation Report
SLOPE- State and Local Planning for Energy
SLTT- State, Local, Tribal, and Territorial
SOP- Standard Operating Procedure
SPR- Strategic Petroleum Reserve
SPR- Stakeholder Preparedness Review
SPSRC- Southeast Petroleum Shortage Response Collaborative
STB- Surface Transportation Board
SWPA- Southwestern Power Administration
THIRA- Threat and Hazard Identification and Risk Assessment
TVA- Tennessee Valley Authority
TSA- Transportation Security Administration
USACE- United States Army Corps of Engineers
USDA- United States Department of Agriculture
USDOC- United States Department of Commerce
USDOT- United States Department of Transportation
USEPA- United States Environmental Protection Agency
VLP- Vent Line Protectors
WAP- Weatherization Assistance Program **WAPA-** Western Area Power Administration
WHEJAC- White House Environmental Justice Advisory Council