

Power Outage Incident Annex to the Response and Recovery Federal Interagency Operational Plans

*Managing the Cascading Impacts from a Long-Term
Power Outage*

Final - June 2017



Homeland
Security

Handling Instructions

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Intended Audience

The primary audience for this annex is federal departments and agencies with a role in emergency management. However, local, state, tribal, territorial, and insular area officials, as well as private sector and nongovernmental partners with roles and responsibilities for responding to and/or recovering from long-term power outages will also benefit from the material in this annex.

¹ https://www.dhs.gov/xlibrary/assets/foia/mgmt_directive_110421_safeguarding_sensitive_but_unclassified_information.pdf

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Base Annex

Situation

Introduction

Response to a long-term power outage will involve two major concurrent operational efforts; the restoration of power and lifesaving and life-sustaining efforts. Restoration of power will remain within the purview of the utility companies. If a need for federal engagement for energy restoration efforts arises, the Department of Energy (DOE), as the sector-specific agency (SSA) as well as the lead federal agency for the energy sector, directs those efforts. However, the utility companies will maintain operational control over restoration efforts.

Concurrently, the Department of Homeland Security (DHS), through the Federal Emergency Management Agency (FEMA), will coordinate lifesaving and life-sustaining efforts. FEMA will coordinate federal incident response and recovery activities consistent with the constructs identified within the National Response Framework (NRF) and the National Disaster Recovery Framework (NDRF). The Federal Government integrates its efforts with those of local, state, tribal, territorial, and insular area governments; the private sector; and nongovernmental organizations (NGOs).

The Nation's energy sector consists of thousands of geographically dispersed and connected electricity, oil, and natural gas assets. The sector provides for and relies on the Nation's transportation, water, information technology (IT), communications, finance, government, and other critical infrastructures (CIs). Likewise, CI sectors reciprocally depend on energy—especially electricity. The private sector owns and operates the majority of the Nation's energy infrastructure. For this reason, private sector energy asset owners and operators are responsible for developing their own emergency plans and conducting training and exercises to validate and test their procedures. In most cases, energy asset owners and operators are also responsible for the stabilization, restoration, and reestablishment of normal operations at their facilities following a disruption. Fortunately, electric companies in the United States have well-developed protocols that address business continuity, and they are subject to mandatory federal reliability standards that ensure operational reliability. Even though utilities operate under different business models and ownership structures, asset owners and operators function in an integrated manner.

Electricity is essential for daily life. Basic functions, including communication, transportation, food, housing, water, and healthcare, are dependent upon it. As reliance on electricity continues to grow, a significant disruption to the electric grid may put lives, the economy, and the environment in danger. The incidents below illustrate how power outages have previously affected critical services in other CI sectors, such as fuel production and transportation, water and wastewater facilities, mass transit, and public health, and provide context for interdependencies and cascading effects across CI sectors for a long-term power outage.

- August 1996 Blackout—Outages lasted from a few minutes to as long as nine hours and affected over 7.5 million people in the United States, Canada, and Mexico. Power was restored in nearly all affected areas by the next day.

- **August 2003 Northeast Blackout**—Over 50 million people were without power for up to four days in the Midwest and Northeastern United States. Parts of the Province of Ontario, Canada suffered rolling blackouts for more than a week before power was fully restored.
- **Hurricane Katrina, 2005**— In August, Hurricane Katrina left an estimated 2.7 million customers without power across Alabama (AL), Florida (FL), Louisiana (LA), Mississippi (MS), and Texas (TX). Within two weeks, power was restored in AL, FL, and MS, yet full restoration in LA took almost another month due to extensive flooding and hurricane damage that required reconstruction of energy and other supporting infrastructure.
- **Hurricane Rita, 2005** – In September, Hurricane Rita left over two million customers without power throughout AL, FL, LA, MS, and TX. The impact of Rita further impeded ongoing restoration efforts, setting back the number of customers that had power restored initially from Katrina. Most neighborhoods in New Orleans that could take service had electric service restored by November, while the expected restoration timeframe for other local neighborhoods ranged from an additional four weeks to “indefinitely.”
- **Halloween Nor’easter, 2011** – Heavy snow in October 2011 brought down trees, resulting in 3.2 million residents across 12 states losing power. The storm arrived just two months after Hurricane Irene caused extensive power outages and property damage in the Northeast, with the 2011 New England tornado outbreak also causing damage in Western Massachusetts. In Connecticut, the outage lasted more than 11 days.
- **2012 Derecho** – This June storm resulted in power outages for 4.2 million people in 11 states and the District of Columbia. Power was restored within one week. Restoration took longer than anticipated because new follow-on storms affected the region during the second day of restoration, causing additional outages, slowing restoration, and setting back original estimates. Extreme temperatures that followed the 2012 Derecho may also have complicated restoration efforts for many utilities, as the high heat posed a safety risk to utility crews and lowered restoration efficiency.
- **Hurricane Sandy, 2012** – In October 2012, 20 states plus the District of Columbia experienced significant power outages because of Hurricane Sandy. Over 8.5 million customers lost electric power, and significant damage occurred to the energy infrastructure. Within two weeks of Sandy’s landfall, power was restored to 99 percent of customers.
- **Nor’easter 2012** – Following on the heels of Hurricane Sandy in November 2012, strong winds, rain, snow, and coastal flooding resulted in an additional 150,276 power outages on top of those that had already occurred due to Hurricane Sandy. Full restoration of power was achieved in early December 2012.

As shown in the above examples, utilities are fully prepared to respond quickly to restore power for the majority of disruptions that occur by using existing processes and agreements. However, there is a potential for a large-scale damage to the power infrastructure that may cause a long-term (+72 hours) interruption for a large swath of the country. Any prolonged interruption of the supply of basic energy, particularly electricity, would do considerable harm to the U.S. economy and the American people. A long-term outage that results in businesses, CI, and thousands of

people without power for weeks or months could leave the population in need of life saving and life-sustaining efforts.

When a power outage is of such significance and scope that it is beyond the ability of utility companies to restore power in a timely manner, resulting in local, state, tribal, territorial, or insular area capabilities being insufficient to support the population, the Federal Government provides assistance to jurisdictional response and recovery capabilities. A situation that may trigger a need for the local, state, tribal, territorial, or insular area to request federal assistance discussed in this annex will likely possess some or all of the following characteristics:

- The outage covers multiple states/FEMA Regions and leaves millions of customers without power for an extended period².
- A significant portion of the population in the affected area warrants prolonged mass care and emergency assistance support;
- A loss of critical lifeline functions (e.g., energy – electric, energy – gas/oil, water, communication, and transportation) results in risks to health, personal safety, national security, and economic viability.
- Impacts to other CI sectors result in significant loss of services or functions if the duration of the power outage is for an extended period of time.
- Local, state, tribal, territorial, or insular area governments need sustained operational coordination to respond to the effects from the power outage.

Purpose

The *Power Outage Incident Annex: Managing the Cascading Impacts from a Long-Term Power Outage* (POIA) provides guidance for federal level responders to provide response and recovery support to local, state, tribal, territorial, and insular area efforts while ensuring the protection of privacy, civil rights, and civil liberties.³ This annex provides incident-specific supplemental information to the basic concept of operations described in the Response and Recovery Federal Interagency Operational Plans (FIOP), which will be further refined in regional POIAs.⁴

The POIA includes the Federal Government's concept of operations and unified coordination structures required to execute survivor-centric response and recovery operations in the wake of a long-term power outage. The POIA is not an electricity restoration plan although the Federal Government may provide the appropriate supplemental federal assistance and resources to enable the restoration process in a timely manner. It does outline the types of federal support available to CI stakeholders in restoration activities and the responsibilities of industry

² The electricity industry defines a customer as a metered structure (i.e., a metered building is a single customer), not as the number of individuals within the structure.

³ Per the Response FIOP, the whole community includes individuals and communities, the private and nonprofit sectors, faith-based organizations, and all levels of government (local, regional/metropolitan, state, tribal, territorial, insular area, and federal). Whole community contributors include children; older adults; individuals with disabilities and others with access and functional needs; those from religious, racial, and ethnically diverse backgrounds; people with limited English proficiency; and owners of animals, including household pets and service animals.

⁴As with all activities in support of the Response and Recovery FIOPs, activities in this annex must be consistent with all pertinent statutes and policies involving privacy and civil and human rights, such as the Americans with Disabilities Act of 1990, Rehabilitation Act of 1973, and Civil Rights Act of 1964.

stakeholders. The document also identifies potential critical information requirements and unique considerations that could hinder their ability to provide mission-essential services.

The POIA does not alter or impede the ability of any governmental department or agency to execute its authorities or meet its responsibilities under applicable laws, executive orders, and directives

Scope

This annex applies to response and recovery capabilities of the Federal Government in the event of a long-term power outage in which the cascading impacts are so severe that incident-specific activities are required to supplement those in the Response and Recovery FIOPs. Actions listed in this annex may be to provide support to local, state, tribal, territorial, and insular area governments or other federal agencies to address the ramifications of the incident.⁵ This annex will not focus on restoration efforts conducted by utility companies but will briefly address the capabilities of the Federal Government to support the sector in their restoration efforts for informational purposes.

Incident-specific response and recovery activities were determined based on the identified interdependencies and cascading impacts a long-term power outage would have on CI sectors and core capabilities and the relevant responsibilities and legal authorities of federal agencies.

Background

The electric power industry is the backbone of America's economic sectors, generating the energy that powers its people and businesses in global commerce. Transportation, water, emergency services, healthcare, communications, and manufacturing represent only a few of the power grid's critical interdependencies. Reliance on the electric grid is a key interdependency (and vulnerability) among all CI sectors and supporting infrastructures, making grid reliability and resilience a fundamental need for national safety and security. Therefore, a basic understanding of the roles of electricity providers is important for setting expectations of potential federal support to address the cascading impacts of a long-term power outage. See Annex A for more information on the electricity subsector and electricity delivery.

Over 3,200 electric companies in the United States generate, transmit, and distribute electricity for sale to customers. There are two types of utilities—for-profit and not-for-profit, as identified below.

For-Profit Utilities

- **Investor-Owned Utilities (IOU)** – IOUs are utilities operated as private, tax-paying businesses whose management is not associated with any government agency. Private citizens or private investment groups hold financial securities or assets, and the stock is publicly traded. IOUs may have service territories in one or more states. State commissions grant IOUs their licenses to operate in specific areas of the state under certain terms and conditions. The Federal Energy Regulatory Commission (FERC)

⁵ While the intent is not to use this annex for every incident in which there is a power outage, elements of this annex may be selectively used (e.g., critical information requirements) consistent with the principles in the NRF.

regulates IOU interstate generation, transmission, and power sales. A state commission or public utility commission regulates IOU distribution system and retail sales. While IOUs comprise only a small portion of the total number of utility companies in the United States, they serve more than two-thirds of the Nation's population.

- **Independent Power Producer** – Often called non-utility generators, independent power producers are entities that own or operate an electricity generating facility that is not included in an electric utility's rate base. They include, but are not limited to, cogenerators, small power producers, and all other non-utility electricity producers (such as exempt wholesale generators) who sell electricity.

Not-For-Profit Utilities

- **Public Power Utilities** – Public power utilities are not-for-profit utilities owned and operated by state or local governments or by agencies, authorities, or instrumentalities of such governments. City-owned utilities are also known as municipal utilities (munis). Public power utilities are regulated and governed by locally elected or appointed officials and are thus directly accountable to the communities they serve. Within the United States, more than 2,000 community-owned electric companies serve more than 48 million people, or about 14 percent of the Nation's electric companies.⁶
- **Rural Electric Cooperatives (Co-Ops)** – Electric co-ops are private, independent, not-for-profit electric utilities owned by the customers they serve. They are incorporated under the laws of the states in which they operate and are generally exempt from federal income tax laws. Established to provide at-cost electric service, co-ops are governed by a board of directors elected from the membership, which sets policies and procedures that the co-op's management implements. Distribution cooperatives deliver electricity to retail customers, while generation and transmission cooperatives provide wholesale power to distribution co-ops through their own generation or by purchasing power on behalf of the distribution members. Co-ops tend to provide service in rural areas that are not served by other utilities. Most electric cooperatives were initially financed by the Rural Utilities Service (formerly known as the Rural Electrification Administration) within the United States Department of Agriculture (USDA).
- **Federal Power Program** – This program includes the Tennessee Valley Authority (TVA), the Bonneville Power Administration (BPA), the Southeastern Power Administration (SEPA), the Southwestern Power Administration (SWPA), and the Western Area Power Administration (WAPA). TVA is a corporate agency of the United States that sells electricity to business customers and local power distributors serving nine million people in parts of seven southeastern states. BPA, SEPA, SWPA, and WAPA are Power Marketing Administrations (PMA). PMAs are federal agencies within DOE that market hydropower, primarily from multiple-purpose water projects operated by the Bureau of Reclamation, the USACE, and the International Boundary and Water Commission.

⁶ American Public Power Association website. <http://publicpower.org/>.

Interdependencies

Key interdependencies exist among the 16 CI sectors, as denoted in Table 1. The energy sector provides essential power and fuels upon which all other CI sectors depend. In turn, the energy sector depends upon other CI sectors, such as transportation, IT, communications, water, and government facilities, to help provide its services. For example, the transportation sector relies upon fuel for its operation, and the energy sector relies upon transportation for fuel delivery.

In addition to multiple cross-sector interdependencies, interdependencies also exist within the energy sector itself, which can further complicate the restoration of power. For instance, the increasing demand for natural gas to generate power has served to heighten the interdependence between gas and electric systems. Natural gas is used heavily in electricity generation, and electricity is necessary throughout the natural gas supply chain, including at production, pipeline, processing, and distribution facilities. In addition, supervisory control and data acquisition systems (SCADA) and energy management systems that supply data and monitor and control equipment and processes essential to energy industry operation both require reliable power supplies for their operations.

Since energy systems and networks also transcend national boundaries, cross-border collaboration, information sharing, mutual assistance, and other agreements are necessary to ensure reliable operations. For additional information on these relationships, impacts from a power outage, critical information requirements, and potential decisions for each CI sector, refer to Appendix 2: Critical Infrastructure Sector Interdependencies.

Table 1: CI Sector Interdependencies

Critical Infrastructure Sector	Energy Sector Reliance on CI Sector	CI Sector Reliance on Energy Sector
Chemical	Chemical products to extract coal or perforate gas and oil wells; petrochemicals	Chemical manufacturing
Communications	Voice and data services for management, response, and restoration activities	Facility power for voice and data services and distributed in-line network equipment
Commercial Facilities	Lodging and feeding of restoration workers	Facility service
Critical Manufacturing	Manufacturing and control logistics; transportation; supply chain integrity	Supply chain
Dams (hydroelectric)	Energy source	Station service
Defense Industrial Base	Manufacturing and control logistics; transportation; supply chain integrity	Military bases and defense production facilities
Emergency Services	Facility security and incident management	Facility power; communications; database use
Energy	Electricity generation fuel source; backup generators; service vehicle fuel; station service	Fuel production and transportation (pumping); station service
Financial Services	Financial institutions, funds transfers	Deposits; consumer credit; payment systems products
Food and Agriculture	Retail food and food service	Agricultural production; food manufacturing, processing, distribution, storage, transportation, retail, and food service
Government Facilities	Government functions	Facility service

Critical Infrastructure Sector	Energy Sector Reliance on CI Sector	CI Sector Reliance on Energy Sector
Healthcare and Public Health	Facility and community-based patient and staff well being	Facility service; community-based individuals with power dependent durable medical equipment or devices.
Information Technology	Automated tools	Facility service
Nuclear Reactors, Materials, and Waste	Electricity generation fuel sources	Station service, including safety systems
Transportation Systems	Fuel sources; equipment transportation	Communications; control systems; operations
Water and Wastewater		Water treatment; pumping and distribution

Threat

A power outage of this magnitude may be the result of a natural disaster, space weather, large near-earth object, accident, terrorist act such as an electromagnetic pulse (EMP), or significant cyber incident.⁷ This annex is not concerned with the threat and focuses on lifesaving and life-sustaining actions post power outage. However, response and recovery efforts listed in this Annex may be implemented in conjunction with other incident annexes. Depending on the cause of the power outage, other incident annexes or emergency plans (e.g., Nuclear Radiological Incident Annex or Earthquake Incident Annex) may be concurrently implemented but are supplementary to the overarching core coordinating structures, processes, and protocols detailed in the NRF, NDRF, and Response and Recovery FIOPs. When appropriate, counterterrorism and law enforcement operations are conducted in coordination with federal incident response and recovery operations.

Facts, Planning Assumptions, and Critical Considerations

In addition to the threats posed to critical lifeline sectors in the event of a significant grid disruption, it is also vital to consider how a prolonged power outage would affect those living in and around the impacted areas. These issues must be factored into whole community planning assumptions and critical considerations specific to a long-term power outage and are intended to supplement those listed in the Response and Recovery FIOPs.

Facts

If a power outage effects the United States for an extended period, the following facts drive planning:

- The private sector owns and operates the vast majority of the Nation's CI.
- The implications of the duration of the power outage may not be immediately known.

⁷ Pursuant to *Presidential Policy Directive – 41, United States Cyber Incident Coordination*, a significant cyber incident is a cyber incident that is (or group of related cyber incidents that together are) likely to result in demonstrable harm to the national security interests, foreign relations, or economy of the United States or to the public confidence, civil liberties, or public health and safety of the American people.

- All utilities, regardless of ownership, size or structure, have emergency plans and contingency plans for short-term power outages.
- Damage to energy generation capabilities will result in a longer restoration timeframe than if there is just damage to certain transmission or distribution capabilities.
- Damage to components of the electric transmission system could delay power restoration efforts and cause longer estimated restoration timelines than a loss of a generation asset, especially if the damaged component is limited in supply or requires time-consuming logistical support and installation.
- The Federal Power Act provides regulatory jurisdiction over wholesale, bulk power whereas states regulate the retail sale of power to customers at the distribution level.
- Lack of power will create challenges to providing consistent heat or air conditioning and sufficient sanitation/hygiene in shelter or other mass care facilities.
- People with disabilities comprise about 20 percent of the national population, and people with access and functional needs generally comprise about 30 to 50 percent of the population.
- The availability or shortage of redundant, accessible, and diverse communications will affect response and recovery operations.
- The Federal Government has a limited organic generator capability.

FACT: A statement of information known to be true, such as a verified location of an incident.

ASSUMPTION: A supposition about the current situation or future course of events, assumed to be true in the absence of facts.

Planning Assumptions

In absence of fact, planning assumptions represent information presumed to be true and are necessary to facilitate planning. Assumptions are a baseline for planning purposes, and they do not replace specific activities or decision points that would occur during an incident. During response and recovery operations, assumptions may become facts.

Certain assumptions pertaining to a long-term power outage are predicated on historical experiences or modeling. They include, but are not limited to the following:

General Assumptions

- Due to the duration of the outage, normal resources and processes for support to impacted populations is not sufficient.
- A large-scale or long-term power outage with significant consequences requiring interagency coordination is likely to be caused from a Stafford Act incident.
- Millions of customers and/or multiple states or FEMA Regions may be impacted.
- If an additional incident occurs during a long-term power outage, it will compound the effects of a power outage and the timeline for restoration of power.
- Federal response and recovery capabilities will be in limited supply, forcing resource prioritization decisions.

Assumed fuel and generator planning factors are based on the following information formulas for daily generator fuel requirements, daily fuel transportation requirements, and the daily fuel consumption by critical facility (see Figure 1, Figure 2, and Figure 3).

Figure 1: Daily Generator Fuel Requirements

<u>Temporary Emergency Power Fuel Requirements (<72 Hours)</u>		
377,249	229,879,818	352,788,760
Facilities	Gallons/Day (Low)	Gallons/Day (High)

<u>Temporary Emergency Power Fuel Requirements (72 Hours to 2 Weeks)</u>		
132,037	80,457,936	123,476,066
Facilities	Gallons/Day (Low)	Gallons/Day (High)

<u>Temporary Emergency Power Fuel Requirements (> 2 Weeks)</u>		
37,725	22,987,982	35,278,876
Facilities	Gallons/Day (Low)	Gallons/Day (High)

Figure 2: Daily Fuel Transportation Requirement

Daily Fuel Transportation Requirement*

<u>Temporary Emergency Power Fuel Transportation Requirements (< 72 Hours)</u>		
No Requirement (Use On-Site Fuel)		

<u>Temporary Emergency Power Fuel Transportation Requirements (72 Hours to 2 Weeks)</u>		
132,037	8,940	13,720
Facilities	Tankers/Day (Low)	Tankers/Day (High)

<u>Temporary Emergency Power Fuel Transportation Requirements (> 2 Weeks)</u>		
37,725	2,554	3,920
Facilities	Tankers/Day (Low)	Tankers/Day (High)

Figure 3: Daily Fuel Consumption by Critical Facilities

Type of Facility	Critical Infrastructure Sectors	Generator Size	Fuel Requirement in Gallons (Low)	Fuel Requirement in Gallons (High)
Fire Station	Emergency Services Sector	15-25 kW	25	42
Police Stations (local and State)	Emergency Services Sector	15-25 kW	25	42
Schools (shelters) private, public	Government Facilities Sector	200-300 kW	336	504
Hospitals	Healthcare and Public Health Sector	800 kW-2mW	1344	2000
Nursing Homes	Healthcare and Public Health Sector	100-200 kW	168	336
Urgent Care	Healthcare and Public Health Sector	200-300 kW	336	504
Prisons	Government Facilities Sector	400-600 kW	672	1008
Water Treatment Facilities	Water and Wastewater Sector	800kW-2mW	1344	2000
Transportation (public use)	Transportation Systems Sector	100-300 kW	168	504
Wastewater Treatment Facilities	Water and Wastewater Sector	800kW-2mW	1344	2000
Dialysis Centers	Healthcare and Public Health Sector	200-300 kW	336	504
Public Water wells	Water and Wastewater Sector	40-150 kW	67	252
Water/wastewater Pumping Stations	Water and Wastewater Sector	40-150 kW	67	252
EMERGENCY MANAGEMENT	Emergency Services Sector	15-25kW	25	42
Command Post	Emergency Services Sector	15-25kW	25	42
Medical Center	Healthcare and Public Health Sector	200-300	336	504
State Facility	Government Facilities Sector	100-200	168	336
Morgue	Healthcare and Public Health Sector	100-200	168	336
Detention Center	Government Facilities Sector	400-600	672	1008
Communications facilities (telephone cell towers)	Communications Sector	35-75 kW	59	126
Radio Towers	Communications Sector	35-75kW	59	126
Airport	Transportation Systems Sector	200-400kW	336	672
Port facilities	Transportation Systems Sector	600kW 1.2mW	1008	1200
Rescue facilities	Emergency Services Sector	15-25kW	25	42
911 Centers	Emergency Services Sector	15-25kW	25	42
FORMULA				
0.07 gallons x generator kW size x 24 hours				

International Assumptions

- Due to the United States' dependency on cross-border flows of energy resources to meet its total energy requirements and global flows of information, knowledge, and investment capital, a long-term power outage will have international implications.⁸

Mass Care/Emergency Services Assumptions

- Transportation limitations and supply chain disruptions make it difficult to open shelters, prepare food, distribute food and emergency supplies, and provide means for reunification services.
- Relocation of populations may occur if the power outage lasts for a significant period.
- A portion of the population have access and functional needs and are power dependent on medical equipment, devices and services outside hospital settings and must be supported during outages.
- Extremely hot or cold weather conditions will greatly increase the number of survivors unable to shelter at home during a prolonged outage.

⁸ Energy Sector-Specific Plan, 2015, pg. 22.

Power Restoration Assumptions

- Physical damage to electricity infrastructure may not be the primary hindrance to the restoration of power (e.g., power generation capabilities may be impaired due to a cyber incident).

Public Health and Medical Assumptions

- Critical health care facilities, sites such as hospitals, may have difficulty maintaining sufficient temporary emergency power and will face stress from a surge in care needs and potential degradation of services.

Supply Chain Assumptions

- Supply chains will be disrupted, affecting availability of resources.
- The Defense Production Act (DPA) may be activated at the discretion of federal agencies with the appropriate authority to expedite procurement and allocation of critical materials, services, and facilities, as needed or appropriate to respond to or recover from a power outage.

Critical Considerations (for Crisis Action Planning)

Critical considerations pertaining to the unique circumstances of a long-term power outage include, but are not limited to the following:

General Considerations

- Power operations outside the outage areas may be limited or degraded.
- Impacts to tribal lands and access for restoration activities may present unique challenges that require understanding of specialized authorities or approaches.
- The U.S. Government and states interconnected and affected by the power outages must coordinate restoration efforts as well as the issuance of emergency orders to the electric industry and utilities based on jurisdictional boundaries and limitations within the federal and state laws.
- Mutual aid resources among investor-owned, public power, and cooperative utilities may be overextended.
- Water and wastewater operations will be hindered and affect the delivery of some key services.
- Lack of inclusion for people who depend on power to sustain life or to maintain quality of life, health, safety, and independence unnecessarily places people who need assistance in a higher category of risk and increases likely rescue and response requirements.

Agriculture and Natural Resources Considerations

- Animal and agriculture operations (including agriculture, aquaculture, zoos, aquariums, animal research facilities, and animal breeding and sheltering facilities) rely on power for the provision of food and water to animals and to ventilate, maintain inside temperature, and remove waste products from animal housing areas.

Continuity of Operations and Government

- Robust continuity programs and capabilities mitigate impacts to the performance of essential functions, core capabilities, and critical services, as well as expedite the recovery and full resumption of impacted operations.
- Public and private sector organizations impacted by long-term power outages will require the activation of continuity plans to sustain essential functions and provide critical services to the affected population, and to ensure continuity of government at all levels.
- Federal or local, state, tribal, territorial government essential functions performed from primary or alternate locations will rely on backup power support, which may be limited.
- Decision-making and coordination processes among government official and with the heads of public and private critical infrastructure sectors and other non-governmental organizations are necessary to ensure support to response and recovery efforts. This coordination will require resilient communications capabilities.

Economic Considerations

- Economic impacts may not be initially apparent, but may appear over a longer period and last for months or years. As a result, the Federal Government may provide long-term recovery assistance for months or years at an enormous cost. (Refer to the NDRF for specific types of long-term recovery assistance that may be available.)
- Individuals affected by the incident and by evacuation orders will likely be cut off from income and will need social services support.

Environmental Considerations

- Environmental issues that occur due to a long-term loss of power may include water contamination and spoilage of food sources.

Fuel/Generator Considerations

- Fuel will need to be prioritized for distribution and use based on requirements, such as the number of available generators, number of CI facilities requiring fuel or generators, and fuel consumption.
- The provision of temporary emergency power to a CI facility is not the sole factor in returning the facility to normal operating status (e.g., lack of supplies, time to restart operations).
- Even with adequate fuel stocks, distribution and delivery shortfalls may still limit the ability to refuel in place.
- The failure rate of backup generators will increase to approximately 15 percent after 24 hours of continuous use.
- Backup generators at some CI facilities may not be tested frequently or maintained consistently, which may result in equipment failures

- Diesel fuel stored for more than 12 months begins to form sediments and gums. Diesel fuel used after it has exceeded its shelf life will increase the likelihood of damage to the generator.
- Use of points of distribution (PODs) may not be a feasible approach for providing fuel to critical CI facilities at fixed locations. As a result, a fuel delivery strategy will need to take into account daily fuel transportation requirements.

Mass Care/Emergency Services Considerations

- Power support will be needed for selective delivery of emergency services to high-density areas or populations of people who need assistance evacuating.
- The public may have difficulty reaching 9-1-1 emergency services if communications backup battery power systems fail due to an extended loss of electricity.
- Large numbers of survivors in areas where power outages are projected to be long term may relocate to areas where power and resources are available. Therefore, people whose homes are not damaged may require housing assistance and coordination with the private sector for innovative accessible housing solutions.
- A decision to evacuate large populations to an area out of the impact area could require significant resources.
- Temporary housing assistance may be required for essential personnel in impacted areas who cannot stay in their own homes.

Public Health and Medical Considerations

- Healthcare services typically operate on just-in-time inventory, which may affect patient care.
- Individuals who rely on durable medical equipment and implantable devices requiring either electric power or battery recharging may lose their life-sustaining independence and overwhelm healthcare facilities if the power is out for more than a few days.
- Dialysis centers generally do not have backup generators, but often operate within a network and may shift patients to other local network facilities if they have power, essential medical staff and patient public and accessible transportation services are available and costs are not prohibitive.
- Health systems must plan for crisis standards of care and scarce resource utilization during mass power outages.
- A segment of the population in the United States operates power-dependent durable medical equipment and, as a result, is unable to self-relocate during a mass power outage.

Law Enforcement Considerations

- Actual criminal activities and rumored lawlessness will contribute to public safety fears, which may affect response of recovery efforts.

- The loss of power and impacts on communications, financial services, food, and water will attract certain criminal activities (i.e., theft and looting). Law enforcement officers will need to establish and visibly demonstrate a robust law enforcement presence.

Mission

The end state for response and recovery during a long-term power outage includes the following:

- Federal lifesaving and life-sustaining assistance to local, state, tribal, territorial, and insular area entities is completed.
- Basic services, public safety, and community functionality are restored and long-term recovery measures are in place to enable full restoration of power and the economy.
- Any displaced populations have returned home or been relocated to permanent accessible housing.
- The logistics supply chain for mass care/emergency assistance and life-sustaining support to survivors and infrastructure restoration missions can meet demand.
- Measures are in place to enable full revitalization of power systems, to include sustainability and resilience enhancements, where feasible.
- Economic and business activities are returned to a healthy state.
- Health and social services systems are restored to promote the resilience, health (including behavioral health), independence, and well-being of the whole community.
- Public safety and health protection assurances have been made.
- Environmental impacts are mitigated.
- National essential functions and all primary mission essential functions are restored.⁹
- Resource requirements for sustainable asset owner CI operations have been sufficiently met for reliable power delivery.
- Management of federal long-term recovery support shifts to the appropriate steady state managers (e.g., regional, district, or similar local office).

Execution

When the overall coordination of federal incident response and recovery activities is required, per Homeland Security Presidential Directive 5 (HSPD-5), the Secretary of Homeland Security coordinates with federal entities to provide for federal unity of efforts for domestic incident

⁹ Per *Presidential Policy Directive 40, National Continuity Policy*, National Essential Functions (NEF) refer to the subset of national functions that are necessary to lead and sustain the Nation during a catastrophic emergency. Primary Mission Essential Functions refer to those federal government functions that must be performed to support or implement the performance of NEFs before, during, and in the aftermath of an emergency.

management. The FEMA Administrator, as the principal advisor to the President, the Secretary of Homeland Security, and the Homeland Security Council regarding emergency management, assists the Secretary in carrying out Stafford Act response and recovery operations. Other federal departments and agencies carry out their responsibilities consistent with applicable policy and statutory authorities. Actions within this annex supplement the concept of operations in the Response and Recovery FIOPs.

Concept of Operations

Response and recovery support to mitigate the cascading effects from a long-term power outage will require a coordinated effort involving the appropriate local, state, tribal, territorial, insular area, and federal governments, NGOs, and private sector partners. federal coordination centers, agency operations centers, and agency teams provide their own logistical support consistent with agreed-upon interagency and agency-specific execution plans. State and local governments are encouraged to coordinate with federal efforts yet maintain their own logistical support, when possible, in accordance with applicable authorities and requirements. The concept of support is consistent with Response and Recovery FIOP principles.

The premise for this annex is that a power outage affects multiple FEMA Regions or states and leaves millions of customers without power for an extended period of time. Some areas are likely to get power restored in a few weeks, but the overall outage will last much longer in other areas. Therefore, federal support to local, state, tribal, territorial, and insular area governments in a long-term power outage will follow a triage approach, utilizing limited resources to achieve the most positive impact for the largest number of people.

- Resources will maintain infrastructure in areas where power is expected to be restored in two weeks or less. This will reduce the cascading impacts of power loss, maintain or facilitate quicker restoration of essential services, and prepare regions to accept survivors self-evacuating from areas suffering long-duration outages.
- In tandem with these activities, emergency resources and services will be selectively delivered to areas with the longest projected duration of power loss that have a high population density or a significant number of survivors who either choose not to self-evacuate or need assistance with evacuating.

For a majority of incidents meeting the assumptions of this annex, Federal Government core capabilities and resources will be initially prioritized to meet following objectives:

- Facilitate power restoration and maintain other CI within geographic regions where it is anticipated that power will be restored in two weeks or less.
- Stabilize and sustain CI in geographic regions that suffer the next shortest duration of power outages.

- Provide mass care services and resources to support states and tribal nations conducting the mass evacuation of survivors, including people with disabilities and those with access and functional needs.¹⁰
- Provide mass care/emergency assistance services to those self-evacuating.
- Selectively deliver emergency services to high-density areas or vulnerable populations who are unable to evacuate.
- Provide law enforcement support to establish and maintain public safety and security to ensure a safe environment for infrastructure restoration.

This approach prepares areas to accept evacuees, sustains CI to reduce the cascading impact of power loss, allows for essential service restoration, and complies with the FEMA Catastrophic Housing Annex to the Response FIOP.¹¹

As part of the crisis action planning process during an actual long-term power outage, this course of action and these priority objectives will be reviewed and refined based on the particulars of the incident.

Tiered Response

This annex is founded on the principle of tiered response or the understanding that most incidents are handled at the lowest possible jurisdictional level. As resources and capabilities are exceeded, additional SLTT, insular area, and federal assets are applied. In the case of the electricity industry, restoration starts with the electric companies.

A key component of tiered response is mutual aid and assistance. Local communities and states have mutual aid compacts in place to share critical resources across jurisdictional boundaries in a timely manner. Likewise, companies in the electric industry have formal agreements with one another to share resources as the capabilities are exceeded.

Private and Public-Sector Utility Assistance

Each segment of the electric industry is prepared to coordinate and provide assistance for national-level catastrophic incidents. As such, the electric industry has a tiered response structure that evolves from small, localized incidents, to larger incidents requiring support from neighboring or regional utilities, to incidents that require national support and oversight. For example, Edison Electric Institute (EEI), an association of investor-owned electric companies, has developed a formal designation of National Response Event (NRE) to explain a natural or manmade event that is forecasted to cause or that causes long-term power outages affecting a significant population or several regions across the United States and requires resources from multiple regional mutual assistance groups. The term NRE is unique to the members of EEI, but the general principle of regional mutual aid and the elevation of incidents applies across the various utility companies, municipally owned electric systems, and co-ops.

Top priorities for the electricity subsector include:

¹⁰ It is important for preparedness planning to account for inclusive accessible transportation for evacuation, to ensure individuals with communications and physical access barriers are taken into consideration.

¹¹ https://www.fema.gov/media-library-data/20130726-1854-25045-3570/catastrophic_housing_annex.pdf

- Identifying and leveraging mutual aid resources;
- Coordinating and deploying response resources in a safe, efficient, and equitable manner;
- Providing public messaging (in accessible and alternate formats, when possible); and
- Responding with unity of effort.

When there is an electrical outage that affects large portions of the Nation, the utility companies use their internal coordination mechanisms to identify requirements and organize mutual aid. Mutual assistance is an essential part of the electric power industry's service restoration process and contingency planning. Electric companies impacted by a major outage event are able to increase the size of their workforce by "borrowing" restoration workers from other utilities. Below are some examples of mutual aid assistance compacts and national programs to assist energy sector owners and operators in sharing or procuring equipment and assistance in a disaster.

- **American Public Power Association (APPA) Mutual Aid Network** – Formalized in 2013, APPA leads the Mutual Aid Network for public power utilities, state associations, and joint action agencies. The Public Power Mutual Aid Playbook includes a national mutual aid agreement signed by more than 2,000 public power utilities and rural electric cooperatives, connecting utilities so they can help each other in times of need. Each of the ten APPA regions, which match the ten FEMA Regions, has appointed a Public Power Network Coordinator to each state who works with utilities in relevant regions on coordinating any needed support. The network ensures a coordinated response with state and federal government officials and outlines roles and responsibilities of utilities, Network Coordinators, and National Coordinators. In steady state, APPA's Mutual Aid Working Group (MAWG) works to refine plans and procedures to enhance preparedness response.
- **Investor-Owned Electric Company Mutual Assistance** – The Nation's investor-owned utilities, who are members of EEI, coordinate their mutual assistance efforts at a regional level through seven Regional Mutual Assistance Groups (RMAG). Some RMAGs also have municipal and cooperative utilities as members. When a member determines that it needs restoration assistance, it initiates a request through a RMAG. When a RMAG is unable to meet its resource needs, it can coordinate with adjacent RMAGs to obtain additional mutual assistance restoration resources. Following a power outage that requires a national response and upon request from an EEI chief executive officer, all RMAGs are activated and all of the available resources will be allocated at the national level using EEI's NRE Framework.¹² A National Response Executive Committee, consisting of senior-level member company executives from all regions of the country, will determine if a NRE activation is warranted and will activate EEI's National Mutual Assistance Resource Team (NMART). The NMART evaluates mutual assistance requests and assigns available resources to affected companies in coordination with the RMAGs.

¹² http://www.eei.org/issuesandpolicy/electricreliability/mutualassistance/Documents/MA_101FINAL.pdf

- **Electric Cooperative Mutual Assistance Network** – Rural electric cooperatives adhere to the principal of Cooperation Among Cooperatives.¹³ The backbone of the Electric Cooperative Mutual Assistance Network is the collective of statewide organizations that operate in virtually all 47 states in which electric cooperatives serve. The statewide organizations are the conduit through which individual electric cooperatives request and receive help, as well as make offers of assistance to their fellow cooperatives. The National Rural Electric Cooperative Association (NRECA), the national organization representing electric cooperatives on federal regulatory and legislative issues, developed a Mutual Assistance Agreement in collaboration with APPA. This document forms the basis for providing mutual assistance between and among electric cooperatives and municipally owned electric systems. As needed, the statewide organizations activate the Cooperative Mutual Assistance Network and conduct conference calls to discuss requirements and mutual aid support.
- In 2006, the FERC approved the **Spare Transformer Equipment Program (STEP)**, an electric industry program that strengthens the sector’s ability to restore the Nation’s transmission system more quickly in the event of a terrorist attack. Any electric utility that owns transformers in the United States or Canada, including an investor-owned utility, a government-owned utility, or a rural electric utility, is eligible to participate in the program.¹⁴ Under the program, each participating electric company is required to maintain a specific number of transformers. STEP requires each participating utility to sell its spare transformers to any other participating utility that suffers a “triggering event” (an act of terrorism that destroys or disables one or more substations and results in the declared state of emergency by the President of the United States). In addition to the investor-owned STEP program, several other spares programs and many bilateral and multilateral agreements are in place between utilities for spare transformer sharing and leveraging.
- **SpareConnect** – The SpareConnect Program provides an additional mechanism for Bulk Power System (BPS) asset owners and operators to network with other SpareConnect participants concerning the possible sharing of transmission and generation step-up transformers and related equipment, including bushings, fans, and auxiliary components. SpareConnect establishes a confidential, unified platform for the entire electric industry to communicate equipment needs in the event of an emergency or other non-routine failure. SpareConnect complements existing programs, such as the STEP and voluntary mutual assistance programs, by establishing an additional, trusted network of participants who are uniquely capable of providing assistance concerning equipment availability and technical resources. This program does not create or manage a central database of spare equipment. Instead, SpareConnect provides decentralized access to points of contact at power companies so that, in the event of an emergency, its participants are able to connect quickly with other participants in affected voltage classes.

¹³ The Seven Cooperative Principals are Voluntary and Open Membership; Democratic Member Control; Members’ Economic Participation; Autonomy and Independence; Education, Training, and Information; Cooperation Among Cooperatives; and Concern for Community.

¹⁴ *Order on Application for Blanket Authorization for Transfers of Jurisdictional Facilities and Petition for Declaratory Order*, September 22, 2006. <https://www.ferc.gov/whats-new/comm-meet/092106/E-13.pdf>

- **GridAssurance™** is an independent organization formed by six energy companies that provides subscribers with a readily available inventory of equipment at secure, strategically located warehouses in the United States. The company also offers logistics support to facilitate expedited delivery of the equipment to affected sites following a qualifying event. Subscription to GridAssurance’s inventory and services is open to all transmission owners.

State-to-State Assistance

State and local governments have a unique role in energy assurance because they represent the front lines of protection and the face of public services to citizens during an emergency. They also have a primary responsibility to coordinate with and make recommendations or requests to industry on prioritizing restoration of electric service to critical facilities. Public power utilities have local, state, and regional contracts and agreements in place to render mutual aid. In the event that additional state-level resources are required, the state will generally request assistance from other states by using interstate mutual aid and assistance agreements such as the Emergency Management Assistance Compact. The governor of any state impacted directly or indirectly by the consequences of a long-term power outage may activate elements of the National Guard to support state domestic civil support functions and activities.

Requesting Federal Assistance

When an incident overwhelms or is anticipated to overwhelm state resources, the governor or chief tribal executive may request federal assistance from the President. In such cases, the affected local, state, tribal, territorial, or insular area and the Federal Government will collaborate to provide the necessary assistance. The Federal Government may provide assistance in the form of funding, resources, and critical services.

Federal Support

Federal support for the impacts from a long-term power outage depends on a variety of factors including, but not limited to, the following:

- Whether a major disaster or emergency declaration has been issued by the President;
- The capability and resources of public and private utilities, as well as SLTT or insular area governments in the affected areas;
- Federal agency operational agreements with states;
- Availability of organic federal resources and private sector resources which the federal government relies upon;
- Statutory authorities and parameters consistent with the adjudication process (case-by-case basis);
- Magnitude and duration of the outage (e.g., number of persons affected combined with length of time without power; number and type of CI affected; projected length of outage); and
- Specific federal department and agency roles and statutory authorities.

When a long-term power outage occurs and exceeds (or is anticipated to exceed) local, state, tribal, territorial, or insular area capabilities, it is anticipated that governors or chief tribal executives will seek federal assistance under the Stafford Act. The Stafford Act authorizes the President to provide financial and other disaster and emergency assistance to local, state, tribal, territorial, and insular area governments; certain private not-for-profit organizations; and individuals to support response, recovery, and mitigation efforts following a Presidential emergency or major disaster declaration. The specific types of assistance under the Stafford Act that the Federal Government may provide depend on a variety of factors, to include whether utilities are publicly or privately owned within the impacted communities.

- **Investor-Owned or For-Profit Utilities** – The private sector owner and operator is the primary entity responsible for all power restoration requirements. The Federal Government does not provide support to investor-owned for-profit utilities under the Stafford Act. However, in rare instances and on a case-by-case basis, the Federal Government may provide certain support to investor-owned for-profit entities for an exceptionally limited period for life-saving or life-sustaining missions, at the request of a local, state, tribal, or territorial government. The Federal Government may consider regulatory relief for private institutions and should synchronize its operations to enable, support, and otherwise not contradict private sector restoration operations.
- **Municipal, Cooperative or Not-For-Profit Utilities** – In addition to federal support to survivors and their communities, the Federal Government may provide assistance to the public utility through the applicable state, tribal, territorial, or insular area to enable its power generation and distribution requirements and support restoration operations. These utilities are eligible for public assistance under the Stafford Act. Figure 4 provides examples of the types of support potentially available to public utility companies.

Figure 4: Order on Application for Blanket Authorization for Transfers of Jurisdictional Facilities and Petition for Declaratory

On August 2, 2015, Typhoon Soudelor made landfall in Saipan causing extensive damage. It was the worst storm to strike Saipan in the Northern Mariana Islands in nearly 30 years. Hundreds of homes were either damaged or destroyed, and power was expected to take a month to restore. As a result, a joint Commonwealth/Federal Power Task Force was established to support the Commonwealth Utility Company (CUC) in the restoration of power and the people of Saipan in dealing with the impacts to critical services. The CUC continued to set priorities and manage power delivery through power system restoration, placement of generators, and routing of power to key facilities. The Task Force collectively worked to accomplish the restoration priorities established by the CUC.

In addition to providing mass care and emergency services such as shelter, meals, and potable water, the Federal Government provided support to CUC to enable power restoration. Examples included:

- Joint crisis action planning;
- Installation of generators at critical facilities, water and wastewater stations in particular;
- Acquisition and airlift of replacement power poles from other islands;
- Debris and route clearances; and
- Acquisition of other restoration-related resources such as bucket trucks, augers, and pole trucks.



While restoration of power is the responsibility of electric companies, the Federal Government may be requested to provide services to enable the power restoration process, as well as the delivery of essential services, through the facilitation of policy decisions and resource prioritization. Examples of federal support that may be provided include, but is not limited to, the following:

- Enforcement of road closures, public safety, and security at access points;
- Debris removal (if warranted) to enable utility companies to more quickly access damaged equipment;
- Coordination with all of the CI sectors to understand the interdependencies with the electricity subsector and resulting cascading effects on other sectors and businesses; or
- Logistical support for mass care and emergency assistance services and power generation equipment to enable continuity of essential services.
- Employment of the DPA, as required.

Coordination of Federal Support

The principles in the NRF and NDRF, and the actions in the Response and Recovery FIOPs, are the primary mechanisms to coordinate the Federal Government's response and recovery to terrorist attacks, major disasters, and other emergencies. As such, they form the basis of federal support to the impacts from a power outage. Nothing in these documents alters or impedes the ability of government departments and agencies to carry out their specific authorities or perform their responsibilities under all applicable laws, executive orders, and directives. Individual

federal departments and agencies have responsibilities for various aspects of a coordinated federal response to a power outage.

- **Department of Homeland Security** – The Secretary of Homeland Security is the principal federal official for domestic incident management. Pursuant to the Homeland Security Act of 2002, the Secretary is responsible for coordinating federal operations within the United States to prepare for, respond to, and recovery from terrorist attacks, major disasters, and other emergencies. The Secretary coordinates with federal entities to provide for federal unity of efforts for domestic incident management.

The FEMA Administrator is the principal advisor to the President, the Secretary of Homeland Security, and the Homeland Security Council regarding emergency management. The FEMA Administrator's duties include assisting the President, through the Secretary, in carrying out the Stafford Act; operating the National Response Coordination Center (NRCC); effectively supporting all Emergency Support Functions (ESF) and Recovery Support Functions (RSF); and, more generally, preparing for, protecting against, responding to, and recovering from all-hazards incidents.

- Within DHS, the National Protection and Programs Directorate (NPPD) serves as the federal coordinator of SSAs and CI.
- **Department of Energy** – DOE is the SSA and lead federal agency for the energy sector. DOE is also responsible for coordinating the energy sector's emergency preparedness requirements. Under the authority of the Secretary of Energy, DOE directs ESF #12 – Energy activities for the energy sector under the NRF. Additionally, DOE is responsible for leading, facilitating, or supporting the security and resilience programs and associated activities of the energy sector in the all-hazards environment and coordinating the preparation and implementation of the Energy Sector-Specific Plan as an annex to the National Infrastructure Protection Plan (NIPP). The Secretary of Energy is responsible for helping to acquire equipment and trained personnel for the energy sector from other nations as appropriate and for sector coordination with North American partners in Canada and Mexico. Under the 2015 Fixing America's Surface Transportation (FAST) Act (P.L. 114-94), the Secretary of Energy is authorized to order emergency measures to protect or restore the reliability of critical electrical infrastructure or of defense critical electric infrastructure upon a Presidential finding of a Grid Security Emergency. This authority allows DOE to support the energy sector for and responding to cyber, electromagnetic pulse, geomagnetic disturbance, and physical attack threats.
- **Department of State (DOS)** – DOS is responsible for all communication and coordination between the United States Government and other nations regarding the response to a domestic crisis. Consistent with the International Coordination Support Annex to the NRF, DOS may also be required to assist private industry during a domestic incident by expediting specifically requested equipment, goods, or trained personnel to enter the United States and assist with non-energy related assistance.
- **Department of Defense (DOD)** – DOD is responsible for providing military forces and certain intelligence capabilities to deter war and to protect the security and national interests of the United States. The Secretary of Defense may assist in the support of domestic infrastructure and essential government services or, at the direction of the

President and in coordination with the Attorney General, the maintenance of civil order or law enforcement, in accordance with applicable law. The Secretary of Defense will retain command of Title X military forces providing support.

- **Other Federal Departments and Agencies** – Various federal departments or agencies play primary, coordinating, or support roles in delivering response and recovery core capabilities. Some departments also serve as SSAs for a CI sector. In some circumstances, other federal agencies may have a lead or support role in coordinating operations, or elements of operations, consistent with applicable legal authorities. For all incidents, to include a long-term power outage, federal department and agency heads serve as advisors for the Executive Branch relative to their areas of responsibility.
- Several federal departments and agencies have authorities to respond to and declare specific types of disasters or emergencies. These authorities may be exercised independently of, concurrently with, or become part of a federal response coordinated by the Secretary of Homeland Security.

Appendix 4: Roles and Responsibilities provides a detailed list of unique power-related responsibilities for all members of the whole community.

International Support

The energy sector relies on the import of critical technologies and equipment, such as large power transformers (LPTs), as well as many key raw materials that are essential to the manufacturing of certain electrical infrastructure. As such, a long-term power outage will have international implications that may include, but are not limited to, travel restrictions into and out of the United States, processing of visas or other immigration documents, customs and border security, and support to United States citizens living abroad.

DOS is responsible for communication and coordination between the Federal Government and other nations regarding the response to a domestic crisis. Consistent with the NRF and Response FIOP, DOS coordinates with foreign governments concerning travel restrictions or issues, facilitates offers of assistance from foreign governments through the International Assistance System, and coordinates assistance to cross-border communities. DOS also maintains communication with the Electricity Information Sharing and Analysis Center (E-ISAC), the North American Electric Reliability Corporation (NERC), DOE's Office of Intelligence and Counterintelligence and Office of International Affairs, and the National Council of ISACs to share cyber and physical threats, vulnerabilities, and incidents for the electricity subsector which involve international dimensions or elements.

Agencies other than DOS do have authorities pertaining to international partners. For example, DOE, FERC, NERC, and North America's Electric Reliability Organization (ERO), have authorities and responsibilities outside of the United States involving energy infrastructure and resources with Canada and Mexico. When there is a domestic crisis resulting in international energy-related impacts, these entities coordinate and consult with DOS to ensure consistent messaging.

Operational Coordination

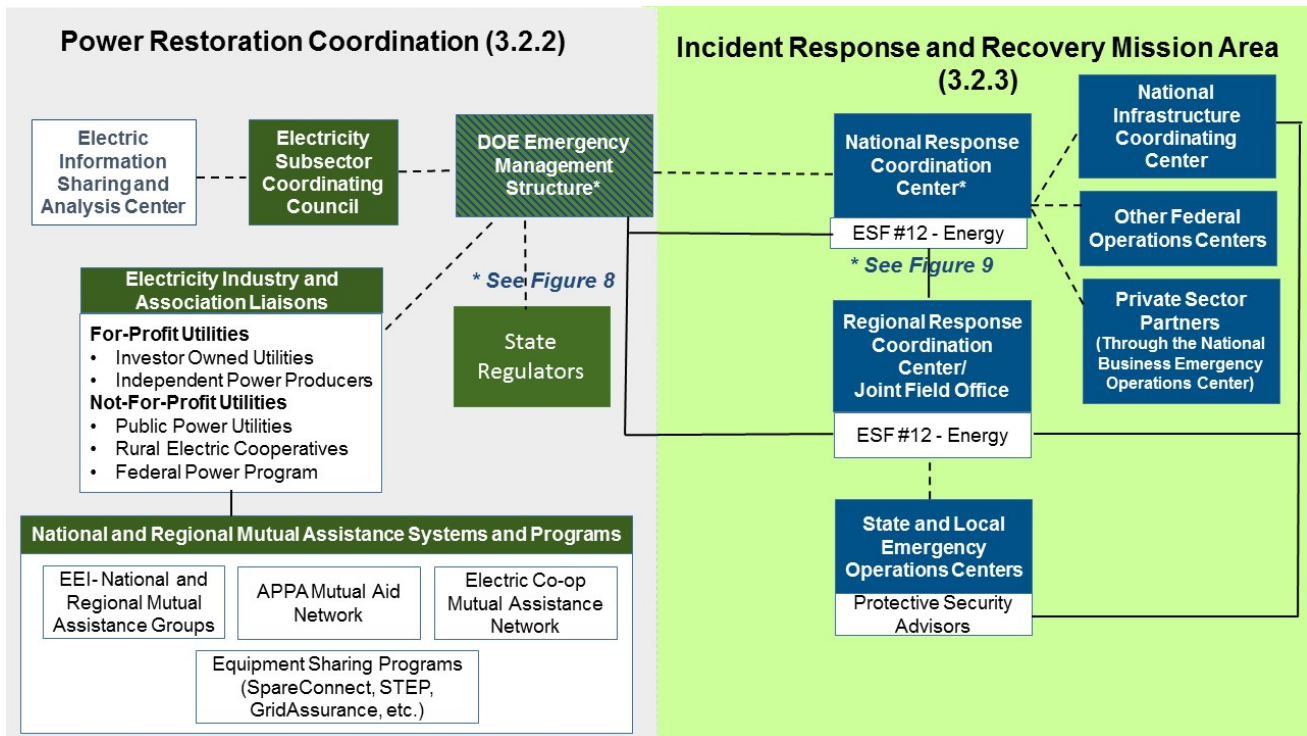
Several support and operational coordination elements facilitate operational coordination and information sharing during a power outage incident. Depending on the cause of the outage, this construct is scalable and flexible. As a result, scenario-specific coordinating structures may be utilized in addition to the entities listed below. For example, if the outage is a result of a significant cyber incident, the Federal Government organizes coordinating structures three ways—national policy-level coordination through a cyber response group, operational coordination through the DHS National Cybersecurity and Communications Integration Center (NCCIC) and Federal Cyber Centers, and sector coordination through the DHS NPPD Office of Infrastructure Protections and SSAs. In these situations, additional coordination structures are integrated into a unified coordination construct as necessary.

Unified Coordination

A long-term power outage may involve many states or FEMA Regions and require coordination and prioritization of national-level resources. This annex applies the concept of unified coordination at the NRCC and among federal departments and agencies to coordinate federal support to multiple Unified Coordination Groups (UCG) at Joint Field Offices (JFO) established for this incident. The unified coordination approach helps various levels of government and the private sector supporting the incident to work together to establish a common set of priorities, objectives, and strategies. Unified coordination provides a vital means of coordinating the allocation or reallocation of scarce resources across the entire incident according to a common set of priorities. It also enables effective coordination across restoration activities led by DOE and incident response activities led by FEMA, as depicted in Figure 5.

A significant power outage will affect all CI sectors, requiring public-private partnerships with their respective owners and operators to prioritize and enable the restoration process, manage cascading impacts, and mitigate future risks. The appropriate ESF and RSF shall facilitate coordination with each sector, often through the relevant SSA, and utilizing existing public-private partnerships to the greatest extent possible.

Figure 5: Unified Coordination Between Power Restoration and Incident Response and Recovery Mission Area



Power Restoration Coordination

Federal Power Restoration Coordination

DOE uses established processes and structures unique to the energy sector, as the lead for restoration. Restoration is the primary responsibility of the utility industry. However, coordination between the restoration and incident response and recovery components is critical to enable their success. For information on the restoration process, refer to DOE's United States Electricity Industry Primer.

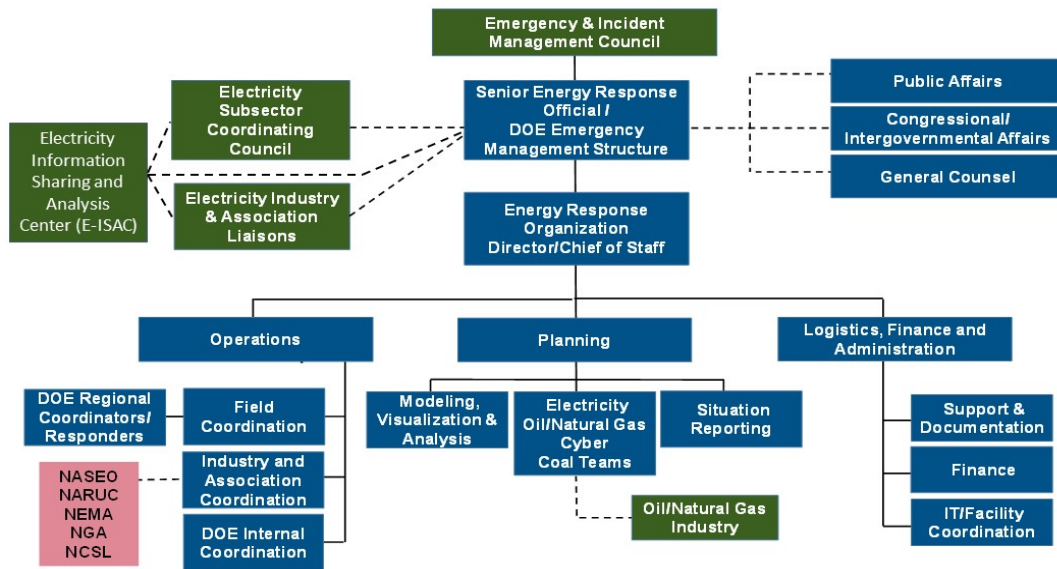
Department of Energy Emergency Management Structure – Similar to the UCG concept in the NRF, DOE uses a department-wide coordination structure to address major, energy incidents across all of its programs and stakeholders. The DOE emergency management structure directs operational activities across the department to ensure DOE utilizes existing resources, expertise, and authorities and that directives are carried out to the fullest extent possible. Should a resource or restoration prioritization issue need to be resolved, the Secretary of Energy will make that decision in close coordination with the NRCC and in consultation with the electricity industry. The DOE emergency management structure also provides situational awareness to energy sector owner/operators; local, state, tribal, territorial, and insular area governments; DOE leadership; the federal interagency; and the White House.

Energy Incident Management Council – The Secretary of Energy directs the establishment of the Energy Incident Management Council to increase cooperation and coordination across the Department to prepare for, mitigate, respond to, and recover from major disruptions to energy systems (including infrastructure, supply, and services). The council utilizes the authorities and

expertise from across the department to anticipate impacted and future requirements, provide a rapid, integrated DOE assessment of an incident, adjudicate conflicting views or information, enable an effective response by the sector, develop mitigation options for decision makers, and provide a unified, comprehensive voice and set of actions for the Department.

The Council will serve as the primary DOE coordination mechanism for senior department leadership during an energy emergency. Energy emergencies include any potential or actual disruption to energy infrastructure by a natural disaster, an industrial accident, a threat actor (cyber or physical), or an energy crisis or shortage.

Figure 6: DOE Internal Unified Coordination Structure



National-Level Industry Power Restoration Coordination

Electricity Subsector Coordinating Council

The Electricity Subsector Coordinating Council (ESCC) facilitates and supports the coordination of sub-sector wide, policy-related activities and initiatives to improve the reliability and resilience of the electricity sub-sector, including physical and cyber security infrastructure and emergency preparedness. It serves as the principal liaison with the Government Coordinating Council (GCC) for energy and its member federal agencies (including DOE as the SSA for the energy sector) and federal utilities on issues pertaining to joint planning, preparedness, resilience, and recovery related to incidents that may affect the secure and resilient supply and delivery of electricity. The ESCC’s role during its “crisis state” is to provide the mechanism for

executive coordination and communication between the electric power industry and government during the response to and recovery from an event of regional or national significance.¹⁵

The ESCC Secretariat communicates with the ESCC leadership, the ESCC Steering Committee, and the E-ISAC, as well as with government liaisons, to request activation of a Federal Government-industry coordination group.

Electricity Information Sharing and Analysis Center

The E-ISAC, operated by the NERC, establishes situational awareness, incident management, coordination, and communication capabilities within the electricity sector through timely, reliable, and secure information exchange. The E-ISAC, in collaboration with the DOE and the ESCC, serves as the primary security communications channel for the electricity sector and enhances the sector's ability to prepare for and respond to cyber and physical threats, vulnerabilities, and incidents. The E-ISAC coordinates with the Electric Subsector Coordinating Council made up of industry trade associations such as EEI, APPA, and NRECA, as well as other industry groups.

During a long-term power outage, the E-ISAC—

- Closely aligns with the ESCC to keep it informed and help implement sector response and coordination intent with unity of effort and message.
- Provides representatives to the NRCC and UCG.
- Receives incident data from private and public entities.
- Coordinates with member companies.
- Identifies, prioritizes, and coordinates the protection of critical power services, infrastructure service, and key resources.
- Assists DOE, the FERC, and DHS in analyzing event data to determine threat, vulnerabilities, trends, and impacts for the sector, as well as interdependencies with other CI entities.
- Analyzes incident data and prepares reports based on subject matter expertise in security and the BPS and grid system.
- Shares threat alerts, warnings, advisories, notices, and vulnerability assessments with the industry subject to prior notification to FERC, as appropriate.
- Coordinates with other ISACs, as well as local, state, tribal, territorial, insular area, federal, and international partners on incident-specific issues.
- Develops and maintains an awareness of private and governmental infrastructure interdependencies.

¹⁵ The ESCC defines a crisis state when an incident possesses the following three characteristics. (1) National engagement by the industry and federal government is needed to respond to (2) an event of regional or national significance that (3) exceeds established private or public subsector capabilities (e.g., resources, communication, coordination).

- Provides an electronic, secure capability for E-ISAC participants to exchange and share information.
- Provide technical sector coordination support aligned to ESCC intent.

Energy Emergency Assurance Coordinators

Established in 1996, the Energy Emergency Assurance Coordinators (EEAC) Program is a cooperative effort among DOE, the National Association of State Energy Officials, the National Association of Regulatory Utility Commissioners, the National Emergency Management Association, and the National Governors Association. The program facilitates coordination and communication between states, industry, and DOE and provides states and local communities access to information on energy supply, demand, pricing, and infrastructure (e.g., petroleum, electricity, natural gas, and heating oil). Administered by DOE, the EEAC establishes a secure communications environment that consists of a restricted access website, database, and distribution list for state government personnel. During a power disruption, the EEAC provides points of contact to share energy-related information. In addition, states can also use the EEAC regional distribution list to send information to their counterparts within the region (or different regions) to exchange information and share best practices, as well as request information.

Regional/Local-Level Industry Power Restoration Coordination

As noted in Private and Public-Sector Utility Assistance section, public and private utility associations have established regional mutual aid groups and compacts. The regional footprint of each of these groups is unique based on their stakeholders. Appendix 4: Roles and Responsibilities provides more information on these associations. As the energy sector SSA, DOE communicates with individual utilities and associations through various mechanisms and provides utility assessments and the status of their activities and resources to the Regional Response Coordination Center (RRCC), NRCC, and NICC, as appropriate, and through DOE Situation Reports.

Headquarters-Level Operational Coordination

The responsibilities of various government agencies under the NRF are an important element of intra-governmental cooperation during an energy emergency or other significant event. The coordination of federal incident response and recovery support to local, state, tribal, territorial, and insular area officials, is led by FEMA during Stafford Act incidents.

Interagency Response and Recovery Coordination

This section describes the coordinating structures that the Federal Government uses to provide response and recovery support to SLTT and insular area officials to deal with the consequences of a long-term power outage.

National Response Coordination Center

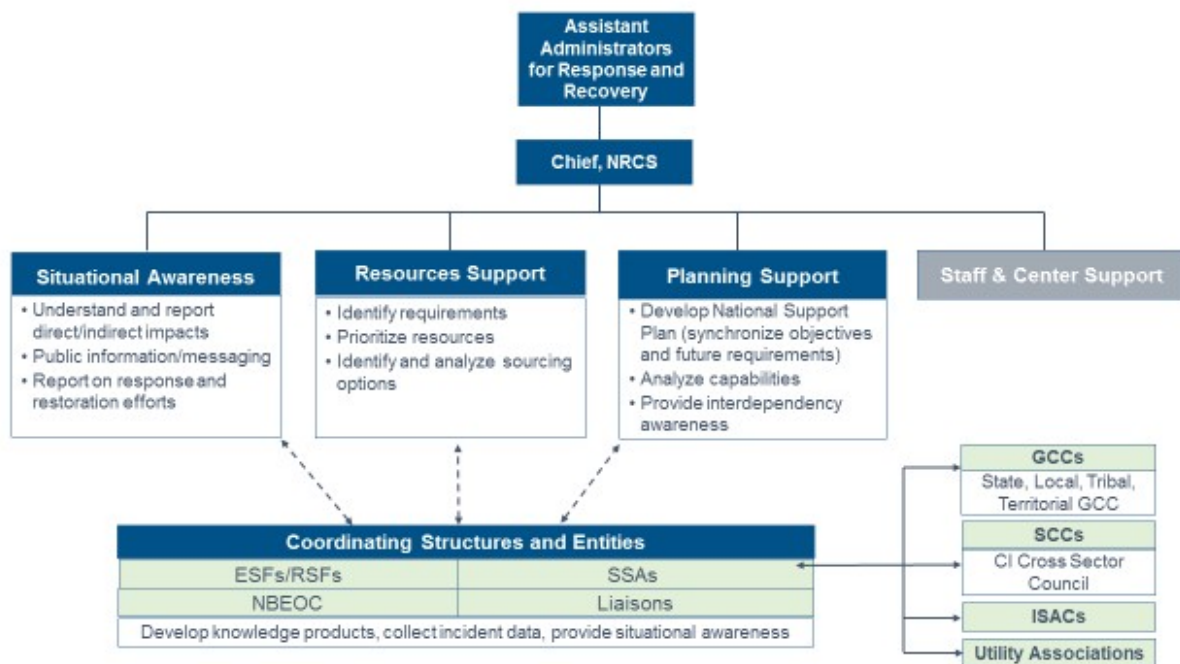
The NRCC at FEMA Headquarters serves as the national incident response and recovery coordination center, collecting and reviewing all source information across all threats and all hazards information during a long-term power outage. The National Response Coordination Staff (NRCS) is the headquarters-level entity through which federal response and recovery support is

minated and through which national-level response and recovery resource decisions are made. Figure 7 portrays the coordination within the NRCC.

- Emergency Support Functions/Recovery Support Functions** – The Federal Government organizes response resources capabilities under the ESF construct denoted in the NRF and Response FIOP. The ESFs are the primary, but not exclusive, federal coordinating structures for building, sustaining, and delivering the response core capabilities.

Consistent with the NDRF and the Recovery FIOP, the Federal Government uses RSFs to coordinate key functional areas of recovery support. The synchronization of federal response and recovery support operations and facilitation of restoration efforts with the private sector is facilitated through each of the 16 CI sectors, in coordination with the relevant ESF or RSF, as required.

Figure 7: Coordination within the NRCC for Cascading Impacts from a Long-Term Power Outage



- Future Planning Cell** – The FEMA Administrator may establish a planning cell within the NRCS’s Planning Support Section to forecast incident support functions needed to handle cascading impacts to survivors resulting from the outage. Planning cells serve as a decision support entity to senior policy makers or to the leadership of the NRCC by developing future courses of action or recommendations on strategic emergency management issues. The cell is ideally comprise subject matter experts (SMEs) representing key core capabilities and agencies that can advise and develop consensus recommendations on federal response and recovery efforts based on the regional and national impacts from the long-term power outage on health, safety and security. Given the resource demands on many entities during a large-scale incident, if SMEs themselves are not available, staff with the ability to reach back to appropriate SMEs within their organizations may be asked to participate. The cell does not have an operational role

during power outage response/recovery operations and will not be in direct contact with on-the-ground personnel in the incident command. It also does not direct or provide guidance for energy restoration efforts. The cell augments ESF and RSF capabilities by providing an integration and decision-support function for leadership to help synchronize federal response and recovery operations to support sector restoration efforts and lifesaving and life-sustaining actions.

The planning cell's membership will vary depending upon the location, scope, and complexity of the event and may occur virtually. The members may include representatives from the following entities:

- Department of Commerce (DOC)
- DOD
- National Guard
- DOE
- DHS
 - FEMA
 - NPPD
- Department of the Interior (DOI)
- Department of Labor (DOL)
- DOS
- Department of Transportation (DOT)
- HHS
- Environmental Protection Agency (EPA)
- FERC
- General Services Administration (GSA)
- Nuclear Regulatory Commission (NRC)
- USDA.

Based on the specificities of the incident, requests for agency representatives will be based on the expertise required and will be appropriately communicated to the agencies (e.g., full-time or part-time; subject matter areas; desired level of expertise or seniority). National-level electric industry association representatives (e.g., APPA, EEI, ESCC, and NRECA) or representatives from PMAs may be asked to participate in the cell on an ad hoc basis depending on their availability and upon the Secretary of Energy's determination that their assistance is required.

Critical Infrastructure Planning Cell

The NRCC, is the mechanism through which federal response and recovery activities are coordinated. Among the mechanisms are dedicated planning cells that may or may not stand up based on the complexity and scope of the power outage.

The NRCC may choose to stand up a critical infrastructure planning cell. The critical infrastructure planning cell would serve as a decision support entity to senior policy makers or to the leadership of the NRCC by developing future courses of action or recommendations to mitigate the ongoing cascading effects of the incident to other CI sectors. The critical infrastructure planning cell may include representatives from each of the SSAs as well as other subject matter experts.

National Business Emergency Operations Center – Within the NRCC, the National Business Emergency Operations Center (NBEOC) coordinates with national companies and private sector organizations to obtain situational awareness of the impacts of a long-term power outage on these businesses. Consisting of over 500 private sector companies of national scale, the NBEOC serves as the central clearinghouse of situational awareness for the private sector at large and complements the efforts of the National Infrastructure Coordinating Center (NICC) and SSAs. Additionally, the NBEOC coordinates with state BEOCs and other operational private sector coordinating functions at the state or regional levels. The NBEOC conducts scheduled conference calls during a long-term power outage and invites state public utility commissions, appropriate ESFs/RSFs, FEMA Regions, NICC, DOE, and the DHS NPPD Office of Infrastructure Protection (IP) liaison to the NRCC. During these calls, the private sector obtains an understanding of the response and recovery priorities and needs of survivors, as well as provides the government with an understanding of the private sector’s impacts, needs, and available capabilities and resources to support business continuity. This ensures that the Federal Government is aware of the cascading impacts on businesses and works collaboratively with the private sector at large.

National Infrastructure Coordinating Center

The DHS NPPD NICC provides situational and operational awareness across the CI sectors and serves as a central point for requests for information and action for the CI sectors. During an incident, the NICC coordinates with Government Coordinating Councils (GCCs), SSAs, ISACs, other federal departments and agencies, and private CI owners and operators to monitor potential and developing threats to and the current operational status of the Nation’s CI sectors. It provides this information to the NRCC, JFO, and other operations centers, as required. Table 2 describes the relationships between the coordination elements within each CI sector as well as its relationship to various ESFs and RSFs. Attachment 1 to Appendix 2: Critical Infrastructure Sector Partners includes a detailed list of GCC and Sector Coordinating Councils (SCC) members for each CI sector.

CI Sector Coordination

Coordination across the CI sectors and with ESFs and RSFs provides a mechanism to:

- Understand cascading impacts of a long-term power outage;
- Identify opportunities for federal response and recovery operations to enable restoration of CI; and
- Synchronize operational priorities and targets.

Table 2: CI Sector Coordination Relationships

CI Sector	SSA Coordinating Entity	SCC	GCC		ISAC	ESFs	RSFs			
Chemical	DHS NPPD IP	X	Critical Infrastructure Cross Sector Council	Federal Senior Leadership Council	State, Local, Tribal and Territorial Government Coordination Council	Chemical ISAC	None	Infrastructure Systems		
Commercial Facilities	DHS NPPD IP	X				X	Real Estate ISAC	#5, #7	Infrastructure Systems	
Communications	DHS NPPD Office of Cybersecurity and Communications (DHS NPPD CS&C)	X				X	Communications ISAC	#2		
Critical Manufacturing	DHS NPPD IP	X				X	None	None		
Dams	DHS NPPD IP	X				X	None	#3		
Defense Industrial Base	DOD	X				X	Defense Industrial Base (DIB) Collaborative Information Sharing Environment (DCISE)	None		
Emergency Services	DHS NPPD IP	X				X	Emergency Management and Response ISAC	#3, #4, #5, #13		
Energy	DOE Office of Electricity Delivery and Energy Reliability/ Infrastructure Security and Energy Restoration	X				X	Electricity Sector ISAC, Oil and Natural Gas ISAC, Downstream Natural Gas ISAC, NERC	#3, #12		
Financial Services	Department of the Treasury (TREAS) Office of Critical Infrastructure Protection and Compliance Policy					X	Financial Services ISAC	None		Infrastructure Systems/
Food & Agriculture	USDA Office of Homeland Security and Emergency Coordination; Food and Drug Administration, Center for Food Safety and Applied Nutrition, Office of Analytics and Outreach	X				X	None	#8, #11		Infrastructure Systems

CI Sector	SSA Coordinating Entity	SCC	GCC			ISAC	ESFs	RSFs
Government Facilities	GSA Office of Mission Assurance, Security and Special Programs Division/ DHS Federal Protective Service			X		None	#7	Infrastructure Systems
Healthcare & Public Health	DHHS Office of the Assistant Secretary for Preparedness and Response (ASPR)	X				National Healthcare ISAC and Healthcare Ready	#6, #8	Infrastructure Systems/ Health & Social Services
Information Technology	DHS NPPD CS&C			X		Information Technology ISAC	None	Infrastructure Systems
Nuclear Reactors, Materials, and Waste	DHS NPPD IP	X				None	#12	
Transportation Systems	DHS (Transportation Security Administration [TSA] Office of Security Policy and Industry Engagement and United States Coast Guard [USCG] Office of Port & Facility Compliance); DOT Office of Intelligence, Security and Emergency Response	X				Surface Transportation ISAC, Public Transportation ISAC, Aviation ISAC, Maritime ISAC, Oil & Natural Gas ISAC	#1	
Water and Wastewater Systems	EPA Water Security Division	X				Water ISAC	#3, #8, #10	Infrastructure Systems/ Health & Social Services

- CI Crisis Action Team (CI-CAT)** – During incidents resulting in significant impacts to CI, DHS NPPD IP activates a CI-CAT that provides incident support for situational awareness and planning. The NICC continues to monitor CI at the national level. The CI-CAT responds to incident specific requests and collects, coordinates, and disseminates CI incident information and analysis to DHS, NPPD, and IP leadership, as well as CI partners. The CI-CAT and NBEOC identify requests for information (RFIs), incident priority trends, and coordinate engagement across the 16 sectors to ensure private sector priorities, resource gaps, and needs are included in the incident action plan.

Other National-Level Response and Recovery Coordination

In addition, agencies may also activate their own operations centers such as the National Military Command Center, the Strategic Information and Operations Center, or the HHS Secretary's Operations Center. Depending on the international impact, DOS's Executive Secretariat and its Operations Center may establish a DOS Task Force for a power outage if there are major international implications.

Regional- Level Operational Coordination

Responsibilities of a RRCC are consistent with the NRF, NDRF, and Response and Recovery FIOP. The RRCC coordinates assignments, actions, and other support until a JFO is established and mission-execution responsibilities are transferred to the appropriate team leaders. While the assumption is that a long-term power outage would result in a Stafford Act declaration, in a circumstance where it does not, federal incident management activities will be coordinated out of the applicable RRCC.

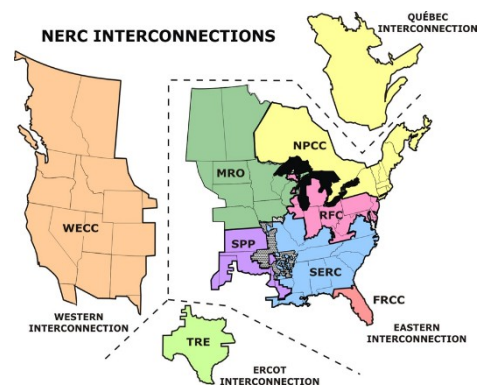
NERC Regional Entities

NERC, as the ERO for North America, assures the reliability of the BPS.

NERC delegates its authority to monitor and enforce compliance to eight regional entities whose members come from all segments of the electric industry: investor-owned utilities; federal power agencies; co-ops; state, municipal, and provincial utilities; independent power producers; power marketers; and end-use customers. These entities account for virtually all the electricity supplied in the United States, Canada, and Mexico. The NERC coordinates with federal agency leadership, including DOE, FERC, DHS, and others as appropriate.

Figure 8: NERC Regions

Florida Reliability Coordinating Council (FRCC)
 Midwest Reliability Organization (MRO)
 Northeast Power Coordinating Council (NPCC)
 Reliability First Corporation (RFC)
 SERC Reliability Corporation (SERC)
 Southwest Power Pool, RE (SPP)
 Texas Reliability Entity (TRE)
 Western Electricity Coordinating Council (WECC)



Field-Level Operational Coordination

Joint Field Office or Regional Response Coordination Center

The UCG in a JFO/RRCC is flexible and scalable, depending on the specific incident. For a power outage, representatives from affected utilities or the regional utility association may participate as members of the UCG to assist in decision making to prioritize resources.

The JFO/RRCC coordinates with state and local emergency operations centers (EOCs), as well as with industry-specific EOCs that are supporting the response and recovery of a power outage. It incorporates appropriate ESF and RSF structures. As the federal focus shifts towards long-term recovery, a plan between the Federal Coordinating Officer and Federal Disaster Recovery Coordinator will be developed to ensure a seamless transition.

Joint Operations Center

If the cause of the power outage is an actual or suspected terrorist attack, the Attorney General, acting through the Federal Bureau of Investigation (FBI) Director, leads and coordinates the operational law enforcement response, on-scene law enforcement, and related investigative and appropriate intelligence activities related to terrorist threats and incidents. As noted in the Response FIOP, the FBI may establish an FBI Command Post or Joint Operations Center (JOC) for the purpose of managing the investigation, leading and coordinating the law enforcement response to resolve terrorist threats or incidents. If established, the JOC coordinates with the JFO.

State/Local Emergency Operations Centers

As necessary, the state and local EOCs incorporate representatives from impacted utilities and other CI sectors to ensure that the appropriate SMEs are involved in decision making for state support. Working with the state EOCs, representatives from state public utility commissions or other electricity/utility SMEs advise and assist in decision making to prioritize state resources for the restoration process (e.g., public safety officers to assist with access points, fuel, and logistics).

In the case of tribal lands, tribal governments have a special relationship with the United States Government, and local, state, and federal governments may have limited or no authority on tribal lands. The NRF's Tribal Relations Support Annex provides further guidance. Many states involve their tribal counterparts in their EOCs.

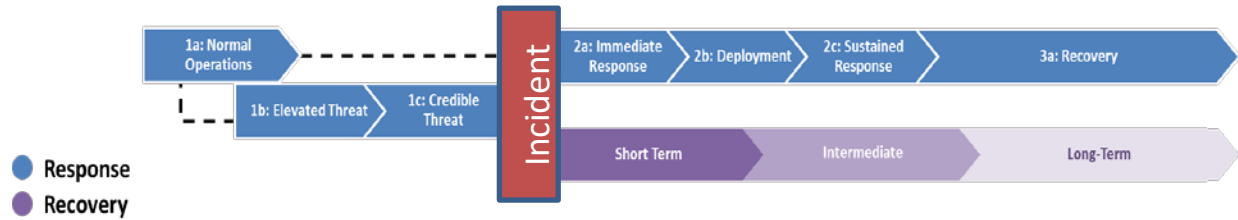
- **Protective Security Advisors** – Protective Security Advisors (PSAs) are field-deployed DHS NPPD IP experts who serve as liaisons in state and local EOCs and coordinate the provision of situational awareness and analytical support. During incidents, the PSAs report to the Infrastructure Liaison in the JFO.

Operational Phases

The operational phases for providing coordinated federal support to local, state, tribal, territorial, and insular area governments are identified in the Response and Recovery FIOPs. While individual partners may not use the same phasing for their internal operations, for the purpose of a coordinated federal response, the following phasing applies. Response and recovery operations run concurrently, and the actions will overlap to an extent.

Figure 9 depicts the synergy between the response and recovery operational phases. The actions associated with this annex are focused on Phase 2c (Sustained Response) and Phase 3a (Recovery) in the response phases and Intermediate and Long-Term phases in the recovery phases.

Figure 9: Operational Phases



Federal Government Response Phases—Defined	
Phase 1a	Normal operations
Phase 1b	Elevated threat and the development of situational awareness
Phase 1c	Credible threat of a known hazard; selected teams are alerted and resources may be pre-positioned in anticipation of support needed by the state
Phase 2a	Immediate response at the state/local level (some initial response from federal entities), gaining situational awareness, and activation of operations centers
Phase 2b	Response at the federal level, maintain situational awareness, deployment/employment of resources to incident support bases, federal staging areas, and identified delivery sites, and the movement of resources to incident support bases
Phase 2c	Sustained response, employment of resources at the incident site, saving lives, sheltering survivors and restoring critical systems such as power and communications
Phase 3a	Recovery activities that occur as part of the response mission area to facilitate the transition and support to the recovery mission area
Federal Government Recovery Phases—Defined	
Immediate/Short-Term (Days)	Addresses the health and safety needs beyond rescue, the assessment of the scope of damages and needs, the restoration of basic infrastructure, and the mobilization of recovery organizations and resources, including restarting and/or restoring essential services (e.g., gas, water, electricity) for recovery decision making
Intermediate (Weeks–Months)	Involves returning individuals, families, CI, and essential government or commercial services to a functional, if not pre-disaster, state; such activities are often characterized by temporary actions that provide a bridge to permanent measures
Long-Term (Months–Years)	Addresses complete redevelopment and revitalization of the impacted area; rebuilding or relocating damaged or destroyed social, economic, natural, and built environments; and a move to self-sufficiency, sustainability, and resilience

The concept of operations of this annex focuses on power outages with long-term impacts. While many incidents such as severe weather result in some type of short-term power outage, the actions in this annex assume that initial response and power restoration activities (e.g., activation of operations centers, deployment of response teams) to support immediate life-saving actions have occurred. The actions in this annex focus on only unique activities for a long-term power outage and those activities undertaken by those entities responsible for the energy sector.

Phase 1a – Normal Operations

The Federal Government coordinates with all stakeholders to develop and validate plans to deal with long-term power outages and continues situational awareness monitoring. Refer to the Response FIOP for a list of all-hazards preparedness actions for the Federal Government in this phase.

DOE, as the SSA and lead federal agency for the energy sector, coordinates the following preparedness actions within the energy sector:

- Coordinates with the public/private energy sector, the Electricity and the Oil and Natural Gas SCCs, the ERO, and various associations that represent portions of the energy sector, as well as with SLTT, insular areas, and federal entities.
- Assists the states in preparing state energy assurance plans to improve the reliability and resiliency of the Nation's energy systems, and maintains the EEAC Program, contact list, and database.
- Conducts national security emergency preparedness planning, including capabilities development, administering operational programs for all energy resources, and conducting energy emergency exercises with the energy industry; federal partners; and local, state, tribal, territorial, and insular area governments.
- Develops, tests, trains, and exercises continuity programs and plans coordinating with whole community partners and stakeholders.

DOE coordinates the following activities with SLTT and insular area governments:

- Conducts preparedness activities that support response and recovery to power outages, such as exercises, training, and plan development, consistent with their emergency operations and continuity plans.
- Involves local disability stakeholders in emergency planning to accurately and adequately incorporate considerations of people with disabilities during a long-term power outage.
- Develops inclusive engagement strategies with the public and private utility companies in their state or jurisdiction.¹⁶
- Ensures local and state emergency operations plans include fuel action plans that identify priority users, staging areas, and daily fuel consumption by type of critical facility.

In preparation for power outages, utilities participate in preparedness activities such as—

- Contingency and continuity planning and exercises for restoration.
- Educating state EOC personnel on energy restoration and importance of right-of-way programs.
- Validating contact information for local, state, tribal, territorial, and insular area partners.
- Hardening of infrastructure, inspections, and assessments.
- Ensuring that they have standing contracts with diesel fuel suppliers.
- Developing restoration priorities.
- Developing smart grids and micro grids.
- Developing contracts (e.g., for fuel).
- Improving resiliency.
- Developing mutual assistance agreements.

¹⁶ Jurisdictions with emergency operations plans that are inclusive of people with disabilities and others with access and functional needs are better prepared to meet or quickly identify and mitigate mass care needs of all whole community members.

Phase 1b and 1c – Elevated and Credible Threats

Long-term power outages cannot always be predicted; however, certain threats such as severe weather are a common cause. Certain scenarios such as winter storms or hurricanes often cause power outages. The intelligence community may identify and communicate potential or credible threats to the electric grid. In situations with an elevated or credible threat of disruption to the energy sector, government agencies and utility owners and operators will take certain preventative actions.

The Federal Government—

- Analyzes and models the potential impacts to the electric power, oil, natural gas, and coal infrastructures; analyzes the market impacts to the economy; and determines the effect the disruption has on other CI sectors.
- Through DOE, conducts coordination calls and initiates situational reporting with electric industry representatives, regions, and states.
- Through the NCCIC and E-ISAC, provides threat information and alert products.

Local, state, tribal, territorial, and insular area governments—

- Coordinate with their public utility commissions.
- Identify potential waivers that may be required to expedite disaster response.
- Review local and state plans for energy restoration and prioritization.

Utility owners and operators also take preventative actions depending on the credibility and likelihood of a threat to the electric grid. They—

- Appoint coordinators or leads for various functions (e.g., live wires down, restoration, vegetation management, communications) if not already identified as part of their emergency plans.
- Review and reassess their critical asset list and rank assets for restoration priority.
- Initiate communications with local, state, tribal, territorial, insular area, or federal officials and members of mutual assistance groups.
- Share information with industry and government through ISACs.
- Identify and position resources to respond to an outage, and implement a plan to prioritize response actions (i.e., those that have immediate threat to life or property loss such as downed live wires, and restoration of emergency and hospital services).
- As needed, communicate with their customers on preventative measures and expectations of consequences.
- Commence industry-government coordination through the ESCC and aligned E-ISAC support.
- Alert regional mutual assistance programs.

Phase 2a and 2b – Immediate Response and Deployment

Immediate response includes actions taken within 72 hours of a notice or no-notice incident resulting in a power outage. Actions focus on saving lives; protecting properties and the environment; rapidly meeting basic human needs; preserving the social, economic, and political structure of the jurisdiction; and supporting the transition to recovery.

During this phase, the Federal Government and utilities undertake certain actions such as activating and deploying specialized teams and assets (if not already done in Phase 1), conducting damage assessments, and sharing information on outages.

Specific federal actions are detailed in the ESF and RSF annexes, as well as in the Response and Recovery FIOPs. The following section focuses on power-specific activities of the electric industry.

Local, state, tribal, territorial, and insular area governments—

- Through the public utility commissions or other appropriate state agencies, require the reporting of outages and other events that disrupt power systems.
- Activate the State Energy Operation Center, if one exists.
- Conduct damage assessments.
- If required, develop governor directives authorizing counties to use available in-state fuel supplies to perform initial life safety missions.
- Coordinate with the Federal Government on any waivers that are necessary to expedite lifesaving or life-sustaining missions.
- Coordinate delivery of in-state bulk fuel supplies into impacted areas.
- Review pre-designated state staging areas and fuel PODs.
- Develop prioritized lists of CI for temporary emergency power.

During these sub-phases, public and private electric companies—

- Initiate actions consistent with company emergency plans and the ESCC Playbook and in coordination with the E-ISAC to provide support, information, and advice to the Federal Government and sector stakeholders on incident response.

- Coordinate mutual aid through their regional energy-specific associations and inform federal agencies and other organizations of mutual aid status; if warranted, they activate their national-level frameworks.
- Request assistance from local or state governments, health and human services, including disability, stakeholders who can provide immediate real-time information and situational awareness about people with disabilities and others with access and functional needs who may depend on power for life maintenance and/or to mitigate personal health and safety issues (such as those living independently and or group or some facility settings).
- Maintain open communication channels with customers to inform them of safety measures, impact assessments, and restoration estimates.
- Prioritize plans and actions to restore energy during response and recovery operations.
- Assess, isolate, and restore undamaged areas of the BPS.
- Assess the state of the power grid to determine restoration priorities and strategies.
- Employ “black start” generators to restore generating stations if power is unavailable from the transmission network.
- Synchronize re-energized sections of the BPS.

Restoration Priorities

Typically, utilities adhere to the following repair and restoration sequencing:

- Power Plants
- Startup Power
- Large Transmission Lines/Sub-Stations
- Distribution Substations and Feeder Lines
- Restoration to CI Facilities
- Residential Areas

Many of the actions performed by electric companies will continue through various phases and until restoration is complete.

Phase 2c – Sustained Response

Phase 2c of the power outage covers a period of 2 weeks to 30 days following the incident, when response operations will transition from Initial Operating Facilities to JFOs (if not already established). In addition to the actions identified in the Response FIOP, the Federal Government—

- Coordinates with utilities and CI sectors and identifies cascading impacts from the outage.
- Supports interdependencies with other sectors and identifies actions needed to enable the restoration process in other sectors.
- Communicates critical information to the public, including estimated time of restoration; as provided by industry.
- Identifies and communicates opportunities to mitigate or safeguard against risks.

Local, state, tribal, territorial, and insular area governments—

- Confirm that pre-designated state staging areas and fuel PODs align with state lifeline routes.

- Ensure that pre-designated fuel points align with local priority routes with adequate storage and dispensing capabilities.

Public and private electric companies—

- Assess and isolate damaged areas of the bulk power grid and determine remediation plans.
- Activate their mutual aid networks through their respective electricity associations (if not done so in earlier phases).
- Monitor requests for mutual aid and responses through their respective mutual assistance programs.
- If warranted, activate transmission equipment sharing programs (e.g., STEP, SpareConnect) to help restore the BPS.
- Continue to execute emergency operating procedures such as—
 - Cancelling or recalling prior-scheduled transmission and generation outages.
 - Managing the generating resources to address fuel supply and inventory concerns.
 - Requesting waivers or other regulatory relief from environmental requirements as appropriate.
 - Using curtailable load and demand response.
 - Loading management procedures including rotating blackouts, as needed.

An increasing number of short-term and intermediate recovery and mitigation activities will occur during this sub-phase.

Phase 3 – Recovery

Recovery planning and coordination for all phases of recovery (short-term, intermediate, and long-term) begin with the event and response. Short-term recovery actions occur within the response mission space (Phase 3a) to address health and safety needs beyond rescue, assess the scope of damages and needs, restore basic infrastructure, and fully mobilize recovery organizations and resources. Intermediate and long-term recovery activities can extend much longer when there is a continued need for federal assistance by impacted states.

Each community, state, tribe, or territory defines successful recovery outcomes differently based on its circumstances, challenges, recovery vision, and priorities. In general, the goal of recovery following a long-term power outage includes ensuring the return of individuals and families and to reestablish essential government and/or commercial services to support the physical, emotional, and financial well-being of impacted community members. Recovery activities also include incorporating health and social services and strengthening key systems and resource assets that are critical to the economic stability, vitality, and long-term sustainability of the communities themselves. Actions during this phase are likely to include:

- Support the social services disaster recovery efforts of local, state, tribal, territorial, and insular area jurisdictions.

- Continue identifying and facilitating federal mechanisms to expedite CI restoration (e.g., DPA to prioritize contracts, regulatory relief, restoration logistics support).
- Develop a Recovery Support Strategy that includes an anticipated timeline for engaging with disaster-impacted communities and the levels, types, and durations of federal support to each affected jurisdiction.
- Advise on incorporating mitigation, sustainability, and resilience-building measures into recovery plans and implementation.
- Demobilize any deployed recovery assets.
- Ensure long-term management is in place to sustain any needed federal support to ongoing local, state, tribal, territorial, or insular area recovery efforts.

Critical Requirements

Critical information requirements (CIRs) facilitate timely command, control, and coordination of decisions during disaster operations. They provide insight into important details and essential elements of information that response personnel need to effectively make decisions and execute their operations.

CIRs may vary based on the specifics of the power outage. The UCG will define what information is required, and the CIRs are incorporated into the JFO's Information Collection Plan. The following CIRs are supplemental to those outlined in the Response and Recovery FIOPs and are linked to key decisions where appropriate.

Incident Characterization

- Identification of damage zones or outage zones.
- Demographic information of the affected population, including vulnerable positions on utility registries that may need assistance.
- Population density maps with overlay of power outage areas.

Utility and Restoration Information (Coordinated through DOE)

- Power outage statistics organized by state, county or parish.
- Customers impacted/without power.
- Damage assessment and estimates of duration of power outages, and status of restoration.
- State of utility systems, current limitations and capabilities, resource requirements, and recovery strategy.
- Status of all types of fuel, status of generation, substation, line facilities.
- Limiting factors/barriers (e.g., transportation, housing) for utility restoration efforts.

Resource Availability

- Availability of backup power and restoration assets within the impacted area that will affect response and recovery options.

- Fuel status for public consumption.
- Fuel status for public safety and security services.
- Generator/fuel status for critical assets across each of the 16 CI sectors and any additional interagency needs to support essential functions and services.

Sheltering, Feeding, and Distribution of Emergency Supplies

- Status of evacuations and locations of evacuees or shelters.
- Location of actual or potential impacts to CI sectors other than the energy sector.
- Name and status of healthcare facilities (including nursing homes, dialysis facilities) in the impacted area for restoration prioritization.
- Forecasted and cascading impacts to CI, which may affect mobility within the area for an extended period of time (e.g., bridges, roads, major highways, railways, and airports).
- Water treatment plants' operational status.
- Wastewater treatment plants' operational status.

State and Local Plans/Agreements

- State-identified priorities for restoration.

Essential Elements of Information

Essential elements of information support the CIRs by providing more detail for situational awareness and decision-making. Essential elements of information must be verified and include specific details. Examples of potential essential elements include, but are not limited to the following items.

Essential Elements of Information for Government

- Maps/information on CI specific to the incident area.
- Identification of frequency and command structure for operational communications.
- Name of power utilities impacted.
- Updates on restoration progress.
- Critical needs of materials, transportation, and physical access restrictions per sector.
- Status of state and local response and recovery resources.
- Number of potential evacuees, and locations of host communities with concentrations of evacuees, whether in state or out of state.
- Location and status of critical healthcare facilities and services (hospitals, nursing homes, dialysis) and information on at-risk populations with access and functional needs and their medical and social service needs.
- Long-term evacuee/displaced persons' status tracking data (e.g., employment, temporary housing, preferences for permanent relocation versus return, if applicable).

- Location and accessibility of open or planned shelters, fixed and mobile feeding sites, and sites for distribution of emergency supplies (e.g., PODs).
- Limiting factors or obstacles for each sector's restoration of functions (sequencing of activities).
- Requirements for federal assistance (if any) to enable sector continuity or restoration efforts.
- Status of sector mutual assistance, major restoration efforts underway, and estimated times for restoration.
- Private association/nonprofit association requests for assistance.
- Contaminated waste management and potential sites for temporary debris/waste storage.
- Host community agreements to support displaced populations.

Essential Elements of Information for the Electricity Subsector

- Situational awareness:
 - Reports provided through DOE.
 - Information and intelligence on incident characterization.
 - Status on emergency declarations.
 - Command structure.
- Prioritization for restoration and resource allocation:
 - List of critical facilities to use in prioritizing restoration.
 - Priorities for SLTT, insular area, or federal governments.
 - Identification of critical needs to aid in prioritizing restoration efforts (e.g., water, emergency services, hospitals, shelters).
 - Deployment and location status of federal assets.
 - Lists of designated staging sites.
 - Status of generator packs in relation to affected utilities, and estimates on arrival times.
 - Status and availability of airport, seaport, and other transportation infrastructure and access route status.
 - Status of United States border crossing processes with Canada and Mexico, to ensure expedited crossing to support restoration.
- Coordination and communication with government (through DOE):
 - Communication of waivers to utilities, including the status and a central point of contact) for information on waivers.
 - List(s) of applicable key decisions involving utility resources and/or assets.

- Information on security concerns, access-controlled area(s), and credentialing requirements.
- Accessible public information:
 - Federal support and assistance programs to which members of the public can be directed.
 - Support and assistance from FEMA and other federal agencies made available to assist affected subsector employees.

Administration, Resources, and Funding

Administration

Federal agencies are responsible for managing their own financial activities during all operational phases and across all mission areas within their established processes and resources. The Financial Management Support Annex to the NRF provides basic guidance for all federal agencies that provide support for incidents requiring a coordinated federal response.

Resources

Consistent with the Homeland Security Act of 2002 and the Response and Recovery FIOPs, federal departments and agencies are responsible for augmenting personnel to support operations under this annex. Each federal agency possesses individual policies to augment personnel based on its authorities, policies, memoranda of understanding, and mutual aid agreements. Federal agencies must ensure that their employees who are engaged in incident response and recovery activities are able to perform in accordance with operational requirements.

Federal agencies are expected to provide full and prompt cooperation, resources, and support, as appropriate and consistent with their own responsibilities for national security, to the Secretary of Homeland Security in the exercise of their leadership responsibilities and missions for domestic incident management.

Funding

One of the assumptions of this annex is that a large-scale or long-term power outage with significant consequences requiring interagency coordination is likely to be caused from a Stafford Act Incident with associated funding through the Disaster Relief Fund (DRF).

Stafford Act

The Stafford Act authorizes the President to issue a major disaster or emergency declaration upon the request of a governor or chief tribal executive when an incident overwhelms local, state, tribal, territorial, or insular area governments. A Stafford Act declaration enables the Federal Government to provide financial and direct assistance to individuals and families, certain private not-for-profit organizations, and public entities. The funding source for Stafford Act declarations is the DRF. The DRF is not available for non-Stafford Act operations nor activities authorized under another federal agency's independent authority.

The Stafford Act addresses two types of disaster declarations—major disaster declarations and emergency declarations. Both authorize the President to provide supplemental federal assistance to local, state, tribal, territorial, and insular area governments. In addition, certain not-for-profit organizations that own or operate a facility providing essential governmental type services may be eligible for assistance under FEMA’s public assistance program. The type and amount of assistance differs depending on whether the Stafford Act Declaration is a major disaster or an emergency.

- **Major Disaster Declaration**—The President can issue a major disaster declaration for any natural catastrophe or, regardless of cause, any fire, flood, or explosion, in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance under this Act to supplement the efforts and available resources of states, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering that has ensued.¹⁷ A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work. Not being a natural catastrophe, a cyber incident or any other outage not inducted by natural events, generally would not qualify for a major disaster declaration, but would likely qualify under the broader definition of an emergency declaration. A fire, flood, or explosion caused by a cyber incident may qualify for a major disaster declaration. A space weather or EMP incident may result in a major disaster declaration if it is determined to be a natural incident.
- **Emergency Declaration**—The President can issue an emergency declaration for any occasion or instance when the President determines federal assistance is needed to supplement local, state, tribal, territorial, or insular area government efforts and capabilities to save lives, protect property and public health and safety, or to lessen or avert the threat of a catastrophe in the United States. A power outage may qualify as an emergency under the Stafford Act. Such an incident resulting in a long-term power outage may qualify for an emergency declaration, as may space weather and EMP incidents not resulting in an explosion.

In extremely rare circumstances, a private for-profit entity may be the beneficiary of federal assistance when it is determined that such assistance is necessary to enable that private organization to continue to provide a critical service to the community at large. The service must involve an activity to save lives, protect property or public health and safety, and be beyond the capability of the local, state, tribal, territorial, or insular area government. If authorized, this assistance would be for an exceptionally limited period of time and only for so long as to allow the private sector entity an opportunity to take the necessary steps to meet its own unmet needs. Because of the exceptionally limited circumstances under which private sector assistance would be warranted, matters are reviewed on a fact-specific case-by-case basis and require the prior approval of FEMA senior leadership and the Chief Counsel. The Stafford Act does not authorize assistance to the private sector for economic recovery.

¹⁷ *Robert T. Stafford Disaster Relief and Emergency Assistance Act*, Public Law 93-288, as amended, 42 U.S.C. 5121 et seq.

In absence of a Stafford Act declaration and DRF funding, other funding sources may be available.

Federal-to-Federal Support –Non-Stafford Act

For non-Stafford Act responses, federal departments and agencies with their own response authorities may also have associated appropriations to fund their response, as well as mechanisms to fund supporting federal agencies. Federal agencies with authority to respond but lacking funds may need to request emergency supplemental funding from Congress. Federal-to-federal support is executed through inter/intra-agency reimbursable agreements, in accordance with applicable authorities. Federal departments and agencies providing mutual aid support may request reimbursement from the requesting federal agency for eligible expenditures, consistent with provisions of the Economy Act. Refer to the Financial Management Support Annex to the NRF for more detail.

Other Funding Options

For long-term recovery support, both private and public utilities, as well as other private businesses and CI entity

es, may be able to apply for certain loans to help restore their functions. The United States Small Business Administration (SBA), through its Office of Disaster Assistance, provides financial assistance in the form of low-interest long-term loans to businesses of all sizes, most private nonprofit organizations, small agricultural cooperatives, and small businesses engaged in aquaculture, following a declared disaster. In addition, SBA provides eligible small businesses with the necessary working capital to help overcome the economic injury of a declared disaster. SBA has the authority to issue two types of disaster loans:

- **Physical Disaster Loans** – Businesses of any size and most private nonprofit organizations may apply to borrow up to \$2 million for a physical disaster loan, which may be used for the repair or replacement of real property, machinery and equipment, fixtures, inventory and leasehold improvements.
- **Economic Injury Disaster Loans** – Small businesses, small agricultural cooperatives, small businesses engaged in aquaculture, or most private, not-for-profit organizations located in a disaster area that suffered substantial economic injury may be eligible for up to \$2 million Economic Injury Disaster Loans (EIDL), regardless of whether the entities suffered physical property damage.¹⁸ Small businesses can apply for a maximum loan (physical and EIDL) of \$2 million.

Other federal recovery programs may be available to states, tribes, territories, and insular areas, but they are dependent on supplemental appropriations. All federal funding options for long-term recovery will be explored during recovery planning for the specific incident.

Oversight, Coordination Instructions, and Communications

¹⁸ <https://www.sba.gov/loans-grants/see-what-sba-offers/sba-loan-programs/disaster-loans/types-disaster-loans>.

Oversight

FEMA, in close coordination with the DOE, is the executive agent for this annex and is responsible for its management and maintenance. FEMA will update this annex periodically, as required, to incorporate new presidential directives, legislative changes, and procedural changes based on lessons learned from exercises and actual incidents.

Coordinating Instructions

To facilitate the rapid, coordinated, and seamless integration of federal and federally accessible resources into a localized response effort, local, state, tribal, territorial, and insular area governments are encouraged to incorporate the concepts of this annex into their respective plans to support the delivery of federal assistance. Successful incident management operations depend on the involvement of multiple jurisdictions as well as personnel and equipment from federal agencies. Federal agencies should assume that jurisdictional capabilities will be insufficient, or have been exceeded, as soon as they recognize that multiple jurisdictions/regions have lost power.

Logistics Architecture

A long-term power-constrained environment will require significant logistical support from the whole community to support mass care and emergency assistance services, enable the power restoration process, support evacuation if necessary, and promote continuity of critical missions. An interagency supply chain system known as the National Logistics System coordinates federal logistical support consistent with the logistics concept of support in the Response FIOP.¹⁹ Under this system, FEMA and other federal interagency partners operate under their statutory authorities, in coordination with the whole community, to stage personnel and resources in locations favorable to providing timely and efficient access to the impacted area(s). Within the NRCC, federal logistical resource requirements are reviewed and prioritized based on the specifics of the power outage and the approved course of action.

In a long-term power outage, federal temporary emergency power generation assets (e.g., generators and fuel) to maintain mission essential functions and provide lifesaving and life-sustaining support will be in high demand. Federal temporary power generation equipment and technical support may be provided by FEMA, USACE, the Defense Logistics Agency (DLA), or GSA. Prioritization for generators and fuel will be particularly important since the Federal Government has limited organic generator capability. As a result, the logistics architecture will be adapted as necessary (e.g., tailoring unique delivery and dispensing plans of commodities to address the unique circumstances for an incident).

Private Sector Coordination

- DHS NPPD IP, including through the NICC, coordinates with private sector partners directly (for sectors which IP serves as SSA) and with cross sector partners (as the national coordinator of CI protection) to accomplish the following:

¹⁹ For more information on the National Logistics System, refer to *NRF ESF #7 Logistics Support Annex* or the *Federal Emergency Management Agency (FEMA) Logistics Operations Manual* (FEMA publication 9380.1-PR, August 2010).

- Coordinate with NBEOC to vet CI private sector RFIs.
- Support requirements to ensure rapid stabilization and access to impacted private sector CI.
- Collect, share, and disseminate status updates on CI operations, impact, consequences, and analysis and recommendations for restoring CI in coordination with the relevant SSAs.
- DHS NCCIC, through the National Coordinating Center (NCC) joint government and communications industry partnership, serves as the Communications Information and Sharing Analysis Center to—
 - Coordinate with wireline, cellular, wireless, broadcast, satellite, and cable, operators; equipment manufacturers; and communications associations.
 - Provide situational awareness of communications services.
 - Provide communications analytic products of impacts to support planning, response prioritization, and decision-making.
- DOE:
 - Coordinates with electricity owner/operators, suppliers, regulatory entities, and industry associations and conducts regularly scheduled conference calls with impacted utilities and their associations, as incidents require.
 - Coordinates with owners, operators and members of trade associations representing the oil and natural gas sub-sector as necessary and appropriate.
- FERC coordinates with NERC and the E-ISAC regarding cyber and physical alerts to be issued to regulated entities.
- The National Council of ISACs conducts calls with cross-sector stakeholders during a long-term power outage to share information and obtain status updates on emerging issues from various CI sectors.
- The NBEOC, an element within the NRCC, connects private sector stakeholders to resources or information at the local, state, regional, or federal levels for specific issues or capabilities pertaining to a long-term power outage.
- DHS NPPD Liaison:
 - Serves as the primary conduit between FEMA and DHS NPPD to assist the NRCC in future planning and to provide situational awareness as it relates to CI risk analyses.
 - Coordinates with DHS NPPD analysts who develop CI-specific products, identify infrastructure of concern (IOC) lists, and identify available resources to support response and recovery operations. The IOC List is based on incident-specific analyses of the threat to, vulnerabilities of, and potential consequences from the disruption of CI in the impacted area; it is developed by DHS NPPD analysts and updated based on a request from DHS leadership. DHS NPPD IP Liaisons in the field distribute the IOC list to other stakeholders in regional or incident-level

coordinating structures as appropriate. Appendix 2: Critical Infrastructure Sector Interdependencies provides more information on the IOC List.

- Provides the NRCC with access to analytical products such as infrastructure impact assessments. The IOC list and infrastructure assessments are decision support tools that are available to NRCC leadership to inform resource allocation and prioritization.

Nongovernmental Organizations

- Provide critical situational awareness and field data on the survivor needs to the NRCC, DOE, and infrastructure and other teams to support power restoration, evacuation and other planning efforts.
- Through Voluntary Agency Liaisons, share information on requirements and capabilities of voluntary, faith-, and community-based organizations with the Federal Government.
- Assess needs generated by the incident and support the state's coordination of the provision of timely and efficient services.
- Coordinate with state agencies to determine the need for any federal resource requests for needed mass care/emergency assistance items and help facilitate their deployment and arrival.
- Determine federal support for state and local response and recovery efforts, to include referrals for housing, unmet needs, case management, and referral services.

Communications

Immediate action should be taken to identify communication systems for public messaging to provide clear, factual, accessible, linguistically appropriate and timely guidance to the public (see Appendix 3). Communication systems for local, state, and federal agencies should coordinate to maintain situational awareness and permit timely assessments of the status of critical services, resources, and infrastructure. The primary reporting method for interagency information flow is the Homeland Security Information Network (HSIN) and WebEOC™. In the event that WebEOC is inaccessible due to the power outage, backup communications and information sharing protocols will be identified on a case-by-case basis. In addition, to WebEOC, federal recovery partners use the Office of Management and Budget's MAX program for a broad scope of daily information sharing and collaboration, both pre- and post-incident.²⁰

²⁰ <http://max.omb.gov>.

Annex A: Electricity Delivery

Electricity Delivery

Three functions categorize the structure of electricity delivery within the United States—generation, transmission, and distribution—that are linked through key assets, including substations. Overall, the power infrastructure is highly redundant and resilient, but some components of the systems are vulnerable to natural hazards, acts of terrorism, space weather, geomagnetically induced currents, EMP, and sabotage.²¹ As a result, outages can and do occur because of system disruptions.²²

Generation

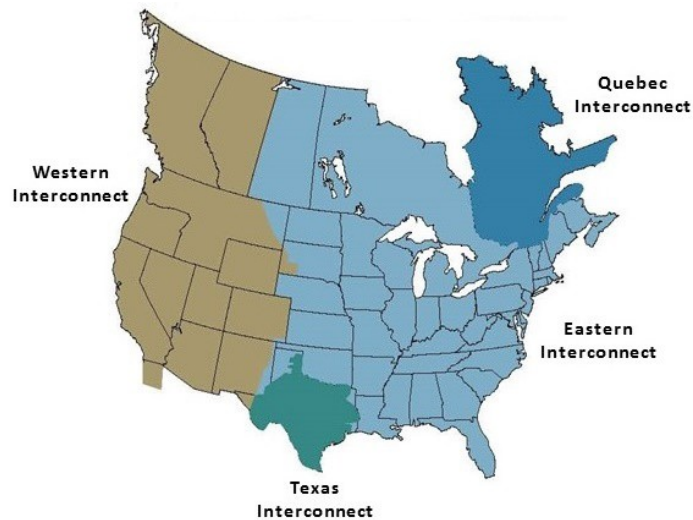
A diverse fuel mix generates the power supply in the United States, including coal, natural gas, petroleum liquids, nuclear, hydroelectric, and renewables. A power plant can have one or more generators, and some generators have the ability to use more than one type of fuel. Generation capacity varies regionally and depends upon the availability of the fuel resource. For example, coal and natural gas power plants are more common in the Midwest and Southeast, whereas the West Coast depends upon high-capacity hydroelectric power and natural gas-fired power plants. Power generation fuels also have their own supply chain. Vast infrastructure networks of railroads, pipelines, waterways, highways, and processing plants support the delivery of resources to generating facilities, and many such networks rely on electric power.

Transmission

The combined transmission and distribution network is referred to as the “power grid” or simply “the grid.” The power generation and high-voltage transmission lines that deliver power to distribution facilities make up the BPS, which actually comprises four lesser alternating current power grids or “interconnections.” Each interconnection operates independently of one another, with the exception of a few direct current conversion links in between. Figure 10 shows the boundaries of four of these interconnections. The two major subordinate grids, which are also the largest, are the Eastern Interconnection and the Western Interconnection. The Eastern Interconnection reaches from Central Canada eastward to the Atlantic coast (excluding Québec), south to Florida, and west to the foot of the Rockies (excluding most of Texas). The Western Interconnection stretches from Western Canada south to Baja California, Mexico, reaching eastward over the Rockies to the Great Plains. The two minor alternating current power grids are the Texas Interconnection, which covers most of the State of Texas and represents approximately 90 percent of the state’s electrical load, and the Quebec Interconnection, which covers all of the Province of Quebec. The Hawaii and Alaska grid systems (not shown in the figure) are not connected to the grids of the lower 48 states.

²¹ Extreme space weather, especially geomagnetic storms that can cause long-term power outages, are low probability, potentially high-impact incidents. The United States has experienced extreme space weather events during the past 150 years, most notably the Carrington Event of 1859 and the great geomagnetic storm of 1921.

²² *United States Electricity Industry Primer*, Office of Electricity Delivery and Energy Reliability, United States Department of Energy, DOE/OE-0017, August 2016 Revised Edition.

Figure 10: Map of Four North American Power Grid Interconnections²³

The United States' bulk electric system (BES) consists of more than 360,000 miles of transmission lines, including approximately 180,000 miles of high-voltage lines, connecting to about 7,000 power plants.²⁴ Power transmission lines facilitate the bulk transfer of electricity from a generating station to a local distribution network. These networks are designed to transport energy over long distances with minimal power losses, made possible by boosting voltages at specific points along the electricity supply chain.

Transmission lines consist of structural frames, conductor lines, cables, transformers, circuit breakers, switches, and substations.

Substations provide crucial links for generation and serve as key nodes for linking transmission and distribution networks to end-use customers. A substation generally contains transformers, protective equipment (relays and circuit breakers), switches for controlling high-voltage connections, electronic instrumentation to monitor system performance and record data, and firefighting equipment in the event of an emergency. There are over 55,000 substations in North America.

Transformers are critical equipment in delivering electricity to customers, but many are located in isolated areas. The loss of transformers at substations may represent a significant concern for energy security in the electricity supply chain due to the long lead time to design and build transformers, increased global demand in grid-developing countries, and limited domestic manufacturing capabilities. Transformers and their components are unique due to their specificity in design and application. Substations are highly specific to the systems they serve, which also limits the interchangeability of transformers. Replacing, for example, is associated with a long delivery lead-time, as they are generally difficult and costly to transport due to their considerable size and weight. Failure of even a single unit could result in temporary service interruption. The production of an LPT ranges from approximately 12–24 months and involves

²³ North American Reliability Corporation.

²⁴ *United States Electricity Industry Primer*.

contract procurement, design, manufacturing, testing, delivery, and installation as illustrated in Figure 11.

Figure 11: 2011 Large Power Transformer Procurement Process and Estimated Optimal Lead Time²⁵



As a resiliency measure, some utilities keep backup transformers, or “spare transformers,” for use during emergencies. Since high-voltage transformers can cost millions of dollars, utilities may opt to purchase a spare transformer or build redundancy into the system (e.g., being able to reroute power should a transformer fail) as part of their overall risk mitigation strategy.

Distribution

The power distribution system is the final stage in the delivery of electric power, carrying electricity out of the transmission system to individual customers. Distribution networks distribute electric power and consist of following main parts:

- Distribution substations
- Primary distribution feeders
- Distribution transformers
- Distributors
- Service mains

²⁵ *United States Electricity Industry Primer.*

Appendix 1: Core Capability Decisions, Requirements, and Tasks

Core Capability Considerations, Requirements, and Actions

Incidents such as a long-term power outage require a broader set of atypical partners to accomplish the capability targets for the Response and Recovery Core Capabilities identified in the National Preparedness Goal.

The following table discusses scenario-specific critical considerations, resource requirements, and actions for Core Capabilities beyond their all-hazards actions described in the Response and Recovery FIOPs.

Table 3: Core Capability Considerations, Requirements, and Actions

Core Capability	POIA-Specific Critical Considerations	POIA-Specific Resource Requirements	POIA-Specific Critical Actions (ESF with Primary Responsibility)
Cross-cutting Core Capabilities			
Operational Coordination	<ul style="list-style-type: none"> • There will likely be multiple JFOs • There will be a need to integrate with the private sector 	<ul style="list-style-type: none"> • Representatives to participate in any future planning activities 	<ul style="list-style-type: none"> • Determine the need for a future planning cell (ESF #5) • Coordinate with the NBEOC (ESF #5) • Invite utility association representatives to participate in NRCC activities (ESF #5)
Planning	<ul style="list-style-type: none"> • FEMA Regional POIAs are being developed in certain regions 	<ul style="list-style-type: none"> • Awareness of resource allocation and prioritization decisions • Awareness of energy restoration and prioritization spanning a large geographical area 	<ul style="list-style-type: none"> • Develop a national support plan based on the concept of operations in the applicable Regional POIA (ESF #5) • Determine the need for a future planning cell (ESF #5) • Monitor private sector coordination in collaboration with DHS NPPD IP (ESF #5)
Public Information and Warning	<ul style="list-style-type: none"> • Traditional means of providing information to the public will not be available without power (e.g., social media, TV, radios, text alerts, computer messages) • All disaster notifications and information must be made available to all people, including those with access and functional needs, simultaneously; therefore, preparedness planning with disability SMEs provides guidance on formats, platforms, and methods so that 	<ul style="list-style-type: none"> • Assessment of timeline for power and communications restoration • Awareness of ESF field activities that could be leveraged for message distribution • Awareness of resource allocation and prioritization decisions • Access to other federal agencies' communication methods, including technology and grassroots channels 	<ul style="list-style-type: none"> • Identify alternative means for communicating information to the public (ESF #2, ESF #15) • Determine and address critical communication needs of vulnerable populations (ESF #6, ESF #8, ESF #15) • Assess agency MOUs to identify added capabilities, private sector capabilities, and FEMA National Radio System (ESF #2, ESF #15)

Core Capability	POIA-Specific Critical Considerations	POIA-Specific Resource Requirements	POIA-Specific Critical Actions (ESF with Primary Responsibility)
<p>Infrastructure Systems</p>	<p>messaging is accessible to everyone</p> <ul style="list-style-type: none"> Multiple CI systems will be impacted by a power outage requiring significant coordination with the CI sectors All levels of government will determine prioritization of sector specific CI restoration There will be a need to determine what the priorities are for funding energy restoration and eligibility requirements for the public/private sector to receive funding 	<ul style="list-style-type: none"> CI damage/impact assessments from SSAs, ISACs, or DHS NPPD Crews (e.g., transmission specialists) and necessary mechanical parts to restore CI Generators and the expertise to assess, install, and maintain them Teams and expertise to assess temporary emergency power requirements and install, operate, and maintain generators at critical facilities 	<ul style="list-style-type: none"> Activate USACE power generation teams (ESF #3) Assess and prioritize healthcare facilities' reliance on power for sustaining ongoing operations (ESF #8) Assess the energy impact of the incident, provide analysis of the extent and duration of energy shortfalls, and identify requirements to repair energy systems (ESF #12) Coordinate with intergovernmental and private sector partners to identify requirements for temporary emergency power (ESF #3) Coordinate with critical SSAs to ensure consistency of information provided through the Secretary of Energy, the National Security Council, SCCs, and/or committees or other high-level coordinating structures as directed (ESF #12) Establish a process for public and private sector utilities to gain access to the incident site(s) (ESF #2, ESF #12), May liaise with states and locals on law enforcement support to establish and maintain a safe environment for infrastructure restoration(ESF #13) Coordinate between government and the communications industry to assess communications needs required to coordinate restoration of power (ESF #2)
	Response Core Capabilities		
<p>Critical Transportation</p>	<ul style="list-style-type: none"> Prioritization of key resources and transportation requests such as fuel and interstate travel restriction waivers Ensuring continuity of flow of resources through airports, ports, highways and the rail system Accessibility of transportation routes, rest 	<ul style="list-style-type: none"> Access to fuel supply and fuel distribution points Necessary waivers and permits to move resources in to the affected area quickly and efficiently Transportation assets to help restore CI 	<ul style="list-style-type: none"> Employ the DPA, as required, to support restoration priorities, generator productions, and deployment. (ESF #5, ESF #7) Identify priority route access requirements for restoration workers (ESF #1) Facilitate the implementation of regulatory relief mechanisms across the critical transportation sector (ESF #1)

Core Capability	POIA-Specific Critical Considerations	POIA-Specific Resource Requirements	POIA-Specific Critical Actions (ESF with Primary Responsibility)
	<ul style="list-style-type: none"> • areas, etc. for people with disabilities 		<ul style="list-style-type: none"> • Coordinate requests for fuel waivers (ESF #12)
			<ul style="list-style-type: none"> • Facilitate coordination with groups for interstate travel and mutual aid (ESF #1) • Ensure reporting of transportation infrastructure degradation (ESF #1)
<p>Environmental Response/ Health and Safety</p>	<ul style="list-style-type: none"> • Public messaging must include safety issues pertaining to power outage 	<ul style="list-style-type: none"> • Status of emerging or anticipated environmental impacts 	<ul style="list-style-type: none"> • Address and promulgate information about power outage safety issues, including food safety (from lack of food refrigeration) and carbon monoxide poisoning (from extended use of power generators) (ESF #5, ESF #8, ESF #11)
<p>Fatality Management Services</p>	<ul style="list-style-type: none"> • Morgue or mortuary services rely on air conditioning and removal to maintain optimum condition of the deceased 	<ul style="list-style-type: none"> • Fuel to support the movement of bodies • Power to support morgue services (i.e., refrigeration) 	<ul style="list-style-type: none"> • Identify alternate fuel services to support mortuary services (ES #8, ESF #7)
<p>Fire Management and Suppression</p>	<ul style="list-style-type: none"> • Ensure prioritization for restoration of emergency services infrastructure, including fire stations, 9-1-1 and dispatch centers, critical communication sites, and refueling facilities for fire apparatus, water systems components critical for fire suppression • Maintain critical access routes to affected utility locations • Deactivate appropriate systems at affected locations to allow appropriate application of fire suppression techniques 	<ul style="list-style-type: none"> • Situational awareness on affected utility locations to prioritize response efforts • Status on whether appropriate systems are deactivated at the affected locations • Fuel for responders to reach impact area 	<ul style="list-style-type: none"> • DOE and utility coordination for prioritizing and initiating fire suppression efforts (ESF #4, ESF #12) • Ensure communications infrastructure reporting of 9-1-1, dispatch, and first responder communications impacts (ESF #2)

Core Caplity	POIA-Specific Critical Considerations	POIA-Specific Resource Requirements	POIA-Specific Critical Actions (ESF with Primary Responsibility)
	<ul style="list-style-type: none"> Distribution of generators may or may not follow prioritization order for a short-term power outage (i.e., life-saving facilities, life-sustaining facilities, and other municipal facilities) 	<ul style="list-style-type: none"> across state lines (e.g., need for waivers) Minimum/maximum requirements for diesel fuel to support CI per location type and generator size Estimated daily fuel requirements for critical transportation Fuel burn rates from each impacted state's emergency operations plan 	<ul style="list-style-type: none"> fuel resources, including Secretary of Energy decisions associated with the drawdown of the Strategic Petroleum Reserve (SPR), Northeast Home Heating Oil Reserve, and Northeast Gasoline Supply Reserve) (ESF #12, ESF #7)
<p>Mass Care and Emergency Assistance Services</p>	<ul style="list-style-type: none"> Decision on whether to evacuate populations will inform appropriate mass care and emergency services actions Backup power resources should be considered a high priority to support congregate care and non-congregate care facilities Waivers may be needed for expeditious movement of people and allocation of scares medical resources across state lines A framework for allocation should be considered due to a scarcity of human and material support resources. Backup power and fuel should be prioritized for fixed and mobile feeding sites and sites for distribution of emergency supplies 	<ul style="list-style-type: none"> The ability to provide food, water and shelter with a reliable power source and access to food and potable water supply (potentially) outside the affected area Fuel for shelters and feeding stations Fuel for volunteers to reach the impacted public and assess their needs 	<ul style="list-style-type: none"> Identify additional fuel and transportation requirements and other resources needed to support the distribution of food, water, and emergency supplies for survivors (ESF #7) Coordinate with DOE and logistics to determine the most effective use of and locations for accessible mass care resources (facilities, equipment, and supplies) based on restoration priorities (ESF #6) Assess the viability of applying a zone approach to prioritize limited resources in areas with short-term power outages, for evacuations and in communities hosting survivors from areas where there are long-term outages (ESF #12, ESF #6) Coordinate with ESF #8 and Healthcare Coalitions, where appropriate for enhanced support to manage higher levels of needs in mass care facilities due to factors such as depopulation of medical facilities and influx of survivors who rely upon electricity-dependent medical and assistive equipment and technology (ESF #6) Identify options and implement programs for providing housing assistance for survivors whose homes have no long-term power but are not damaged or inaccessible (ESF #6)
<p>Mass Search and Rescue</p>	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> None identified 	<ul style="list-style-type: none"> Implement actions consistent with emPOWER and local

Core Capability	POIA-Specific Critical Considerations	POIA-Specific Resource Requirements	POIA-Specific Critical Actions (ESF with Primary Responsibility)
			databases to identify and support life checks for the elderly, people with disabilities, and others on life-sustaining medical equipment (ESF#9
On-Scene Security and Protection	<ul style="list-style-type: none"> • Access points may require enforcement mechanisms to ensure authorized personnel and resources can proceed through • Intra-state coordination may be required to ensure neighboring states avoid restricting entry by closing access points, thus restricting the flow of resources, response/recovery personnel and evacuees • Jails and detention centers may require relocation • Civil disturbance (rioting, looting, etc.) may require additional law enforcement resources. 	<ul style="list-style-type: none"> • Fuel for security vehicles • Backup communications systems to maintain operational coordination • Resources to transport prisoners to new locations • Law enforcement resources to respond to civil disturbances. 	<ul style="list-style-type: none"> • Liaise with local, state, tribal, territorial, and insular area authorities to ensure a safe environment for infrastructure restoration (ESF #13) • Identify fuel needs for equipment and transportation to support operations (ESF #7) • Coordinate with local, state, tribal, territorial, and federal government agencies responsible for jails, detention centers and prisons to ensure that any necessary prisoner relocation efforts are conducted (ESF #13) • Coordinate with local, state, tribal, territorial, and insular area authorities to ensure sufficient law enforcement resources are available to respond to civil disturbances.
Operational Communications	<ul style="list-style-type: none"> • Consideration of key communications resources to support continuity of government at all levels, effective command and control of response and recovery capabilities, and public messaging in a degraded communications environment 	<ul style="list-style-type: none"> • Fuel for government fixed and mobile communications capabilities • Coordination of fuel, access, and security for private sector capabilities critical to lifesaving and life-sustaining operations and to public alerts and warnings 	<ul style="list-style-type: none"> • Provide timely legal counsel to federal decision-makers for use of federal communications resources in support of private sector entities (ESF #2) • Facilitate transition from government-provided temporary restoration to commercial long-term restoration (ESF #2)
Public Health, Healthcare, and Emergency Medical Services	<ul style="list-style-type: none"> • Hospitals depend on daily shipments of goods and fuel • Hospitals depend on the availability of potable water and sanitary wastewater treatment • Diversion plans for hospitals will not work; other nearby hospitals will also be impacted • Hospitals and healthcare facilities may require patient evacuation to centers with electricity; this could be hours away depending on the breadth of the outage 	<ul style="list-style-type: none"> • Alternate fuel sources or contingency plans to account for limited generator supply • A patient movement cell to coordinate the evacuation of patients 	<ul style="list-style-type: none"> • Coordinate patient movement, if required (ESF #8) • Coordinate on alternate fuel sources (ESF #7, ESF #8) • Implement strategies to assess and monitor the public health, disease surveillance, and injury prevention (ESF #8)

Core Capability	POIA-Specific Critical Considerations	POIA-Specific Resource Requirements	POIA-Specific Critical Actions (ESF with Primary Responsibility)
	<ul style="list-style-type: none"> • Response times for emergency medical services will increase • Individuals who have power-dependent durable medical equipment or implantable devices who live in the impacted community require assistance with power restoration or evacuation • Accessibility of medications for people with behavior or other mental health needs should be planned for, including provisions for access to compound pharmacies and/or 		
Situational Assessment	<ul style="list-style-type: none"> • It may be difficult to obtain situational awareness until power is restored and communications are up and running 	<ul style="list-style-type: none"> • Status of restoration efforts to include number of customers without power; percentage restored, restoration estimates 	<ul style="list-style-type: none"> • Coordinate with DOE, which will provide the status of restoration and energy sector impacts (ESF #5) • Coordinate with DHS/NCC, which will provide status of restoration and communications sector impacts (ESF #2)
Economic Recovery	<ul style="list-style-type: none"> • Consideration to prioritize key resources to access bank assets (e.g., cash, monetary notes) and/or transportation and security assets to move currency into or near the impacted area • Appropriate authorities and financial resources are identified and communicated to state/local officials 	<ul style="list-style-type: none"> • Clear instructions/ guidance from the Federal Government regarding financial resources available • Situational awareness on affected populations to determine potential economic impacts and assistance needed 	<ul style="list-style-type: none"> • Develop a multi-dimensional strategy capable of supporting economic recovery and enhancing whole community resiliency in absence of power

Core Capability	POIA-Specific Critical Considerations	POIA-Specific Resource Requirements	POIA-Specific Critical Actions (ESF with Primary Responsibility)
<p>Health and Social Services</p>	<ul style="list-style-type: none"> • Consideration to prioritize services for relocated households, to include access to transportation, schools, postal services, fire/police, grocery stores, and educational services for relocated students • Consideration to prioritize health care infrastructure in a timely manner • Due to lack of access, it may be difficult getting inspectors in to the affected areas • Health care providers may not be able to get to their places of work 	<ul style="list-style-type: none"> • Critical dependence on water purification and wastewater treatment • Greater amounts of specifically trained personnel • Tracking clients and/or affected populations needing assistance 	<ul style="list-style-type: none"> • None identified
<p>Housing</p>	<ul style="list-style-type: none"> • Identify and provide timely, appropriate and accessible temporary housing assistance that can support the volume of disaster survivors and their needs following a long-term outage • Housing demand for responders (both public and private) may exceed capacity of impacted area • Consider funding mechanisms are in place for housing costs for the “host” states in receiving evacuees • Large multi-family properties may be habitable if elevators and emergency lighting were operational; this might reduce the impact to mass care and emergency assistance facilities, particularly for housing for the elderly 	<ul style="list-style-type: none"> • Visibility of available accessible housing options • Difficulty obtaining alternate housing in the affected areas if power is not available 	<ul style="list-style-type: none"> • Implement the Housing Annex

Core Capability	POIA-Specific Critical Considerations	POIA-Specific Resource Requirements	POIA-Specific Critical Actions (ESF with Primary Responsibility)
Recovery Core Capabilities			
Housing	<ul style="list-style-type: none"> Identify and provide timely, appropriate and accessible temporary housing assistance that can support the volume of disaster survivors and their needs following a long-term outage Housing demand for responders (both public and private) may exceed capacity of impacted area Consider funding mechanisms are in place for housing costs for the “host” states in receiving evacuees Large multi-family properties may be habitable if elevators and emergency lighting were operational; this might reduce the impact to mass care and emergency assistance facilities, particularly for housing for the elderly 	<ul style="list-style-type: none"> Visibility of available accessible housing options Difficulty obtaining alternate housing in the affected areas if power is not available 	<ul style="list-style-type: none"> Implement the Housing Annex

Executive Decisions

Throughout a long-term power outage, key strategic and operational decisions will be required. This may include decisions about prioritizing resources and implementing waivers, among other issues.

The following table identifies some of the key decisions, identified by Core Capabilities, that either the senior-level policy coordination committee or the NRCC may require. This does not include all of the decisions identified by core capability or CI sector that may be made at an agency level.

Table 4: Executive Decisions

Decision	Essential Elements of Information	Core Capability with Primary Responsibility
Application of the Power Outage Incident Annex: Upon notification from DOE that the power outage is likely to continue for an extended period of time, the FEMA Administrator, in collaboration with the Secretary of DOE, may decide to implement the constructs in this annex.	<ul style="list-style-type: none"> The battle-rhythm of the policy coordination committee and when it requires decision support A need to coordinate response and recovery actions beyond traditional coordination mechanisms What functions/issues require policy decisions that need to be elevated 	Planning
Stafford Act support to private sector entities. Under the Stafford Act, the Federal Government	<ul style="list-style-type: none"> A governor’s request for support for life-saving or life-sustaining missions 	Planning

POWER OUTAGE INCIDENT ANNEX

Decision	Essential Elements of Information	Core Capability with Primary Responsibility
<p>does not provide support to investor-owned, for-profit utilities. In rare instances and on a case-by-case basis, the Federal Government may provide certain support for an exceptionally limited period to for-profit utilities for lifesaving or life-sustaining missions. The Federal Government may consider regulatory relief for private institutions and should synchronize its operations to enable, support, and otherwise not contradict private sector restoration operations.</p>	<ul style="list-style-type: none"> • Clarification of the duration and level of support required, needed to receive FEMA General Counsel and Administrator approval 	
<p>Core Capability Prioritization: Resources to support restoration efforts are likely to be quite limited. Decisions will need to be made in order to prioritize federal operations to support the most optimal restoration of the 16 CI sectors based upon interdependencies and cascading impacts.</p>	<ul style="list-style-type: none"> • Analyses of interdependencies and risk assessments • Infrastructure of Concern List • Status of restoration provided by DOE • Status of private sector businesses provided by the NBEOC, SSAs, ISACs, ESFs, and DHS NPPD IP. 	<p>Planning</p>
<p>Resource Prioritization: Resources to support all of the people impacted by the power outage will be limited. Therefore, decisions will need to occur concerning how to employ those resources in areas to achieve the most positive impact for the largest number of people. The course of action in Concept of Operations will be reviewed and refined by leadership to prioritize resources based on the specifics of the incident.</p>	<ul style="list-style-type: none"> • Areas in which power will be restored within two weeks • Understanding of the core capabilities required to restore power in those areas (e.g., debris removal, port openings, public security, and other public assistance) • Areas with the projected shortest duration of power outage • Whether states have decided to encourage or enforce evacuations • Areas with the densest populations and survivors that cannot self-evacuate • Similar resource requirements across jurisdictions 	<p>Planning</p>
<p>Suspension of highway regulations to allow rapid delivery of restoration capabilities: To expedite the delivery of critical resources, either for restoration or to support survivors, certain regulations governing emergency transportation may need to be waived by applicable federal authorities. Other regulations governing emergency transportation may need to be waived by applicable state and local authorities.</p>	<ul style="list-style-type: none"> • Whether delays exist in transporting critical resources in a timely manner • Whether responders are encountering challenges in the existing framework for transportation permitting • The quantifiable benefits of waiving highway regulations (e.g., can increase response time by X hours) • Impacts to other sectors or ongoing activities 	<p>Critical Transportation</p>

Decision	Essential Elements of Information	Core Capability with Primary Responsibility
	<ul style="list-style-type: none"> • 	
<p>Evacuation: Local, state, and federal officials will evaluate whether or not an evacuation is necessary depending on the scope of the incident, status of the grid and CI sector restoration efforts and immediate health and safety concerns. Local, state, tribal, territorial, or insular area governments may require federal support for coordination of evacuations (e.g., general population; patient). Immediate support for emergency backup power or restoration prioritization may depend on evacuation decisions</p>	<ul style="list-style-type: none"> • Areas in which power will be restored within two weeks • Which, if any, states have decided to encourage or enforce evacuations • Trigger points for evacuation for each state • Areas with the densest populations and survivors who need assistance evacuating • What states are available to accept evacuees • Available transportation resources • Which states have implemented contraflow traffic operations to facilitate evacuation • Availability and locations to implement refueling of evacuation vehicles • Number of patients requiring evacuation and medical transport assets 	<p>Critical Transportation</p> <p>Mass Care Services</p> <p>Public Health, Healthcare, and Emergency Medical Services</p>

Appendix 2: Critical Infrastructure Sector Interdependencies

The NIPP denotes 16 CI sectors, and the reliance of virtually all industries on electric power and fuels means that all sectors have some dependence on the energy sector. It is critical to understand the impacts of a long-term power outage on the other 15 sectors to wisely influence national policy and prioritize critical resource allocation.

Energy sector interdependencies are highly complex and exist at different levels, so a “system of systems” approach is required to address linkages within and among the following:

- Facilities and assets
- Networks (physical, cyber)
- End-to-end systems
- Communities, regions, and states
- States and multi-state groups
- Connections across national borders or global


These linkages may be physical, cyber, or virtual and can cause cascading and escalating failures (or in the case of co-located infrastructure assets, can result in common cause failures).

Disruptions within a single infrastructure can generate disturbances within other infrastructures and over long distances, and the array of interconnections can extend or amplify the effects of that disruption, resulting in impacts to the whole community.

Lifeline Functions

The NIPP identifies certain lifeline functions that are essential to the operation of most CI sectors. The term “lifeline functions” generally refers to a sector that provides indispensable services that enable the continuous operation of critical business and government functions, and that would risk human health and safety or national and economic security if compromised or not promptly restored. These lifeline functions include communications, energy, transportation, and water. These sectors provide the most essential services that underlie a regional economy. Figure 12 describes basic interdependencies between the lifeline functions.

Figure 12: Lifeline Functions^{26/ 27}

(Sub)sector Generating the Service	(Sub)sector Receiving the Service				
	ONG	Electricity	Transportation	Water	Communication
ONG 		Fuel to operate power plant motors and generators	Fuel to operate transport vehicles	Fuel to operate pumps and treatment	Fuel to maintain temperatures for equipment; fuel for backup power
Electricity 	Electricity for extraction and transport (pumps, generators)		Power for overhead transit lines	Electric power to operate pumps and treatment	Energy to run cell towers and other transmission equipment
Transportation 	Delivery of supplies and workers	Delivery of supplies and workers		Delivery of supplies and workers	Delivery of supplies and workers
Water 	Production water	Cooling and production water	Water for vehicular operation; cleaning		Water for equipment and cleaning
Communication 	Breakage and leak detection and remote control of operations	Detection and maintenance of operations and electric transmission	Identification and location of disabled vehicles, rails and roads; the provision of user service information	Detection and control of water supply and quality	

C! Sector Impacts

Table 5 is a snapshot of the impacts to the other 15 CI Sectors that a long-term loss of power has on its mission, the critical information requirements, and potential decisions and coordination points. The information in this table will assist in identifying initial impacts to the other CI sectors that may result in additional actions during the response. This data will be validated as part of the crisis action planning for the particular long-term power outage.

²⁶ Graphic is from the 2015 Energy Sector Specific Plan.

²⁷ Interdependency between nuclear and electricity on base power for nuclear generation.

Table 5: Sector Impacts, Critical Information Requirements, and Decision Points in a Power Outage

Sector/SSA	Sector Overview	Impacts on Sector During a Power Outage	Critical Information Requirements	Potential Decision Points and ESF/RSF Coordination Points
Lifeline Sectors				
Communications SSA: <ul style="list-style-type: none"> DHS CS&C NCCIC 	<ul style="list-style-type: none"> Communication networks (wireline, wireless, cable, satellite, broadcast) Communications facilities Cyber infrastructure 	<ul style="list-style-type: none"> System operators may not be able to maintain telephone, cellular, email or dedicated broadband networks for communications Ability to monitor, generate, and control the delivery of electricity may be affected 	<ul style="list-style-type: none"> Backup communications systems in the impacted area Ability to route communications through other areas/regions Communications priorities/needs for Mass Care and Emergency Assistance, evacuations and re-entry Fuel distribution plans 	<ul style="list-style-type: none"> Federal communications resource priorities to support continuity of government, federal command and control, and public alerts and warning (ESF #2) Highway regulation suspensions to allow rapid delivery of commercial communication restoration capabilities (ESF #1) Fuel distribution priorities (ESF #12) Security for critical facilities (ES F#13) Access to sites and impact areas (ESF #13) Surface transportation regulatory relief to allow rapid delivery of commercial communication restoration capabilities (ESF #1) Power industry restoration plans and priorities (ESF #12)
Transportation Systems SSAs: <ul style="list-style-type: none"> DHS (TSA office of Security Policy and Industry Engagement and USCG Office of Port and Facility Compliance) DOT (Office of the Secretary S-60 Office of Intelligence, Security and Emergency Response) 	<ul style="list-style-type: none"> Aviation Highway and motor carrier Maritime transportation system Mass transit and passenger rail Pipeline systems Freight rail Postal and shipping 	<ul style="list-style-type: none"> Limited or no power for overhead transit lines Limited or no power for railroads switching and signals Limited or no ability to move/pump fuel at gas stations Limited generator capacity of public transit/ SCADA, traffic signal control, tracking and routing (supply chain functioning) 	<ul style="list-style-type: none"> Transportation infrastructure status Community support needs and transport requirements Available transportation resources Determined staging areas for relief operations 	<ul style="list-style-type: none"> Need for evacuation transport, if required (ESF #1, ESF #5) Fuel delivery priorities (ESF #7)

Sector/SSA	Sector Overview	Impacts on Sector During a Power Outage	Critical Information Requirements	Potential Decision Points and ESF/RSF Coordination Points
		<ul style="list-style-type: none"> • Loss of ticketing and check-in at airports and ticketing vending machines for public transit • Loss of badge detectors for secure identification display areas or other controlled access areas • Loss of closed caption television, low-light television, motion detectors, and other electronic surveillance tools • Loss of communications such as security alert functions and public address systems • Loss of lighting in tunnels and underground stations • Loss of fire/life/safety systems and alarms 		
<p>Water and Wastewater</p> <p>SSA:</p> <ul style="list-style-type: none"> • EPA Water Security Division 	<ul style="list-style-type: none"> • 153,000 public drinking water systems • More than 16,000 publicly owned wastewater treatment systems 	<ul style="list-style-type: none"> • Drinking water utilities may have limited backup power and may have to reduce operations, with potential impacts on water pressure and quality; some drinking water utilities may cease operations • Wastewater utilities may have limited backup power and may have to reduce operations, leading to discharges of partially treated or untreated sewage; some wastewater utilities may cease operations 	<ul style="list-style-type: none"> • Drinking water and wastewater utilities' supply of emergency generators, fuel, and treatment chemicals 	<ul style="list-style-type: none"> • Prioritizing generators, fuel, and chemicals to sustain drinking water and wastewater services at impacted utilities (ESF #3, ESF #10)
Other CI Sectors				
<p>Chemical</p> <p>SSA:</p>	<ul style="list-style-type: none"> • Basic chemicals • Specialty chemicals 	<ul style="list-style-type: none"> • Directly affect all chemical facilities 	<ul style="list-style-type: none"> • Status of chemical facilities in impacted region 	<ul style="list-style-type: none"> • Decisions on the chemical sector's resource sharing

Sector/SSA	Sector Overview	Impacts on Sector During a Power Outage	Critical Information Requirements	Potential Decision Points and ESF/RSF Coordination Points
<ul style="list-style-type: none"> DHS NPPD IP 	<ul style="list-style-type: none"> Agricultural chemicals Pharmaceuticals Consumer products 	<ul style="list-style-type: none"> located in the impacted region Limited or no ability to extract coal or perforate gas and oil wells 	<ul style="list-style-type: none"> Cascading effects on other chemical facilities that are dependent on goods or materials provided by the affected facilities 	<ul style="list-style-type: none"> methodology (ESF #5; Infrastructure Systems RSF)
<p>Commercial Facilities</p> <p>SSA:</p> <ul style="list-style-type: none"> DHSNPPD IP 	<ul style="list-style-type: none"> Entertainment and media Gaming Lodging Outdoor events Public assembly Real estate Retail Sports leagues 	<ul style="list-style-type: none"> Impact to facilities in a region Ability to house responders if hotels are not available Ability to provide goods and services 	<ul style="list-style-type: none"> Status of commercial facilities in impacted region Which facilities have backup generators and how long they will last 	<ul style="list-style-type: none"> Trigger point for reallocation of national critical resources (ESF #5) Prioritizing energy restoration to commercial facilities (ESF #5, ESF #12) Coordinating status of backup communications, and public alerts and warning (ESF #2)
<p>Critical Manufacturing</p> <p>SSA:</p> <ul style="list-style-type: none"> DHS NPPD IP 	<ul style="list-style-type: none"> Primary metals manufacturing Machinery manufacturing Electrical equipment, appliance, and component manufacturing Transportation equipment manufacturing 	<ul style="list-style-type: none"> Ability to manufacture power generators and other equipment for energy restoration 	<ul style="list-style-type: none"> Which manufacturers have backup generators What manufacturing facilities have been impacted in the incident area 	<ul style="list-style-type: none"> Local, state, and/or federal governments require assets to be manufactured/ provided to assist in the energy restoration process (ESF #7)
<p>Dams</p> <p>SSA:</p> <ul style="list-style-type: none"> DHS NPPD IP 	<ul style="list-style-type: none"> Water storage and irrigation Sediment and flood control Electricity generation “Black start” capabilities Peaking power 	<ul style="list-style-type: none"> Disruptions to hydroelectric operations could create serious supply deficits and hinder the movement of key commodities if navigation locks do not work Impacted locks are crucial to shipping coal or fuel and no alternative transportation modes are available to transport needed commodities 	<ul style="list-style-type: none"> Status of dams/locks in impacted region Which facilities have backup generators and how long they will provide power Which facilities have “black start” capabilities Whether impacted locks affect the shipment of coal or fuel needed to produce electricity or fuel generators 	<ul style="list-style-type: none"> Facilities need to initiate “black start” capabilities (ESF #3, ESF #12)
<p>Defense Industrial Base (DIB)</p> <p>SSA:</p>	<ul style="list-style-type: none"> Weapon system platforms Military components Military expendables 	<ul style="list-style-type: none"> Ability to produce goods and services required for weapon systems 	<ul style="list-style-type: none"> Expected restoration timelines for affected DIB facilities 	<ul style="list-style-type: none"> Whether DOD will change expectations of DIB deliverables given a long-term disruption (ESF #5, ESF #7)

Sector/SSA	Sector Overview	Impacts on Sector During a Power Outage	Critical Information Requirements	Potential Decision Points and ESF/RSF Coordination Points
<ul style="list-style-type: none"> • DOD Office of the Secretary of Defense, Policy 				
<p>Emergency Services</p> <p>SSA:</p> <ul style="list-style-type: none"> • DHS NPPD IP 	<ul style="list-style-type: none"> • Law enforcement • Fire and rescue services • Emergency management • Emergency medical services • Public works 	<ul style="list-style-type: none"> • Ability to maintain critical emergency services sector operations during disasters • Ability to fuel its service vehicle fleet • Maintain redundant emergency communications 	<ul style="list-style-type: none"> • Emergency managers controlling access to damaged/impacted areas will require personally identifiable information and/or equipment information from utility workers to give them access to begin restoration activities 	<ul style="list-style-type: none"> • Knowledge of restoration timing estimates to maintain response capabilities (ESF #12) • Emergency communications and infrastructure restoration to maintain response capabilities (ESF #2)
<p>Financial Services</p> <p>SSA:</p> <ul style="list-style-type: none"> • TREAS Office of Critical Infrastructure Protection and Compliance Policy 	<ul style="list-style-type: none"> • Deposit, consumer credit, and payment systems products • Credit and liquidity products • Investment products • Risk transfer products 	<ul style="list-style-type: none"> • All major exchanges can be serviced by backup power however, the duration of all backup power generation is limited by availability of fuel and other factors; Moreover, this is inconsequential if all trading institutions are similarly affected, as most institutions would not conduct business • Inability of major exchanges and financial functions to rely on robust communication networks • Offline ATM networks would result in a critical cash shortage, with individuals unable to access checking and savings accounts through normal means • As card transactions become more prevalent for everyday purchases, the impact of an outage impacting point of sale payments systems would be significant 	<ul style="list-style-type: none"> • Status of major equities exchanges and fixed income markets • Access to financial institutions' contingency plans to understand how they would mitigate the effects in an impacted region 	<ul style="list-style-type: none"> • Access to support backup capabilities (such as fuel for generators) (ESF #3, ESF #7) • Rationing available resources across other critical sectors communities (ESF #5, Economic Recovery RSF)

Sector/SSA	Sector Overview	Impacts on Sector During a Power Outage	Critical Information Requirements	Potential Decision Points and ESF/RSF Coordination Points
<p>Food and Agriculture</p> <p>SSAs:</p> <ul style="list-style-type: none"> • USDA Office of Homeland Security and Emergency Coordination • Food and Drug Administration, Center for Food Safety and Applied Nutrition, Office of Analytics and Outreach 	<ul style="list-style-type: none"> • Food supply • Processing, packaging, and production • Agricultural and food product processing, storage, transportation and distribution • Agricultural and food supporting facilities • Regulatory, oversight, and industry organizations • Other agriculture and food 	<ul style="list-style-type: none"> • Ability to provide and store food • Ability to ensure safety of food products • Health and well-being of livestock and crops 	<ul style="list-style-type: none"> • Which facilities have been impacted and resultant disruptions or loss of capacity • Amount of time until operations can resume following restoration of power • Amount of time until operations can resume following restoration of interdependent sector(s) services (e.g., water, transportation, communication) • Cascading effects in the supply and distribution chain 	<ul style="list-style-type: none"> • Authorize the Disaster Supplemental Nutrition Assistance Program (ESF #11)
<p>Government Facilities</p> <p>SSAs:</p> <ul style="list-style-type: none"> • DHS (Federal Protective Service) • General Services Administration Office of Mission Assurance Security and Special Programs 	<ul style="list-style-type: none"> • Buildings owned by governments • National monuments and icons • Educational facilities (kindergarten through college) • Public facilities • Offices and office building complexes • Housing for government employees • Correctional facilities • Embassies, consulates, and border facilities • Courthouses • Maintenance and repair shops • Libraries and archives • Non-public facilities • Research and development facilities • Military installations • Records centers • Space exploration facilities 	<ul style="list-style-type: none"> • Ability to operate government facilities • Ability to operate educational facilities, labs, and research facilities • Security of federal facilities • Disruption of critical information technology (IT) systems 	<ul style="list-style-type: none"> • Cascading effects on government facilities that support national and primary mission essential functions • Status of backup communications systems in the impacted area • Status and duration of backup generators in government CI facilities • Expected restoration timelines for affected facilities • Identification of threat actors, intrusion methods, and network vulnerabilities for a manmade incident 	<ul style="list-style-type: none"> • Prioritizing federal resources to support continuity of government and continuity of operations, federal command and control, and public alerts and warning (ESF #5) • Prioritizing the interruption and restoration of government services such as issuance of entitlement benefits • Coordinating on status of backup communications, and public alerts and warning (ESF #2)

Sector/SSA	Sector Overview	Impacts on Sector During a Power Outage	Critical Information Requirements	Potential Decision Points and ESF/RSF Coordination Points
	<ul style="list-style-type: none"> Storage facilities for weapons and ammunition, precious metals, currency, and special nuclear materials and waste Warehouses to store property and equipment 			
<p>Healthcare and Public Health</p> <p>SSA:</p> <ul style="list-style-type: none"> HHS ASPR 	<ul style="list-style-type: none"> Direct patient care Healthcare information technology Health plans and payers Mass fatality management services Medical materials Laboratories, blood, and pharmaceuticals 	<ul style="list-style-type: none"> Acute care hospitals with emergency service provision have generator power for only a few days 	<p>Hospitals in Affected Area:</p> <ul style="list-style-type: none"> Patient counts and bed availability Generator and fuel status to keep facilities running Which departments are offline or hampered Status of blood supply Status of medications and medical supply Staff availability and/or relocation Status of health clinics in affected areas Which hospitals are open for what services Emergency communications and infrastructure restoration to maintain response capabilities (ESF #2) <p>Access and Functional Needs Accommodations:</p> <ul style="list-style-type: none"> Whether at-risk populations with medical, behavioral health and social service needs are fulfilled Whether jails and prisons are capable of providing necessary medical care Status of Emergency Medical Services in the area, 	<ul style="list-style-type: none"> Whether to initiate mass patient movement plans (ESF #8) Coordinating fuel and generator support for healthcare facilities (ESF #7)

Sector/SSA	Sector Overview	Impacts on Sector During a Power Outage	Critical Information Requirements	Potential Decision Points and ESF/RSF Coordination Points
			including response and transport times of patients <ul style="list-style-type: none"> • Fuel status • Response and transport times of patients • Availability of mental health resources • Drug and alcohol dependent related arrests and disturbances • Morgue availability 	
Information Technology SSA: <ul style="list-style-type: none"> • DHS CS&C 	<ul style="list-style-type: none"> • IT products and services • Incident management capabilities • Domain name resolution services • Identity management and associated trust support services • Internet-based content, information, and communications services • Internet routing, access, and connection services 	<ul style="list-style-type: none"> • Major power outage through sophisticated cyber-attack could result in possible breakdown of a single interoperable internet, and resulting failure of governance policy 	<ul style="list-style-type: none"> • Identifying threat actors, intrusion methods, and network vulnerabilities are critical to mitigation and long-term defensive strategies 	<ul style="list-style-type: none"> • Changes to cybersecurity resiliency protocols (ESF #2)
Reactors, Materials, and Waste SSA: <ul style="list-style-type: none"> • DHS • NPPD IP 	<ul style="list-style-type: none"> • Commercial nuclear power plants • Non-power reactors used for research, training, and radioisotope production • Fuel-cycle facilities • Nuclear and radioactive materials used in medical, industrial, and academic settings 	<ul style="list-style-type: none"> • Directly affect offsite power to all nuclear plants located in the impacted region 	<ul style="list-style-type: none"> • Status of nuclear power plants in the impacted area • Status of the grid, to ascertain if nuclear power plants can continue to generate power or go into a controlled shutdown 	<ul style="list-style-type: none"> • NRC regulations trigger controlled shutdown using onsite power (ESF #5, ESF #12)

DHS NPPD Infrastructure of Concern List

DHS NPPD produces an IOC List during incidents that serves as a decision support tool to inform resource allocation and prioritization decisions. The IOC List prioritizes the physical infrastructure facilities that are most likely to be impacted by a power outage or its cascading effects. Disruption of IOC could result in loss of life or degrade the essential government, public health, safety, or economic functions of the impacted area, region, or the Nation.

Incident-specific analyses of the threat to, vulnerabilities of, and potential consequences from the disruption of CI in the impacted area are the basis of the IOC List. Infrastructure assets on the IOC List are selected based on their criticality, the potential impacts the infrastructure may have on the restoration and recovery activities in the area, and the consequence of disruption. Each asset on the IOC is assigned a priority level based on the overall impacts to its operations based on the power outage.

- **Priority 1** (High Consequence of Loss) – Includes infrastructure which may have regional or national impacts or is critical for immediate response operations.
- **Priority 2** (Moderate to High Consequence of Loss) – Includes infrastructure where the consequence of loss may cascade beyond just the local/regional area. This infrastructure may support incident response operations.
- **Priority 3** (Low to Moderate Consequence of Loss) – Includes infrastructure with a low to moderate consequence, but which is provided for situational awareness for response activities.

Infrastructure analysts update the IOC List as required to reflect evolving changes based on restoration and response activities.

C1 Sector Coordination and Information Management

Certain information is required to help facilitate decision support and operations for a long-term power outage. Information may be required from federal partners, states, electric companies, or other partners. General categories of CIR are noted the Critical Information Requirements section; however, supplemental information will likely be required depending on the specifics of the incident. This information will be used to inform the key executive decisions.

The categories for the RFI process may include but are not limited to—

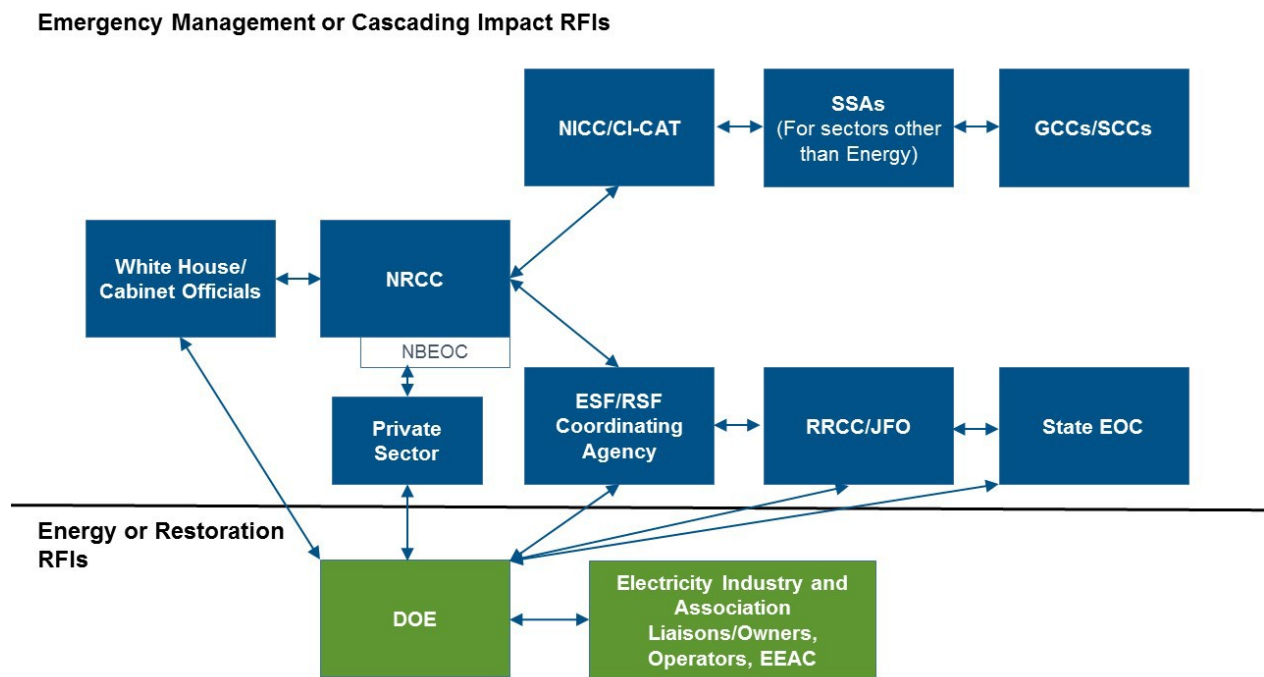
- Incident impacts on CI sector (cascading effects);
- Sector priorities and federal support requirements (e.g. route clearance, public safety/security, regulatory relief);
- National security issues;
- Requirements to synchronize sector and federal response/recovery concept of operations (e.g. responder housing, deployment phasing); and

- Restoration operations status.

The NRCC, as the national center through which federal response and recovery activities are coordinated, supports the incident response informational needs of the CI sectors and initiates RFIs based on needs of senior decision makers at the White House or cabinet members with authority for aspects of the response.

For information specific to an ongoing request for federal assistance, the NRCC distributes the RFI to the appropriate ESF or RSF. This will involve the appropriate ESF Coordinator within the NRCC coordinating with ESF representatives in the various JFO/RRCCs. The NRCC will also coordinate with the NICC for sector-specific information other than energy. Figure 13 illustrates a high-level overview of the process flow for RFIs.

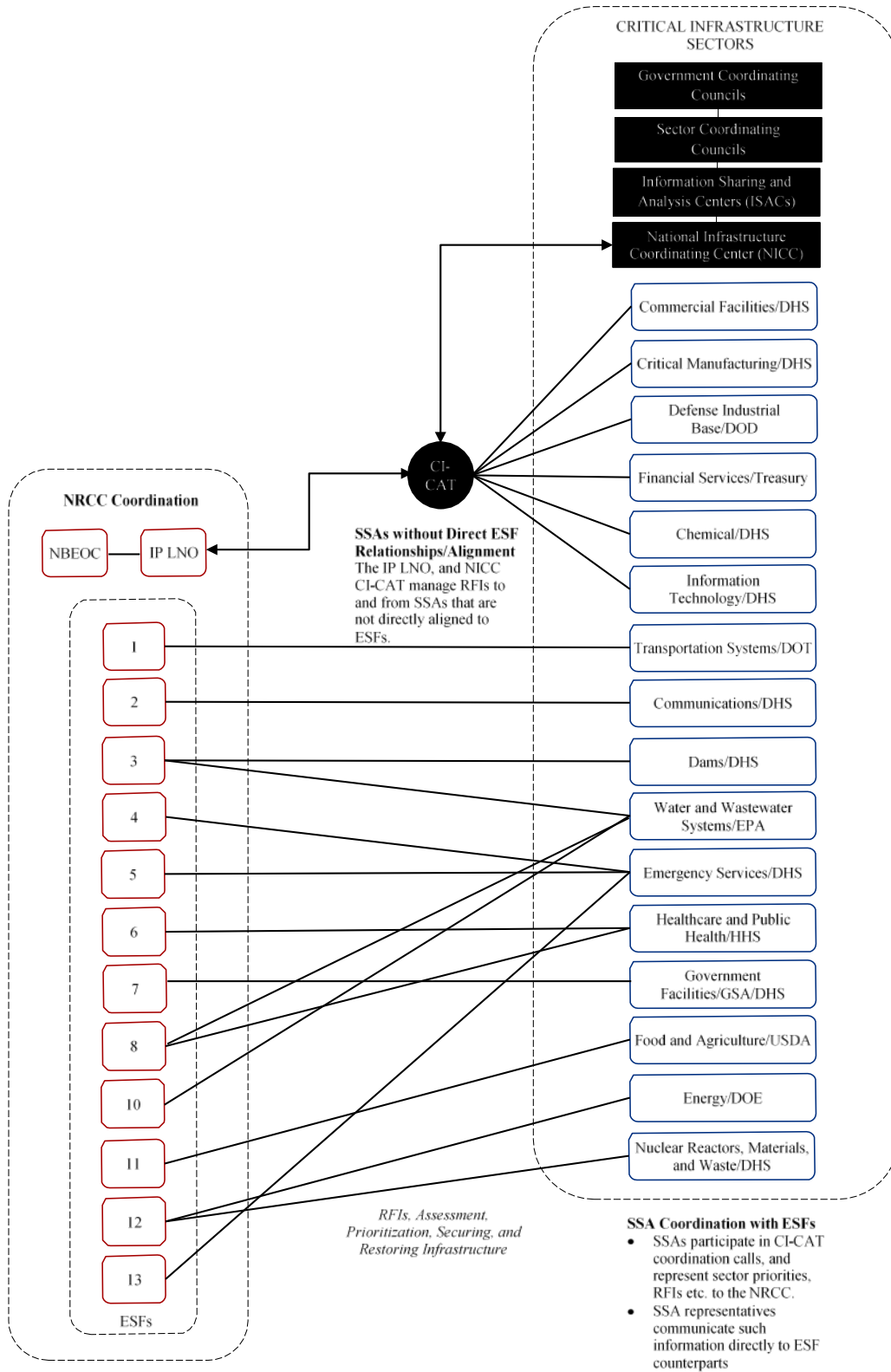
Figure 13: RFI Basic Process Flow for Power Outages



Many of the ESFs have a direct relationship with certain SSAs. Coordination between ESFs/RSFs and SSAs of the CI sectors ensures that the information provided is accurate. RFIs are generated and received by both ESFs and SSAs, and the flow of information shown in Figure 13 is bi-directional.

In cases where RFIs originate with industry partners, those are usually managed first by the SSA, which coordinates with its ESF counterpart. NBEOC and sector coordination calls that are conducted during incident response activities coordinate and align RFI requirements and status among the private sector. For RFIs pertaining to the impacts and status of CI sectors that are not directly aligned to an ESF, the NRCC coordinates with the NICC to obtain information from the appropriate SSA. The SSAs coordinate with their sector-specific partners to obtain the information. Figure 14 provides a relationship diagram between the ESFs and SSAs.

Figure 14: CI Sector and ESF Relationship



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Attachment 1 to Appendix 2: Critical Infrastructure Sector Partners

The community involved in managing risks and restoration of CI is composed of partnerships among owners and operators; local, state, tribal, territorial, insular area, and federal governments; regional entities; not-for-profit organizations; and academia. Sector and cross-sector partnership council structures are the key mechanisms for managing CI security and resiliency.

GCCs consist of representatives across various levels of government, as appropriate to the operating landscape of each individual sector. The councils enable interagency, intergovernmental, and cross-jurisdictional coordination within and across sectors, and they partner with SCCs on public-private efforts.

SCCs are self-organized and self-governed councils whose members are CI owners and operators and their representatives. SCCs serve as principal collaboration points between the government and private sector CI owners and operators for sector-specific planning and collaboration.²⁸

Table 6 identifies the various government and private sector partners who are key to the resiliency of the 16 CI Sectors.

Table 6: CI Sector Partnerships²⁹

Sector	GCC Membership	SCC Membership
Chemical	<ul style="list-style-type: none"> • DOC • DHS • U.S. Department of Justice (DOJ) • DOT • EPA 	<ul style="list-style-type: none"> • Agricultural Retailers Association • American Chemistry Council • American Coatings Association • American Fuel and Petrochemical Manufacturers • American Petroleum Institute • BASF Corporation • Chlorine Institute, The • Compressed Gas Association • Council of Producers & Distributors of Agrotechnology • CropLife America • Dow Chemical Company • Fertilizer Institute, The • Institute of Makers of Explosives • International Institute of Ammonia Refrigeration • International Liquid Terminals Association • Louisiana Chemical Association • LSB Chemical LLC • National Association of Chemical Distributor • Praxair, Inc. • Society of Chemical Manufacturers & Affiliates
Commercial Facilities	<ul style="list-style-type: none"> • DHS • DOJ 	<ul style="list-style-type: none"> • American Hotel and Lodging Association • Analytic Risk Solutions, LLC

²⁸ NIPP 2013, pg 12.

²⁹ Information was obtained from the DHS Critical Infrastructure Partnership Advisory Council Charters and Membership webpage (<https://www.dhs.gov/cipac-charters-and-membership>), dated December 29, 2016. Refer to the website for the most up-to-date membership rosters.

Sector	GCC Membership	SCC Membership
	<ul style="list-style-type: none"> • GSA • HHS • USDA 	<ul style="list-style-type: none"> • Beacon Capital Partners • Boyd Gaming Corporation • Contemporary Services Corporation • Fort Hall Casino • International Association of Amusement Parks & Attractions • Mall of America • Marriott International • National Football League • National Retail Federation • Peppermill Resort Spa Casino • Real Estate Information Sharing and Analysis Center (ISAC) • Retail Industry Leaders Association • Sea World • Simon Property Group • Stadium Managers Association • Target • Tishman Speyer Properties • U.S. Tennis Association • Viacom
<p>Communications</p>	<ul style="list-style-type: none"> • DHS • DOC • DOD • DOE • DOI • DOJ • Federal Communications Commission (FCC) • Federal Reserve Board (FRB) • GSA • National Association of State Chief Information Officers • National Institute of Standards and Technology (NIST) • NRC • United States Postal Service (USPS) 	<ul style="list-style-type: none"> • 3U Technologies • Alcatel-Lucent • Alliance for Telecommunications Industry Solutions • AT&T • Century Link • Cincinnati Bell • Cisco Systems, Inc. • Clearwire • Computer Sciences Corporation • Computing Technology Industry Association • Consolidated Communications • Cox Communication • Fairpoint Communications, Inc. • Frontier • Harris Corporation • Hubbard Radio • Hughes Network Systems • Independent Telephone and Telecommunications Alliance • Internet Security Alliance • Intrado • Iridium • Juniper Networks • Level 3 Communications • Motorola • National Association of Broadcasters • National Cable & Telecommunications Association • National Telephone Cooperative Associations • NeuStar • Research in Motion • Satellite Industry Association • Sprint • Telcordia • Telecommunications Industry Association • Telephone and Data Systems, Inc.

Sector	GCC Membership	SCC Membership
		<ul style="list-style-type: none"> • Time Warner Cable • U.S. Internet Services Provider Association • U.S. Telecom Association • Verizon • Windstream
Critical Manufacturing	<ul style="list-style-type: none"> • DHS • DOC • DOD • DOE • DOI • DOJ • DOS • DOT • SBA 	<ul style="list-style-type: none"> • Aerojet, a GenCorp Inc. • Alexion Pharmaceuticals, Inc. • ArcelorMittal USA • Armstrong Marine Inc. • Boeing Company, The • Bridgestone Americas, Inc. • Briggs & Stratton • Carpenter Technology Corporation • Caterpillar, Inc. • Chrysler Group, LLC • Cisco Systems, Inc. • Cliffs Natural Resources, Inc. • Crane Aerospace & Electronics • Deere & Company • Delbia Do Company • Delphi Corporation • Ellanef Manufacturing • Emerson Electric, Co. • Fairchild SemiConductor • FarSounder, Inc. • Ford Motor Company • General Electric Company • General Motors Company • Goodyear Tire & Rubber Company • GrayGlass • Hercules Heat Treating Corporation • Intel Corporation • ITT Corporation • Johnson Controls, Inc. • Kohler Company • Lee Spring, Co. • Michelin North America • Mi-Jack Systems & Technologies • Mini Circuits • Navistar International Corporation • Nichols Brothers Boat Builders • Novelis, Inc. • Oregon Iron Works • Oshkosh Corporation • PACCAR, Inc. • Pelco by Schneider Electric • Penske Corporation • Raytheon Company • Remy International, Inc. • Rock Ventures, LLC • Rosco Vision Systems • S&L Aerospace Metals, LLC • Schweitzer Engineering Laboratories, Inc.

Sector	GCC Membership	SCC Membership
		<ul style="list-style-type: none"> • Smith & Wesson Holding Company • Steeler, Inc. • Summit Appliances, Inc. • TE Connectivity, Ltd. • ThyssenKrupp Stainless USA, LLC • United States Steel Corporation • United Technologies Corporation • Whirlpool Corporation • Zero International
Dams	<ul style="list-style-type: none"> • DHS • DOD • DOI • DOJ • DOL • DOS • FERC • Lower Colorado River Authority • State of Arkansas • State of California • State of Florida • State of New Hampshire • State of New Jersey • State of North Carolina • State of Pennsylvania • TVA • USDA 	<ul style="list-style-type: none"> • Ameren Services Company • American Electric Power • Association of State Dam Safety Officials • Association of State Flood Plain Managers • Avista Utilities • Brookfield Renewable Energy • CMS Energy • Colorado River Energy Distribution Association • Dominion Resources • Duke Energy Corporation • Dynegy, Inc. • Exelon • Grant County Public Utility District, Washington • National Association of Flood & Stormwater Management Agencies • National Hydropower Association • National Water Resources Association • New York Power Authority • Northwestern Energy • Ontario Power Generation • Pacific Gas & Electric Company • Salt River Project Agricultural Improvement and Power District • SCANA Corporation • Seattle City Light • Southern California Edison • Southern Company • State of South Carolina, Public Service Authority • U.S. Society of Dams • Xcel Energy Corporation
Defense Industrial Base	<ul style="list-style-type: none"> • DOC • DOD • DOE • DHS • DOJ • DOS • TREAS 	<ul style="list-style-type: none"> • Aerojet Rocketdyne • Aerospace Industries Association • Alliant Techsystems • American Society of Industrial Security (ASIS) International • American System • BAE Systems • Ball Aerospace & Technologies Corporation • Boeing Company, The • Booz Allen Hamilton • Computer Sciences Corporation • DRS Technologies, Inc. • Espy Corporation, The • General Atomics Aeronautical Systems Inc. • General Dynamics

Sector	GCC Membership	SCC Membership
		<ul style="list-style-type: none"> • General Electric Company • Honeywell International • HP White Laboratory, Inc. • Huntington Ingalls Industries • InCadence Strategic Solutions • L-3 Communications • Leidos • Lockheed Martin Corporation • MetiSpace Technology • National Classification Management Society • National Defense Industrial Association • Northrop Grumman Corporation • Orbital Science Corporation • Oshkosh Defense Corporation • Pratt & Whitney • Raytheon Company • Rockwell Collins • Rolls-Royce North America • Science Applications International Corporation • TASC, Inc.
Emergency Services	<ul style="list-style-type: none"> • DHS • DOD • DOI • DOJ • DOT • HHS • Interagency Board • USDA 	<ul style="list-style-type: none"> • American Ambulance Association • American Public Works Association • Central Station Alarm Association • Electronic Security Association • Emergency Preparedness Resource Group • International Association of Chiefs of Police (IACP) • International Association of Emergency Managers • International Association of Fire Chiefs • International Public Safety Association • National Association of Security Companies • National Association of State Emergency Medical Services Officials • National Emergency Management Association • National Fire Protection Association • National Fusion Center Association • National Native American Law Enforcement Association • National Sheriffs' Association (NSA) • Securitas Security Services • Security Industry Association
Energy	<ul style="list-style-type: none"> • BPA • DHS • DOD • DOE • DOI • DOJ • DOS • DOT • EPA • FERC • HHS • National Association of Regulatory Utility Commissioners (NARUC) 	<p>Electricity Subsector:</p> <ul style="list-style-type: none"> • American Electric Power • APPA • Arkansas Electric Cooperative • Avangrid • Canadian Electricity Association • Center for Strategic and International Studies • City Utilities of Springfield • Consolidated Edison • Dominion • Duke Energy • EEI • Edison International • Electric Power Supply Association

Sector	GCC Membership	SCC Membership
	<ul style="list-style-type: none"> • National Association of State Energy Officials • Natural Resources Canada • Public Safety Canada • SEPA • SWPA • TREAS • TVA • USDA • WAPA 	<ul style="list-style-type: none"> • ENMAX Corporation • Exelon Corporation • Georgia System Operations Corporation • Great River Energy • Hawaiian Electric Industries, Inc. • Lincoln Electric System • MidAmerican Energy Co. • NERC • Norwich Public Utilities • NRECA • Nuclear Energy Institute • Old Dominion Electric Cooperative • PG&E Corporation • PJM • PPL Corporation • Santee Cooper • Southern Company • Xcel Energy <p>Oil and Natural Gas Subsector:</p> <ul style="list-style-type: none"> • American Exploration & Production Council • American Fuel & Petrochemical Manufacturers • American Gas Association • American Petroleum Institute • American Public Gas Association • Association of Oil Pipe Lines • Canadian Association of Petroleum Producers • Canadian Energy Pipeline Association • Energy Security Council • Gas Processors Association • Independent Petroleum Association of America • International Association of Drilling Contractors • International Liquid Terminals Association • Interstate Natural Gas Association of America • National Association of Convenience Stores • National Ocean Industries Association • National Propane Gas Association • Offshore Marine Service Association • Offshore Operators Committee • Society of Independent Gas Marketers Association • Texas Oil & Gas Association • U.S. Oil & Gas Association
<p>Financial Services</p>	<ul style="list-style-type: none"> • American Council of State Savings Supervisors • Board of Governors of the Federal Reserve System • Conference of State Bank Supervisors • Consumer Financial Protection Bureau • DHS • DOD 	<ul style="list-style-type: none"> • Aetna • AIG • American Bankers Association • American Council of Life Insurers • American Express • American Insurance Association • American Society for Industrial Security International • Bank Administration Institute • Bank of America • Bank of New York Mellon Corporation, The • BATS Exchange

Sector	GCC Membership	SCC Membership
	<ul style="list-style-type: none"> • Farm Credit Administration • Federal Deposit Insurance Corporation • Federal Housing Finance Agency • FRB • FRB of Chicago • FRB of New York • National Association of Insurance Commissioners • National Association of State Credit Union Supervisors • National Credit Union Administration • North American Securities Administration Association • Securities Investor Protection Corporation • TREAS • United States Commodity Futures Trading Commission • United States Securities and Exchange Commission (SEC) 	<ul style="list-style-type: none"> • BB&T • BCG Partners • BITS • Capital One • Charles Schwab Bank • ChicagoFIRST • Citigroup • Clearing House, The • CLS Group • Comerica • CME Group • Consumer Bankers Association • Convergex • Credit Union National Association • Depository Trust & Clearing Corporation, The • Equifax • Fannie Mae • Fidelity Investments • Financial Information Forum • Financial Services ISAC • First Data • FIS • Freddie Mac • Futures Industry Association • GE Capital Retail Bank • Goldman Sachs • Independent Community Bankers of America • Institute of International Bankers • Intercontinental Exchange, NYSE • International Securities Exchange • Investment Company Institute • John Hancock/Manulife • JP Morgan Chase • LCH Clearnet • Managed Funds Association • MasterCard • Money Market Institute • Morgan Stanley • NACHA - The Electronic Payments Association • NASDAQ Stock Market, Inc • National Armored Car Association • National Association of Federal Credit Unions • National Futures Association • National Stock Exchange • Navient • Navy Federal Credit Union • Northern Trust • Omgeo • Options Clearing Corporation • PNC • Property Casualty Insurers Association of America • RBS • Securities Industry Financial Markets Association

Sector	GCC Membership	SCC Membership
		<ul style="list-style-type: none"> • State Farm • State Street Corporation • Sun Trust • Synchrony Financial • U.S. Bank • Visa U-S-A Inc. • Wells Fargo
<p style="text-align: center;">Food and Agriculture</p>	<ul style="list-style-type: none"> • Alaska Government • American Association of Veterinary Laboratory Diagnosticians • Association of Food and Drug Officials • Association of State and Territorial Health Officials • Clemson University, South Carolina Department of Plant Industry • Commonwealth of Virginia, Department of Agriculture • DHS • DOC • DOD • DOE • DOI • DOJ • DOS • EPA • HHS • Iowa Department of Inspection and Appeals • Multistate Partnership for Security in Agriculture • National Assembly of State Animal Health Officials • National Association of County and City Health Officials (NACCHO) • National Association of State Departments of Agriculture • National Center for Foreign Animal and Zoonotic Disease Defense • National Environmental Health Association • Navajo Nation, The • Sandia National Laboratories • Southern Agriculture & Animal Disaster Response Alliance 	<ul style="list-style-type: none"> • Ahold USA, Inc. • American Bakers Association • American Feed Industry Association • American Frozen Food Institute • American Meat Institute • American Veterinary Medical Association • Archer Daniels Midland Corporation • Association of Food Industries • Cargill • Coca-Cola Company, The • ConAgra Foods, Inc. • Consumer Specialty Products Association • CropLife America • Dairy Institute of California • Dean Foods Company • Deloitte & Touche LLP • Food Marketing Institute • General Mills • Giant Food, LLC • Grocery Manufacturers Association • Ingredion, Inc. • International Bottled Water Association • International Dairy Foods Association • International Food Service Distributors Association • Juice Products Association • Kellogg Company • Kraft Foods Global, Inc. • Kroger Company, The • Land O' Lakes, Inc. • Marriott International • McCormick & Company, Inc. • National Association of Manufacturers • National Cattlemen's Beef Association • National Chicken Council • National Corn Growers Association • National Fisheries Institute • National Grain and Feed Association • National Grocers Association • National Milk Producers Federation • National Oilseed Processors Association • National Pork Board • National Pork Producers Association • National Renderers Association • National Restaurant Association • North American Millers' Association • PepsiCo, Inc.

Sector	GCC Membership	SCC Membership
	<ul style="list-style-type: none"> • State of California, Department of Food and Agriculture • State of Florida, Department of Agriculture and Consumer Services • State of Kansas, Department of Agriculture • State of Michigan, Department of Agriculture • State of Minnesota, Department of Agriculture • State of New Mexico, Department of Agriculture • State of Oklahoma, Department of Public Health • State of Texas, Animal Health Commission • State of Texas, Department of Agriculture • State of West Virginia, Department of Agriculture • University of Kentucky, College of Agriculture, Cooperative Extension Service • University of Minnesota, Food Protection and Defense Institute • USDA 	<ul style="list-style-type: none"> • Publix Super Markets, Inc. • SES, Inc. • Starbucks Coffee Company • Sugar Association, The • Super Store Industries • Texas Cattle Feeder's Association • United Fresh Produce Association • USA Rice Federation
Government Facilities	<ul style="list-style-type: none"> • Administrative Office of the United States Courts • Architect of the Capitol • City of Fort Worth, Texas • Department of Veterans Affairs • DHS • DOD • DOE • DOI • DOJ • DOL • DOS • DOT • EPA • FCC • Federal Trade Commission • FRB • GAO • GSA • HHS • U.S. Department of Housing and Urban Development 	<ul style="list-style-type: none"> • N/A

Sector	GCC Membership	SCC Membership
	<ul style="list-style-type: none"> • National Aeronautics and Space Administration • National Archives and Records Administration • National Capital Planning Commission • National Counterterrorism Center (NCTC) • NIST • NRC • Office of the Director of National Intelligence (ODNI) • Office of Personnel Management (OPM) • SEC • Smithsonian Institute • Social Security Administration • State of Maryland • State of Massachusetts • State of Michigan • State of Texas • TREAS • United States Capitol Police • United States Commodity Futures Trading Commission • United States Department of Education (DoED) • United States Trade Representative • USDA • USPS 	
<p>Healthcare and Public Health</p>	<ul style="list-style-type: none"> • American Association of Poison Control Centers • American Public Gas Association • Association of Public Health Laboratories • Association of State and Territorial Health Officials • Centers for Disease Control and Prevention • Commonwealth of Virginia, Department of General Services • Commonwealth of Virginia, Department of Veterans Affairs and Homeland Security 	<ul style="list-style-type: none"> • Abbott Laboratories • Advanced Medical Technology Association • Adventist Health System • Aetna, Inc. • Alexian Brothers Health System • Alexion Pharmaceuticals, Inc. • American Academy of Nurse Practitioners • American Academy of Pediatrics • American Academy of Physicians Assistants • American Association of Blood Banks • American Association of Colleges of Pharmacy • American Association of Tissue Banks • American College of Emergency Physicians • American College of Occupational and Environmental Medicine • American Health Care Association • American Hospital Association • American Medical Depot

Sector	GCC Membership	SCC Membership
	<ul style="list-style-type: none"> • County of Hennepin (Minnesota), Public Health • County of Nassau (New York), Department of Health • Department of Veterans Affairs • DHS • DOD • DOE • DOI • DOJ • DOS • DOT • HHS • NACCHO • National Indian Health Board • Sandia National Laboratories • Southern Nevada, Health District • State of Connecticut, Department of Public Health • State of Maryland, Department of Health • State of Michigan, Department of Health • State of New Jersey, Office of Homeland Security and Preparedness • State of Oregon, Office of Emergency Management • State of Texas, Department of Health Services • USDA 	<ul style="list-style-type: none"> • American Nurses Association • American Osteopathic Association • American Red Cross • America's Health Insurance Plans • Amgen, Inc. • Antelope Valley Healthcare District • Archdiocese of Washington • Association of Healthcare Resource & Materials Management Professionals • Association of State Floodplain Managers • Atlantic Health Systems • Baxter Healthcare, Inc. • Baylor Health Care System • Biotechnology Industry Organization • Blue Cross and Blue Shield Association • Blue Shield California • Brooklawn Memorial Park/Johnson Memorial Medical Center • Business Continuity Consulting • Caliber Security Partners • Cardinal Health • Carolinas Regional Healthcare System • Casket and Funeral Supply Association of America • Catholic Cemetery Conference • Chicago Veterinary Medical Association • Children's Medical Center of Dallas • Cisco Systems, Inc. • Compass Rose LLC • Condition Zebra • Cook Children's Northeast Hospital • Corporate Safety, Security, and Building Services • Dartmouth Hitchcock Medical Center • DaVita Healthcare Partners • Dayton Fire Department (Ohio) • Divergent Group, LLC • Dodge Company • Emergent BioSolutions • Excela Health System • Flattery Touch Healthcare Consulting • Gamxing, Inc. • Generic Pharmaceutical Association • George Washington University Medical Center • Global Institute for Cybersecurity and Research • Greater New York Hospital Association • Group Health Cooperative • Health Industry Distributors Association • Health Promotion Consultants • Healthcare Distribution Management Association • Healthcare Information and Management Systems Society • Healthcare Quality Management AETNA • Healthcare Ready • Henry Ford Health System • Henry Schein • Highmark Health Services

Sector	GCC Membership	SCC Membership
		<ul style="list-style-type: none"> • HITRUST • Hofstra North Shore-LIJ School of Medicine • Horan & McConaty Funeral Services • Horizon Blue Cross Blue Shield of New Jersey • Hospital Association of Southern California • Hospital Corporation of America • HSS Inc. • Humana • Infragard EMP SIG • Inova Health System • Institute for CI Technology • International Association for Healthcare Security and Safety • International Cemetery, Cremation and Funeral Association • IP Services • James B. Haggin Memorial Hospital • Johns Hopkins University • Joint Commission, The • Kaiser Permanente • Kaleida Health • Kidney Community Emergency Response Coalition • Knowledge Center Enterprises, LLC • Laboratory Corporation • LaFayette General Medical Center • Mary Washington Healthcare • Matthews Cremation • Mayo Clinic • McAfee • Medco Health Solutions, Inc. • Medline Industries, Inc • Medtronic • Medxcel • Memorial Sloan Kettering Cancer Center • Merck & Co., Inc. • Monmouth Ocean Hospital Service Corporation • Mount Sinai & Schwab Rehabilitation Hospitals • Nashville Supply Chain Services • National Association of Chain Drug Stores • National Association of Psychiatric Health Systems • National Funeral Directors Association • National Funeral Directors & Morticians Association • National Health Information Sharing and Analysis Center • Nemours Foundation, The • Nevada Hospital Association • New Jersey Hospital Association • Nova Southeastern University • Orlando Health • Palmetto Health Tuomey • Pfizer • Purdue Pharma Technologies • Reclamere, Inc. • Roswell Park Cancer Institute • Saint Louis University Hospital • Samaritan Health Services

Sector	GCC Membership	SCC Membership
		<ul style="list-style-type: none"> • Sempermed USA, Inc. • Siemens Healthcare USA • SMA Technology Group • Southern California Orthopedic Institute • Spectrum Healthcare Resources • St. Luke's Health System • Stanford Health Care/Stanford Children's Health • Stanley Funeral Homes • Strategic Marketplace Initiative • Tauri Group • Technology Partners, Inc. • Tenet Healthcare Corporation • Texas A&M Health Science Center • Texas A&M University • Texas Biomedical Research Institute • Tronex International Incorporated • UAB Health Systems • United Healthcare • UnitedHealth Group • University of California Los Angeles Medical Center Occupational Health Facility • University of Medicine and Dentistry, New Jersey • University of South Alabama • University of Texas, MD Anderson Cancer Center • University of Texas Medical Branch at Galveston • University of Washington Medicine • Valley Health System • Van Scoyoc Associates • Verizon • Virginia Commonwealth University Health System • Virginia Hospital and Healthcare Association • Walgreens • Washington Occupational Health Associates, Inc. • WellPoint, Inc. • Zenith American Solutions
Information Technology	<ul style="list-style-type: none"> • DHS • DOC • DOD • DOE • DOI • DOJ • DOS • GSA • Office of Management and Budget 	<ul style="list-style-type: none"> • ACT-The App Association • Adobe Systems • Advanced Micro Devices (AMD) • Afilias USA, Inc. • Araxid • Arbor Networks • Aveshka • Bell Canada • Biofarma • Bivio Networks • Blackberry • Business Software Alliance • CA Technologies • Center for Internet Security • Certichron, Inc. • Cisco Systems, Inc. • Coalfire Systems, Inc. • Computer and Communications Industry Association

Sector	GCC Membership	SCC Membership
		<ul style="list-style-type: none"> • Computer Sciences Corporation • Computing Technology Industry Association • Core Security Technologies • Cyber Pack Ventures, Inc. • Dell Inc. • Deloitte & Touche LLP • Dunrath Capital • Dynetics, Inc. • eBay, Inc. • Echelon One • e-Management • EMC Corporation • Entrust, Inc. • Equifax, Inc. • EWA Information & Infrastructure Technologies, Inc. • Exelis, Inc. • FireEye, Inc. • Google • Green Hills Software • Hatha Systems • Hewlett Packard • IBM Corporation • Information Technology Industry Council • Information Technology - Information Sharing & Analysis Center • Intel Corporation • Internet Security Alliance • (ISC)2 • ITT Corporation • iWire365, Inc. • Juniper Networks • KPMG LLP • Kwictech Interactive Inc. • L-3 Communications • Lancope, Inc. • LGS Innovations • Litmus Logic, LLC • Lockheed Martin • Lumeta Corporation • Lunarline, Inc • Microsoft Corporation • Motorola • Netstar-1 Government Consulting, Inc. • NeuStar • Northrop Grumman • NTT Communications Corporation • One Enterprise Consulting Group, LLC • Palo Alto Networks • Pragmatics • Rackspace, Inc. • Raytheon Company • Reclamere • Renesys Corporation

Sector	GCC Membership	SCC Membership
		<ul style="list-style-type: none"> • SAFE-BioPharma Association • SafeNet Gemalto, Inc. • SAIC • Seagate Technology • SecureState, LLC • Sentar, Inc. • Serco, Inc. • SI Organization, The • Siemens Healthcare, USA • Sony • Symantec Corporation • System 1, Inc. • TASC, Inc. • Team Cymru • TechAmerica • Telecommunications Industry Association • TeleContinuity, Inc. • Terremark Worldwide, Inc. • TestPros, Inc. • Themis Computer • Triumfant • Tyco International • U.S. Internet Service Provider Association • Unisys Corporation • Vanguard Defense Industries • Vencore • VeriSign Authentication Services • Verizon • Vostrom • Xerox
<p style="text-align: center;">Nuclear Reactors, Materials, and Waste Sector</p>	<ul style="list-style-type: none"> • Conference of Radiation Control Program Directors • DHS • DOD • DOE • DOJ • DOS • DOT • EPA • HHS • NRC • Organization of Agreement States 	<ul style="list-style-type: none"> • Dominion Generation • Exelon Generation Company, LLC • Harvard University / Boston Children's Hospital • Mallinckrodt Pharmaceuticals • Nuclear Energy Institute • Oregon State University • Reed College • Rutgers University • Security Engineering Associates • University of Missouri
<p style="text-align: center;">Transportation Systems</p>	<ul style="list-style-type: none"> • American Association of State Highway and Transportation Officials • DHS • DOC • DOD • DOE • DoED • DOJ 	<p>Aviation Mode Subsector:</p> <ul style="list-style-type: none"> • Aerospace Industries Association • Aircraft Owners and Pilots Association • Airlines for America • Airports Consultants Council • Airports Council International-North America • American Association of Airport Executives • Boeing Company, The • Cargo Airline Association

Sector	GCC Membership	SCC Membership
	<ul style="list-style-type: none"> • DOS • DOT • GSA • HHS • IACP • National Association of State Directors of Pupil Transportation • NRC • NSA • National Transportation Safety Board (NTSB) • State of Florida, Department of Energy • USDA <p>Aviation Mode Subsector:</p> <ul style="list-style-type: none"> • DHS • DOC • DOD • DOJ • DOS • DOT • NCTC • NTSB • ODNI • USPS <p>Freight Rail Mode Subsector:</p> <ul style="list-style-type: none"> • DHS • DOD • DOT <p>Highway and Motor Carrier Mode Subsector:</p> <ul style="list-style-type: none"> • American Association of State Highway and Transportation Officials • DHS • DOC • DOD • DOE • DoED • DOJ • DOT • GSA • HHS • IACP • National Association of State Directors of Pupil Transportation • NRC • NSA 	<ul style="list-style-type: none"> • National Air Carrier Association • National Air Transportation Association • National Business Aviation Association, Inc. • Regional Airline Association <p>Freight Rail Mode Subsector:</p> <ul style="list-style-type: none"> • Alaska Railroad Corporation • American Short Line and Regional Railroad Association • Amtrak • Anacostia and Pacific Company, Inc. • Association of American Railroads • Burlington Northern Santa Fe Railway • Canadian National Railway Company • Canadian Pacific Railway • Capital Metro Transit • Conrail • CSX Transportation • Florida East Coast Railway • Genesee & Wyoming, Inc. • Indiana Harbor Belt Railroad • Iowa Interstate Railroad Ltd. • Kansas City Southern Railway Company • Massachusetts Bay Transportation Authority • Metra – Metropolitan Rail • Metropolitan Transportation Authority (New York) • New Jersey Transit • Norfolk Southern • Pan Am Railway • Union Pacific Railroad Company • Veolia Transportation • Virginia Railway Express • Wheeling & Lake Erie Railway <p>Highway and Motor Carrier Mode Subsector:</p> <ul style="list-style-type: none"> • American Bus Association • American Chemistry Council • American Logistics Aid Network • American Petroleum Institute • American Trucking Association • BusBank, The • CAT Eyes • Con-Way, Inc. • Detroit-Windsor Truck Ferry • First Student, Inc. • Greyhound • Inoventures, LLC • Institute of Makers of Explosives • Intermodal Association of North America • Kenan Advantage Group • Mid-States Express, Inc. • National Association of Pupil Transportation • National Association of Small Trucking Companies • National Association of State Directors of Pupil Transportation Services

Sector	GCC Membership	SCC Membership
	<ul style="list-style-type: none"> • State of Florida, Department of Energy • USDA <p>Maritime Mode Subsector:</p> <ul style="list-style-type: none"> • DHS • DOC • DOD • DOE • DOJ • DOT <p>Mass Transit and Passenger Rail Mode Subsector:</p> <ul style="list-style-type: none"> • DHS • DOD • DOJ <p>Pipeline Mode Subsector:</p> <ul style="list-style-type: none"> • DHS • DOD • DOE • DOJ • DOT <p>Postal and Shipping Mode Subsector:</p> <ul style="list-style-type: none"> • DHS • DOD • DOT • HHS • USPS 	<ul style="list-style-type: none"> • National School Transportation Association • National Tank Truck Carriers, Inc. • Owner-Operator Independent Drivers Association • PITT Ohio Express • Schneider National • Seaton & Husk, LP • Sentinel Transportation • SLT Express • Taxicab, Limousine and Paratransit Association • Transportation Research Board • Tri-State Motor Transit Company • Truck Rental and Leasing Association • United Motorcoach Association <p>Maritime Mode Subsector:</p> <ul style="list-style-type: none"> • N/A <p>Mass Transit and Passenger Rail Mode Subsector :</p> <ul style="list-style-type: none"> • American Public Transportation Association • Amtrak • Bay Area Rapid Transit • Chicago Police Department • Chicago Transit Authority • Dallas Area Rapid Transit / Trinity Railway Express • Denver Regional Transportation District • Greater Cleveland Regional Transit Authority, The • King County Department of Transportation • Los Angeles County Metropolitan Transportation Authority • Los Angeles Sheriff's Department • Maryland Transit Administration • Massachusetts Bay Transportation Authority • Metropolitan Atlanta Rapid Transit Authority • Metropolitan Transit Authority of Harris County • Metropolitan Transportation Authority, New York • Minneapolis Metro Transit • New Jersey Transit • New York Police Department • Northeast Illinois Commuter Railroad Corporation (Metra) • Portland Police Department, Oregon • Southeastern Pennsylvania Transportation Authority • Utah Transit Authority • Washington Metropolitan Area Transit Authority <p>Pipeline Mode Subsector:</p> <ul style="list-style-type: none"> • American Fuel and Petrochemical Manufacturers • American Gas Association • American Petroleum Institute • Association of Oil Pipe Lines • Canadian Energy Pipeline Association • Interstate National Gas Association of America • National Fuel <p>Postal and Shipping Mode Subsector:</p>

Sector	GCC Membership	SCC Membership
		<ul style="list-style-type: none"> • DHL International • FedEx Corporation • United Parcel Service of America
<p>Water and Wastewater</p>	<ul style="list-style-type: none"> • Association of State Drinking Water Administrators • DHS • DOD • DOI • DOJ • DOS • Environmental Council of the States • EPA • HHS • Montana Department of Environmental Quality • NACCHO • NARUC • State of New Hampshire, Department of Environmental Services • USDA 	<ul style="list-style-type: none"> • Alexandria Renew Enterprises • American Water • American Water Works Association • Association of Metropolitan Water Agencies • Boston Water and Sewer Commission • Breezy Hill Water and Sewer Company • Conway County Regional W.D.D. • Davidson Water, Inc. • District of Columbia Water and Sewer Authority • National Association of Clean Water Agencies • National Association of Water Companies • National Rural Water Association • New York City Department of Environmental Protection • Onondaga County Water Authority • Orlando Utilities Commission • Prince William County Service Authority • San Jose Water Company • Spartanburg Water • Trinity River Authority of Texas • Water Environment Federation • Water Environment Research Foundation • Water Information Sharing and Analysis Center • Water Research Foundation

Appendix 3: Communications

This appendix describes how emergency communications systems and protocols will support public messaging in a long-duration power outage. While some unique messaging systems/processes for a power outage are described below as a part of the information sharing methods, the majority of actions are consistent with Response and Recovery FIOPs, ESF #2 – Communications and ESF #15 – External Affairs annexes to the NRF.

Situation

Since communications systems rely on electricity, any incident that causes long-term power outages will create a challenging environment for telecommunications and public messaging. Situational awareness will be difficult to obtain and information may change frequently before an incident stabilizes. This will complicate efforts to deploy and employ resources effectively. Local impacts will vary widely based on direct and cascading impacts to CI, the level and quality of local preparedness efforts, and the availability and capabilities of local, state, tribal, territorial, and insular area resources.

Impacts that result from a long-duration power outage will vary depending on the incident. An incident that results in physical damage to electric power infrastructure (e.g., catastrophic earthquake) will also likely damage or destroy telecommunications infrastructure and require extended federal communications support. Incidents that may not result in physical damage to communications infrastructure (e.g., some space weather) may require non-traditional response and recovery strategies that mitigate telecommunications systems degradation and public messaging when an outage lasts for a significant period.

Additionally, resources that would otherwise be available through mutual aid agreements, the Emergency Management Assistance Compact, and private-sector contracts (e.g., fuel, food, and water) may not be available due to widespread impact and finite capacity. This could adversely affect communications restoration efforts and extend the need for federal support. In the event of a major communication outage resulting from power loss, the applicable state emergency communications annexes to the regional emergency communications plans developed by the FEMA Disaster Emergency Communications Division will be used to outline state capabilities, state restoration priorities, and pre-identified communications risk and interdependencies.

Finally, the loss of power will affect every other CI sector, and all of them rely on communications for response and restoration operations. Therefore, the operational communications community will actively engage non-traditional stakeholders throughout every phase of response and recovery, as well as develop and coordinate continuity of operations plans to avoid prolonging or producing more extensive, deeper, and longer term losses post-disaster.

Concept of Support

Federal operational communications objectives are consistent with the operational communications critical tasks from the Response FIOP:

- Ensure the capacity to communicate with both the emergency response community and the affected populations and establish interoperable voice and data communications between local, state, tribal, territorial, insular area, and federal first responders.
- Reestablish sufficient communications infrastructure within the affected areas to support ongoing life-sustaining activities, meet basic human needs, and transition to recovery.

Except where a pre-negotiated agreement exists, departments and agencies support their own personnel with organic communications assets to the greatest extent possible. National stockpiles of communications assets (e.g., radios, repeaters, smart devices) that might be available on smaller-scale disasters will likely not be available or will not be sufficient. Due to projected lack of sufficient stockpile tactical gear, prioritization should be given to recovering public networks, so that all escorts have a means of coordinating federal departments and agencies and should also be prepared to deploy knowledgeable communications personnel to support their organic equipment. Incident-area technical expertise may not be available, especially in the immediate response phase.

Federal resources will be prioritized to support continuity of government and continuity of operations at all levels—required to effectively coordinate response and recovery operations—and to provide command and control connectivity to federal response teams. Continuity of government and continuity of operations support may require that federal assets be employed at local or state government leadership offices (e.g., governor’s office) and EOCs when the capabilities of state or local entities are damaged, destroyed, or otherwise unusable to support this function. Federal teams engaged in incident management, lifesaving, and life-sustaining operations shall be connected into a command and control network(s) that enables such teams to communicate with higher, lower, and adjacent command elements.

Public Messaging

During a long-term power outage, public messaging informs all affected segments of society by providing credible messaging to expedite the delivery of emergency services and aid the public in taking protective actions.

A long-term power outage brings unique challenges for communications between government officials and the public, since traditional public information and warning mechanisms rely on electricity. Communication through television, radio, email, and social media may not be possible for the majority of the public if no electricity is available to power the apparatuses used to transmit and receive this information.

In an incident that does not result in significant infrastructure damage, some methods of communications will work immediately following an incident and then degrade over time. In these cases, it is estimated that following a power loss, there will be a four- to eight-hour window in which dissemination of information through the Emergency Alert System and the Integrated Public Alert and Warning System (IPAWS) will be most effective. After that window, communication abilities are expected to degrade, due to loss of battery power on devices such as radios and mobile phone. A typical smart device may hold a battery charge for five to eight hours, though methods of recharging may be available (e.g., car battery, solar charger, and hand crank device). The rate of failure will depend heavily on local preparedness; cellular towers, for

example, may have backup batteries or a generator backup system that could maintain power for hours to a few days.

In an incident where infrastructure damage does occur, communications may be lost immediately due to downed lines and damaged equipment. However, as the extent of damage will not be immediately clear, all available means of accessible, linguistically appropriate, and timely communications with the public should be employed.³⁰ Operational communications personnel will have to work closely with External Affairs, Disability Integration Advisors; system owners; ESF #2 and ESF #15 departments and agencies; and local, state, tribal, territorial, and insular area emergency communications officers and public information officers to develop the best technical strategies to communicate with the public.

The National Public Warning System (NPWS), operated by IPAWS, provides a nationwide all-hazards warning capability for the President in the event of a national catastrophic disaster. The core of the NPWS is comprised of privately owned commercial and non-commercial radio broadcast stations that cooperatively participate with FEMA to provide a resilient information broadcasting capability. As denoted in Figure 15 and Table 7, 77 stations participate in the program. Known as FEMA Primary Entry Point (PEP) stations, they collectively provide coverage for approximately 90 percent of the Nation's population. FEMA installed power and other resiliency features at these PEP stations and sustains the capability to support the NPWS mission. Stations outside the NPWS (more than 20,000) will need to request any resources through their state emergency management channels for local broadcasting needs.

FEMA has worked with USACE to harden these stations against some threats, such as electromagnetic pulse, and equip them with backup transmitters, power generation, and fuel systems enabling broadcasting to continue for an extended period in the event of loss of a commercial power source. As fuel runs out, FEMA may also re-supply fuel to these stations to enable broadcast capabilities during a long-term power outage. State and local public safety officials can leverage the FEMA PEP station capabilities in coordination with FEMA and the owner and operators of the private sector facilities.

³⁰ Accessible communication means and methods for employees must be identified, planned for and practiced to not only ensure continuity for them but for the important programs and functions they manage.

Figure 15: Footprint of Radio Stations Supplied with Additional Fuel and Resiliency Resources

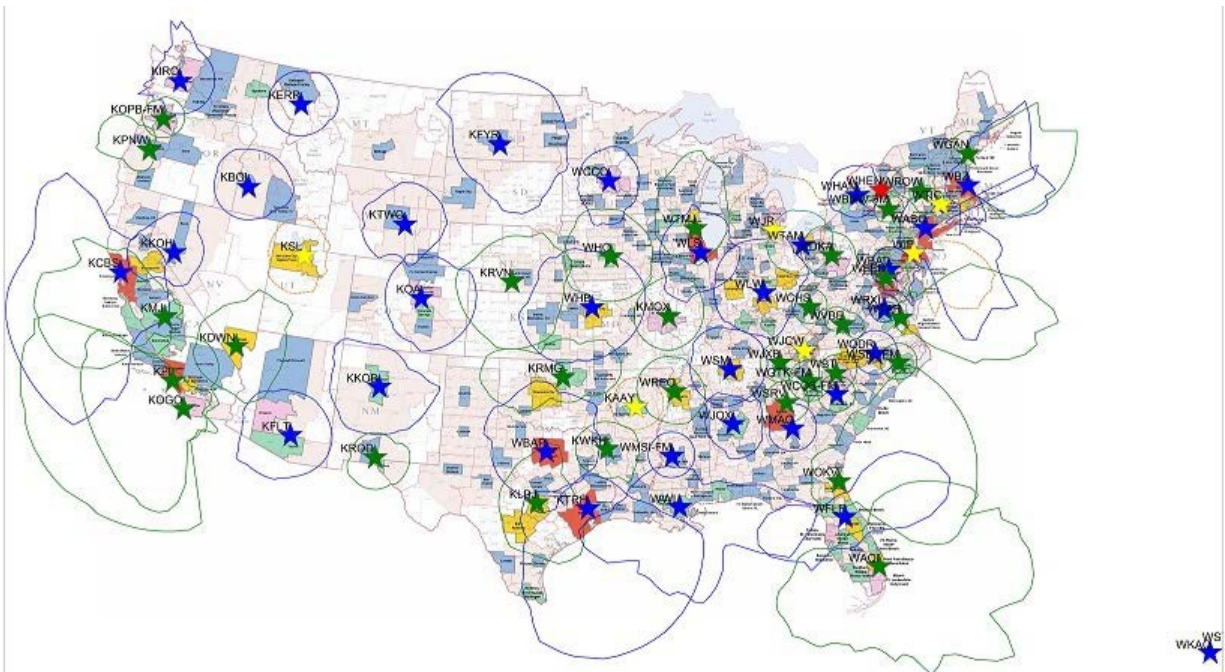


Table 7: Primary Entry Point Radio Stations by FEMA Regions

Station	City	State	FEMA Region
WTIC	Hartford	CT	I
WBZ	Boston	MA	I
WGAN	Portland	ME	I
WROW	Albany	NY	II
WBNW	Endicott	NY	II
WABC	New York	NY	II
WHAM	Rochester	NY	II
WHEN	Syracuse	NY	II
WKAQ	San Juan	PR	II
WSTA	Charlotte Amalie	VI	II
XM	Washington	DC	III
NPR	Washington	DC	III
WBAL	Baltimore	MD	III
WFED	Wheaton	MD	III
WTEL	Philadelphia	PA	III
KDKA	Pittsburgh	PA	III
WTAR	Norfolk	VA	III
WRXL	Richmond	VA	III
WVBE	Roanoke	VA	III
WCHS	Charleston	WV	III
WJOX	Birmingham	AL	IV
WOKV	Jacksonville	FL	IV
WAQI	Miami	FL	IV
WFLF	Pine Hills	FL	IV
WSRV	Gainesville	GA	IV
WMAC	Macon	GA	IV
WMSI	Jackson	MS	IV

Station	City	State	FEMA Region
WLW	Cincinnati	OH	V
WTAM	Cleveland	OH	V
WTMJ	Milwaukee	WI	V
KAAY	Little Rock	AR	VI
WWL	New Orleans	LA	VI
KWKH	Shreveport	LA	VI
KKOB	Albuquerque	NM	VI
KRMG	Tulsa	OK	VI
KLBJ	Austin	TX	VI
KROD	El Paso	TX	VI
WBAP	Fort Worth	TX	VI
KTRH	Houston	TX	VI
PREMIERE	San Antonio	TX	VI
WHO	Des Moines	IA	VII
WHB	Kansas City	MO	VII
KMOX	St Louis	MO	VII
KRVN	Lexington	NE	VII
KOA	Denver	CO	VIII
KERR	Polson	MT	VIII
KFYR	Bismarck	ND	VIII
KSL	Salt Lake City	UT	VIII
KTWO	Casper	WY	VIII
WVUV	Fagaitua	AS	IX
KFLT	Tucson	AZ	IX
KMJ	Fresno	CA	IX
KFI	Los Angeles	CA	IX
PREMIERE	Los Angeles	CA	IX

Station	City	State	FEMA Region
WBT	Charlotte	NC	IV
WSFL	New Bern	NC	IV
WQDR	Raleigh	NC	IV
WCOS	Columbia	SC	IV
WGTK	Greenville	SC	IV
WJCW	Johnson City	TN	IV
WJXB	Knoxville	TN	IV
WREC	Memphis	TN	IV
WSM	Nashville	TN	IV
WLS	Chicago	IL	V
WJR	Detroit	MI	V
WCCO	Minneapolis	MN	V

Station	City	State	FEMA Region
KOGO	San Diego	CA	IX
KCBS	San Francisco	CA	IX
KTWG	Agana	GU	IX
KDWN	Las Vegas	NV	IX
KKOH	Reno	NV	IX
KFQD	Anchorage	AK	X
HEOC	Honolulu	HI	X
KBOI	Boise	ID	X
KPNW	Eugene	OR	X
KOPB	Portland	OR	X
KIRO	Seattle	WA	X

Some legacy stations do not include EMP protection.
FEMA plans to modernize all stations with EMP protection by 2026.

Operational Coordination

Communications Working Group

A large-scale/long-duration power outage will likely exceed the capabilities of operational communications incident management and support as described in the Response FIOP. A Communications Working Group (CWG) may be established in the NRCC. The CWG will coordinate with resource support to help manage the national response and to recommend resource priorities. At a minimum, the CWG shall consist of representatives from the following:

- ESF #2 – Communications
- ESF #7 – Logistics
- ESF #15 – External Affairs
- FEMA Office of National Continuity Programs
- FEMA Office of the Chief Information Officer
- FEMA Office of Chief Counsel
- FEMA Disability Integration and Coordination Advisor
- American Red Cross
- American Radio Relay League
- Communications ISAC.

The membership of the CWG will be flexible and scalable to involve additional stakeholders as necessary. As such, relevant non-ISAC private sector companies may be asked to participate.

The CWG is responsible for:

- Collecting, analyzing, and disseminating communications situational awareness;

- Prioritizing limited resources based on national guidance;
- Identifying and addressing requirements that cannot be solved at a lower level; and
- Developing solutions to unique stakeholder problems as they arise.

National Joint Information Center

Due to the severity of this scenario and need for coordinated national messaging, a National Joint Information Center (JIC) will be established to provide unified, accessible messaging. The JIC serves as the federal incident communications coordination center and is staffed by incident communications response personnel that rapidly mobilize to coordinate the federal external communications effort. It leverages a variety of conference call mechanisms to coordinate across state, tribal, federal, and private sector entities, assuming telephone lines are operational. The Private Sector Incident Communications Conference Line (PICCL) is a standing line and distribution list, comprised of private sector, CI sector, and major national association corporate communicators. The PICCL, maintained by NPPD Office of External Affairs, is provided to component offices to ensure private sector communicators receive timely public information during an incident requiring a coordinated federal response. During a response in which FEMA stands up the NBEOC, NBEOC coordination calls may be initiated with private sector partners across various sectors.

An ESF #15 – External Affairs Operations Director may be delegated to lead the federal interagency team. On the other hand, since DOE is the SSA for the energy sector, DOE and DHS may co-lead the National JIC.

Appendix 4: Roles and Responsibilities

Given that the roles and responsibilities for restoring power, maintaining infrastructure operations, and delivering critical support resides across public, private, and community organizations, it is paramount to synchronize response and recovery concepts across public, private, and other non-governmental sector operations at the local, state, tribal, territorial, insular area, and federal levels.

This section provides an overview of the power-specific roles and responsibilities of the key public and private stakeholders who are involved in the implementation of the POIA. General emergency response or recovery roles and responsibilities are captured in the NRF, NDRF, and Response and Recovery FIOPs.

Table 8: Private Sector Association Roles in a Long-Term Power Outage Incident

Organization	Roles in a Long-Term Power Outage Incident
American Public Power Association (APPA)	<ul style="list-style-type: none"> • Coordinates the restoration of power throughout the public power community. • Facilitates two-way communications with the applicable federal agencies or other trade associations. • Participates in ESCC and DOE SSA and ESF #12 – Energy efforts.
Edison Electric Institute (EEI)	<ul style="list-style-type: none"> • Represents all United States investor-owned electric companies and coordinates with federal agencies as necessary. • For regional outage incidents, supports its members' mutual assistance efforts through Regional Mutual Assistance Groups. • Upon activation of a NRE, serves as the industry liaison to the chief executive officers of its member companies and coordinates with senior government officials and with national organizations representing state and local interests. • Serves as an industry liaison to state regulatory agencies when requested by a member. • Convenes periodic conference calls with the member company chief executive officers and with senior government officials. • Serves as the investor-owned electric company industry's primary national information resource, and provides a broad, national perspective on the event through media and public relations activities and national stakeholder outreach, including relevant federal agencies, social media support, and industry-wide communication and coordination to relevant stakeholders. • Participates in ESCC coordination among senior government and industry executives to ensure effective response, appropriate prioritization and allocation of resources, and support for deviation from standard procedures during an incident.
National Association of Regulatory Utility Commissioners (NARUC)	<ul style="list-style-type: none"> • During a major power outage, links the necessary agencies together for situational awareness and response coordination. • Represents electric cooperatives, and coordinates with federal agencies during an outage. • Supports cooperative mutual assistance program activation and coordinates with other member trade associations of the electric utility industry.
National Association of State Energy Officials (NASEO)	<ul style="list-style-type: none"> • Supports the EEAC program that provides state and territorial energy emergency points of contact. • Assists DOE in facilitating communications and information sharing among impacted states when energy supply disruptions occur and with coordination calls and situational reporting by states. • Provides technical support to state agencies that have a role in energy response or restoration. • Advises states and the Federal Government on energy issues in general and energy emergencies.

Organization	Roles in a Long-Term Power Outage Incident
<p>North American Electric Reliability Corporation (NERC)</p>	<ul style="list-style-type: none"> • Serves as the ERO for North America, subject to oversight by the FERC and governmental authorities in Canada. NERC’s jurisdiction includes users, owners, and operators of the BPS, which serves more than 334 million people. • Coordinates the E-ISAC and oversees the Bulk Power System Awareness program. <p>E-ISAC:</p> <ul style="list-style-type: none"> • Provides threat information, mitigation advice, and alert products to its members. • Supports the ESCC in fulfilling its role. <p>NERC Bulk Power System Awareness:</p> <ul style="list-style-type: none"> • Collects and analyzes information on system disturbances and other incidents that have an impact on the North American BPS, and disseminates this information to internal departments, registered entities, regional organizations, and governmental agencies as necessary. • Monitors ongoing storms, natural disasters, and geopolitical events that may potentially affect or are currently affecting the BPS.
<p>National Rural Electric Cooperative Association (NRECA)</p>	<ul style="list-style-type: none"> • If a disaster necessitates the activation of the ESCC, NRECA and the cooperative sector closely coordinate with the ESCC and local, state, and federal authorities.
<p>Multi-State Fleet Response Working Group</p>	<ul style="list-style-type: none"> • Identifies existing protocols, policies, procedures, systems, organizations, and technologies that are already in place within government and the private sector that impact fleet movement. • Catalogs and disseminates information related to state entrance and pass-through requirements. • Conducts annual meetings and exercises between private sector and state/local government participants. • Identifies common operational impediments and gaps and provides recommendations for solutions. • Coordinates with state and local government planning and operational activities and regulatory requirements. • Promotes awareness, education, and integrated planning. • Develops products and services. • Develops recommendations to public and private sector operational leadership. • Enhances communication between public and private sector participants. • Leverages the efforts and activities of the Federal Government and its agencies who may play a role in this effort.

Table 9: Local, State, Tribal, Territorial, and Insular Area Government Roles in a Long-Term Power Outage Incident

Roles and Responsibilities in a Long-Term Power Outage Incident
<ul style="list-style-type: none"> • Identify what may be exceptions to the normal utility prioritization process when the situation requires utilities to reprioritize based on significant consequences or cascading interdependencies resulting from some unique aspect of the event that might not have been foreseen. • Coordinate with utilities on prioritizing the restoration of power to CI and the public.

Table 10: Federal Government Roles in a Long-Term Power Outage Incident

Agency	Roles and Responsibilities in a Long-Term Power Outage Incident
<p>Department of Agriculture (USDA)</p>	<ul style="list-style-type: none"> • Provides technical support and access to damage assessments, impacts, needs, and restoration efforts for electric power generation, transmission, and distribution in Rural Development Utilities Program-financed systems. • Provides nutrition assistance to affected people through Supplemental Nutrition Assistance Program (SNAP), Disaster-SNAP, and the Women Infants and Children program. • Produces economic impact information and research on food and agriculture.

Agency	Roles and Responsibilities in a Long-Term Power Outage Incident
<p style="text-align: center;">Department of Defense (DOD)</p>	<ul style="list-style-type: none"> • Ensures the health and well-being of livestock, wildlife, and crops. • Ensures the safety and defense of the Nation’s supply of meat, poultry, and processed egg products. <ul style="list-style-type: none"> • DOD supports federal actions related to power outage incidents requiring temporary power restoration assistance. <p>Defense Logistics Agency Energy Office:</p> <ul style="list-style-type: none"> • Provides high-end generators through a memorandum of agreement between DLA and FEMA. • <u>Bulk Petroleum Services</u>—Provides contract support for the bulk petroleum supply chain, including worldwide acquisition of fuel-related services such as government-owned, contractor-operated defense fuel support points and contractor-owned and -operated defense fuel support points, alongside aircraft fuel delivery, lab testing and environmental compliance, assessment, and remediation. • <u>Direct Delivery Fuels/Commercial Specification Fuels</u> – Provides worldwide acquisition and integrated material management of commercial fuels delivered directly to military and federal civilian customers. <p>United States Army Corps of Engineers:</p> <ul style="list-style-type: none"> • Responsible for providing temporary power to designated critical facilities. • Maintains temporary emergency power restoration resources such as USACE Emergency Power Planning and Response Teams, Advance Contracting Initiative contractors, 249th Engineer Battalion, SMEs, and the USACE Deployable Tactical Operations System for communications. • Assesses critical facilities to determine generator and other requirements for temporary emergency power. • Initiates long-term recovery efforts by assessing and coordinating the CI restoration. • Prepares, delivers, installs, and de-installs generators. • Provides operations, fueling, service, and maintenance of installed generators. • Services, maintains, and repairs generators prior to their return to long-term storage to ensure they are fully mission capable.
<p style="text-align: center;">Department of Energy (DO)</p>	<ul style="list-style-type: none"> • Serves as the SSA for the energy sector; the primary federal agency responsible for collaborating with the energy sector on emergency preparedness requirements. • During Stafford Act emergencies, which require coordinated federal support, directs ESF #12 activities for the energy sector. • Addresses significant disruptions in energy supplies for any reason, whether caused by physical disruption of energy transmission and distribution systems, unexpected operational failure of such systems, acts of terrorism or sabotage, or unusual economic, international, or political events. • Assesses the impact that damage to an energy system in one geographic region may have on energy supplies, systems, and components in other regions relying on the same system. • Provides information, in cooperation with local, state, tribal, territorial, insular area, and federal governments and energy industry officials, on energy supply and demand conditions and the requirements for and availability of materials and services critical to energy supply systems (e.g., outages, restoration status, energy infrastructure status). • Serves as a federal point of contact with the energy industry for information sharing and requests for assistance from private and public sector owners and operators. • Provides technical and subject matter expertise regarding energy supplies and systems to energy asset owners and operators, other federal agencies, and local, state, tribal, territorial, and insular area governments, and conducts field assessments as needed. • Exchanges information with the states during a power outage, including the scope, outages and potential duration by county, and response and recovery efforts through the EEACs. • Coordinates and shares information with the Electricity and the Oil and Natural Gas SCCs, the ERO, and various associations that represent portions of the energy sector.

Agency	Roles and Responsibilities in a Long-Term Power Outage Incident
	<ul style="list-style-type: none"> • Serves as a source for reporting of critical energy infrastructure damage and operating status for the energy systems within an impacted area, as well as the impacts on regional and national energy systems. • Applies DOE’s technical expertise to help ensure the security, resiliency, and survivability of key energy assets and critical energy infrastructure. <p>Bonneville Power Administration:</p> <ul style="list-style-type: none"> • Operates and maintains about three-fourths of the high-voltage transmission within Idaho, Oregon, Washington, western Montana, and small parts of eastern Montana, California, Nevada, Utah, and Wyoming. <p>Southeastern Power Administration:</p> <ul style="list-style-type: none"> • Through 23 USACE water projects, markets power to more than 491 wholesale customers in 10 southeastern states—Alabama, Florida, Georgia, southern Illinois, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia—serving over 12 million consumers. • Schedules hydropower generation at the USACE facilities within its marketing area to ensure and maintain continuity of electric service to its customers. <p>Southwestern Power Administration:</p> <ul style="list-style-type: none"> • Markets hydroelectric power in Arkansas, Kansas, Louisiana, Missouri, Oklahoma, and Texas from 24 USACE multipurpose hydroelectric facilities/dams, serving over eight million end-use customers. • Operates and maintains 1,380 miles of high-voltage transmission lines, and owns numerous substations and switching stations, as well as a communications system to monitor and control the transmission of electricity that includes microwave, very high frequency radio, and state-of-the-art fiber optics. <p>Western Area Power Administration:</p> <ul style="list-style-type: none"> • Operates and maintains an extensive, integrated, and complex high-voltage power transmission system to deliver power. • Using this over-17,000-circuit-mile federal transmission system, sells and delivers reliable electric power to most of the western half of the United States BPS.
<p style="text-align: center;">Department of Homeland Security (DHS)</p>	<ul style="list-style-type: none"> • The Secretary of Homeland Security is the principal federal official for domestic incident management and is responsible for coordinating federal operations within the United States to prepare for, respond to, and recover from terrorist attacks, major disasters, and other emergencies. <p>Federal Emergency Management Agency:</p> <ul style="list-style-type: none"> • The FEMA Administrator serves as the principal advisor to the President, the Secretary of Homeland Security, and the Homeland Security Council regarding emergency management. • Obtains the latest information on the status of the power outage from DOE, disseminates CI risk assessments to all authorized government agencies, and responds to requests for such information. • Directs power outage questions, issues, and concerns from emergency management officials to DOE. • Deploys and provides resources as appropriate to collect data for information analysis and situational awareness to support operational decisions during a power outage incident. • Acquires material and resources to support local, state, tribal, territorial, and insular area response and recovery operations through existing contracts, and activates contracts that provide personnel, equipment, and supplies to support life-sustaining services (e.g., shelter, hydration, meals/food, emergency supplies, reunification services, durable medical equipment) resulting from a power outage. • Coordinates overall staffing of federal emergency management activities at multiagency coordination centers, including which ESFs/RSFs are activated, the size and composition of the organizational structure, the level of staffing at multiagency coordination centers, and identification of required key positions. • Provides strategic leadership to coordinate and prioritize federal resources and capabilities to areas affected by the power outage.

Agency	Roles and Responsibilities in a Long-Term Power Outage Incident
	<ul style="list-style-type: none"> • Develop and promulgate continuity guidance across the whole community to increase the resiliency of the nation for all threats and hazards. • National Protection and Programs Directorate: <ul style="list-style-type: none"> • Leads the national effort to coordinate the overall federal effort to promote the security and resilience of the Nation's critical infrastructure. • Office of Cyber Security & Communications: <ul style="list-style-type: none"> – Serves as the SSA for the Communications and Information Technology sectors and provides national-level incident situation reporting for those sectors. – Serves as the national coordinator for ESF #2 – Communications. • Office of Emergency Communications: <ul style="list-style-type: none"> – Coordinates planning for national security and emergency preparedness communications for the Federal Government. – Helps emergency responders and government officials continue to communicate in the event of natural disasters, acts of terrorism, or other incidents. • National Cybersecurity and Communications Integration Center: <ul style="list-style-type: none"> – The operational component of CS&C and the national cyber CI center designated by the Secretary of Homeland Security; serves as a centralized location to coordinate and integrate operational elements involved in cybersecurity and communications reliance, including incident response. – Engages Cyber Incident Response Teams to assist in identification of security vulnerabilities, develop mitigation strategies, and support incident response. • Office of Infrastructure Protection: <ul style="list-style-type: none"> – Serves as the national coordinator for the security and resilience of the Nation's CI in accordance with the Homeland Security Act and Presidential Policy Directive (PPD)-21. – Maintains the NICC, the watch center for DHS NPPD IP, and the CI element of the National Operations Center. – Serves as the national physical infrastructure center, designated by the Secretary of Homeland Security; gathers incident information on the impact to those sectors for which DHS NPPD IP serves as SSA to provide input for national CI situation reporting. – Serves as the SSA for six of the critical sectors designated under PPD 21, providing guidance and support to other SSAs, and supporting CI incident response and recovery. DHS NPPD IP may be utilized to facilitate public-private coordination on a sector-by-sector basis in coordination with the SSA for that sector. – Assigns Protective Security Advisors and Regional Directors to serve as liaisons between local, state, tribal, territorial, insular area, and federal government officials and owners and operators and as infrastructure liaisons at RRCCs and local, state, tribal, territorial, and insular area EOCs. – Assigns an Infrastructure Liaison as the principal DHS NPPD IP representative and advisor to the Unified Coordination Staff when a JFO is established. – Assesses dependencies, interdependencies, and cascading effects to recommend priorities to local, state, tribal, territorial, and insular area officials, to minimize cascading effects and to support recovery and restoration efforts. – Gathers incident information on the impact to those sectors for which it serves as SSA to provide input for national CI situation reporting. • Office of Cyber and Infrastructure Analysis (OCIA): <ul style="list-style-type: none"> – Coordinates with the NICC and the NCCIC to provide infrastructure consequence analysis, decision support, and modeling capabilities to public and private sector partners. – Develops an IOC List which prioritizes CI that may need support to maximize recovery and restoration efforts. – Identifies dependencies on, interdependencies between, and cascading effects of an incident on CI. • National Coordination Center for Communications: <ul style="list-style-type: none"> – Joint governmental and communications industry partnership assisting in coordination, restoration and reconstruction of National Security and Emergency

Agency	Roles and Responsibilities in a Long-Term Power Outage Incident
	<p>Preparedness (NS/EP) communications supporting federal, SLTT, and industry needs</p> <ul style="list-style-type: none"> - Serves as the operational focal point of the Communications Information Sharing and Analysis Center (COMM-ISAC) - Identifies and Assists in resolving addresses cross-sector dependencies where communications is a limiting factor or communications requires support - Deploys ESF#2 communications expertise to NRCC, RRCC, field offices, and EOCs as appropriate.
<p>Department of Health and Human Services (HHS)</p>	<ul style="list-style-type: none"> • Provides federal assets and capabilities to support time-sensitive, life-saving, and life-sustaining public health and medical infrastructure as well as stabilization missions to supplement local, state, tribal, territorial, and insular area response and recovery capabilities. • Provides augmentation support for mass care and emergency assistance services. • Provides technical assistance in the form of impact analyses and recovery planning support of public health and medical services, as well as healthcare service delivery infrastructure, where appropriate. • Provides strategic leadership in coordinating care and movement of patients requiring evacuation. • Provides situational awareness regarding health and medical issues. • Provides support for long-term recovery, including collaborating with local, state, tribal, territorial, and insular area officials on prioritizing restoration of the public health and private medical and healthcare infrastructures to accelerate overall community recovery. • Coordinates linking HHS benefits programs with affected populations. • Through ESF #8 – Public Health and Medical Services, works toward mitigating issues pertaining to healthcare and public health CI, and protects the wholesomeness of food and food sources through increased monitoring.
<p>Department of the Interior (DOI)</p>	<p>Bureau of Land Management:</p> <ul style="list-style-type: none"> • Provides information on energy production and supply on federal lands. • Assesses damage to energy-related infrastructure. • Provides engineering and technical support as necessary. • Develops and maintains information on critical energy-related infrastructure on federal and tribal lands. <p>Bureau of Reclamation:</p> <ul style="list-style-type: none"> • Provides technical assistance for the assessment of hydroelectric facilities and reservoir water operations actions as they affect energy production. • Uses Bureau of Reclamation personnel to assist in the repair of damaged hydropower generation facilities. • Modifies operations at Bureau of Reclamation facilities to increase electrical generation to supplement losses in areas affected by the incident. • Uses hydroelectric plant internal restart.
<p>Department of Justice (DOJ)</p>	<ul style="list-style-type: none"> • Leads the law enforcement response to all terrorist and cyber or threats within federal criminal jurisdiction; supplements state and local law enforcement resources in certain circumstances. • Provides public safety and security assistance to support preparedness and response priorities when needed. • Provide law enforcement support to local, state, tribal, and territorial authorities to address public safety and security concerns if requested and with the requisite authority.
<p>Department of State (DOS)</p>	<ul style="list-style-type: none"> • Acts as the formal diplomatic mechanism for the majority of communications between the United States Government and other nations regarding the response to a domestic crisis. • Maintains the International Coordination Support Annex with United States interagency coordination to provide support and guidance to the United States Government on international coordination during the incident.

Agency	Roles and Responsibilities in a Long-Term Power Outage Incident
	<ul style="list-style-type: none"> • Coordinates and consults with foreign governments and international organizations during the power outage to determine what, if any, international and diplomatic impacts and implications exist. • Notifies foreign governments of travel restrictions and advises American citizens, businesses, and other United States social/economic entities abroad of the nature and extent of the power outage in the United States and any direct effect that it might have on their safety and security. • Works with local, state, tribal, territorial, insular area, federal, and NGO officials to support and facilitate liaison between foreign missions and nationals. • Coordinates non-energy federal assistance to cross-border communities impacted by the power outage. • Coordinates international offers of assistance based on needs conveyed by DHS or other federal departments and agencies, as stated in the International Assistance System, while managing and leveraging applicable bilateral and multilateral agreements and relations.
<p style="text-align: center;">Department of Transportation (DOT)</p>	<ul style="list-style-type: none"> • Actively posts information related to transportation permits, waivers, and other regulations and authorities that are applicable to a power outage on its contingency operations website. • Serves as one of four primary agencies that support USACE in the Infrastructure Systems RSF structure. • Supports communication and coordination needs relative to the overall mission of the Infrastructure Systems RSF. • Supports the Community Planning and Capacity Building and the Health and Social Services RSFs.
<p style="text-align: center;">Environmental Protection Agency (EPA)</p>	<ul style="list-style-type: none"> • Serves as the designated SSA lead for the water sector under HSPD-7 and the NIPP. • Works with the water sector in a preparedness role to encourage water utilities to coordinate with their power utilities on a prioritization list for power restoration after an outage. • Coordinates with the water sector (drinking water and wastewater facilities), including local, state, tribal, territorial, insular area, and federal government partners and the private sector, in support of ESF #3 – Public Works and Engineering. • Coordinates with DOE and state officials to approve and issue motor vehicle fuel supply waivers under the Clean Air Act and in support of ESF #12. • Exercises enforcement discretion, where appropriate, where EPA's environmental requirements could impede emergency operations of first responders or CI. • As the coordinating agency for ESF #10 – Oil and Hazardous Materials Response, addresses the cleanup of any oil and hazardous materials releases under an ESF #10 mission assignment or under the National Oil and Hazardous Substances Pollution Contingency Plan. It may decontaminate CI that is contaminated by oil or hazardous materials, including chemical, biological, radiological, or nuclear substances.
<p style="text-align: center;">Commission (FERC)</p>	<ul style="list-style-type: none"> • Monitors and investigates significant power outages to identify causes and needed reliability improvements and to determine if reliability standards were violated. • Through emergency authority under section 1(15) of the Interstate Commerce Act, gives directions for preference or priority in transportation, embargoes, or movement of traffic whenever the Commission is of the opinion that an emergency requiring immediate action exists in any section of the country. • Acts on requests to waive tariff provisions during an emergency. • Shares timely actionable information regarding grid security with appropriate key personnel of owners, operators, and users of the critical electric infrastructure. • Share with, or receives from, any non-federal entity or the Federal Government a cyber threat indicator or defensive measure. • Receives prior notification of sector-specific alerts developed by the NERC-Electricity Information Sharing and Analysis Center (E-ISAC) in the event of a significant incident or threat that affects the BPS.

Agency	Roles and Responsibilities in a Long-Term Power Outage Incident
General Services Administration (GSA)	<ul style="list-style-type: none"> • Provides contract support for generators and related items; also transportation services and leasing for space, as requested.
Nuclear Regulatory Commission (NRC)	<ul style="list-style-type: none"> • Serves as the primary agency for federal response to radiological incidents at a facility or incidents caused by material that is licensed by the NRC or an NRC Agreement State. These facilities include, but are not limited to, commercial nuclear power plants, fuel cycle facilities, DOE-owned gaseous diffusion facilities operating under NRC regulatory oversight, independent spent fuel storage installations, radiopharmaceutical manufacturers, and research reactors. • Performs an independent assessment of the incident and potential off-site consequences from FEMA disaster-initiated review and, as appropriate, provides recommendations concerning any protective measures. • Performs oversight of the licensee, to include monitoring, evaluation of protective action recommendations, advice, assistance, and, as appropriate, direction. • Dispatches, if appropriate, an NRC site team of technical experts to the licensee's facility.
Tennessee Valley Authority (TVA)	<ul style="list-style-type: none"> • Provides electricity for business customers and local power distributors serving nine million people in parts of seven southeastern states, Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia. • Assesses supply, system damage, and repair requirements within TVA. • Supplies surplus power as required to the power grid. • Supplies critical replacement parts and equipment as requested. • Supplies technical expertise as requested.

Table 11: Non-Governmental Organization Roles in a Long-Term Power Outage Incident

Organization	Roles and Responsibilities in a Long-Term Power Outage Incident
American Red Cross (ARC)	<ul style="list-style-type: none"> • Roles and responsibilities for the ARC are included in the ESF and RSF annexes and the Response and Recovery FIOPs.
National Voluntary Organizations Active in Disasters (NVOAD)	<ul style="list-style-type: none"> • Roles and responsibilities for NVOAD are included in the ESF and RSF annexes and the Response and Recovery FIOPs.

Appendix 5: Power Outage Modeling Capabilities and Tools

A variety of modeling and situational awareness tools and capabilities exist that can provide situational awareness on energy-specific functions. Some of these tools are owned and operated by SMEs in dedicated modeling centers while others are available to end users to operate on their own devices (e.g., computers, smartphones, and tablets). This appendix includes an explanation of the tools, tool management, and tool access; however, it should be noted that DOE is the source for all status and official reporting for the Federal Government for the energy sector.

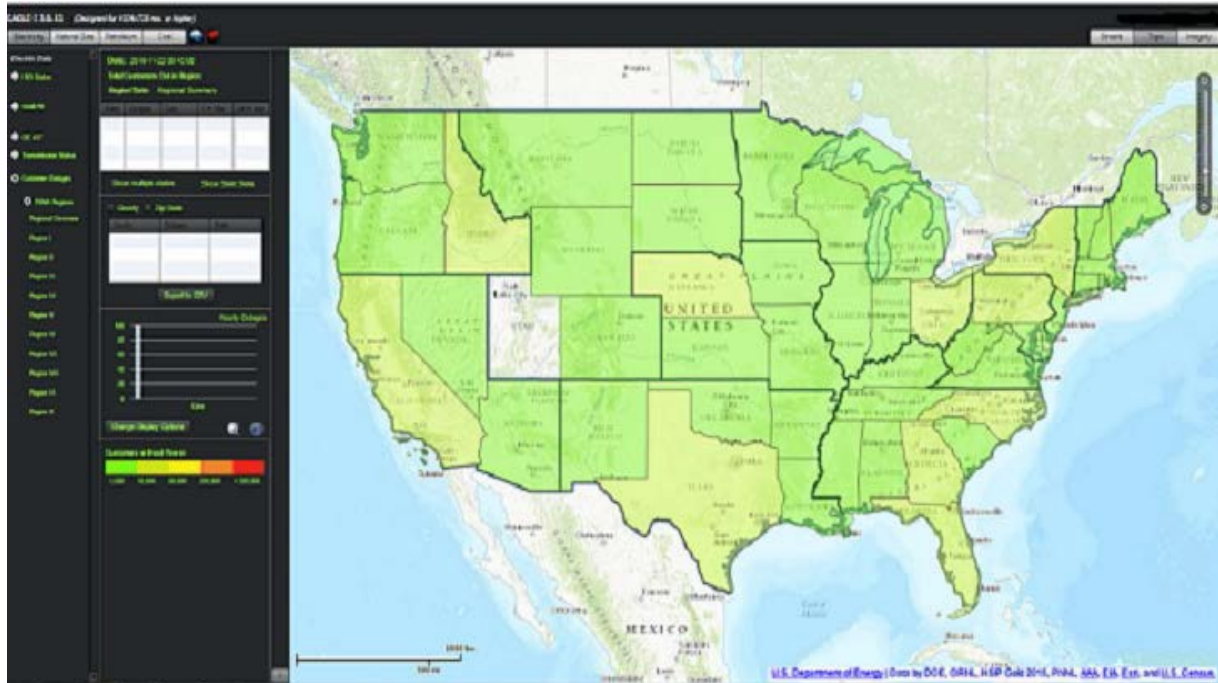
Modeling Tools

EAGLE-I

The Environment for Analysis of Geo-Located Energy Information (EAGLE-I), which was developed by staff at DOE Headquarters, is a web-based visualization and situational awareness system comprised of numerous applications. Use of EAGLE-I is limited to Federal Government personnel only, and while there are currently over 600 users across the federal community, some EAGLE-I data and applications can only be accessed by DOE personnel. The National Outage Map component of EAGLE-I provides federal users with accurate, timely coverage of electric customer outage information, aggregated and visualized at the county level, sourced directly from utility company websites, and refreshed every 15 minutes. (<https://eagle-i.doe.gov/default.aspx>)

Figure 16 shows a screenshot from EAGLE-I.

Figure 16: Screenshot from EAGLE-I



EARSS

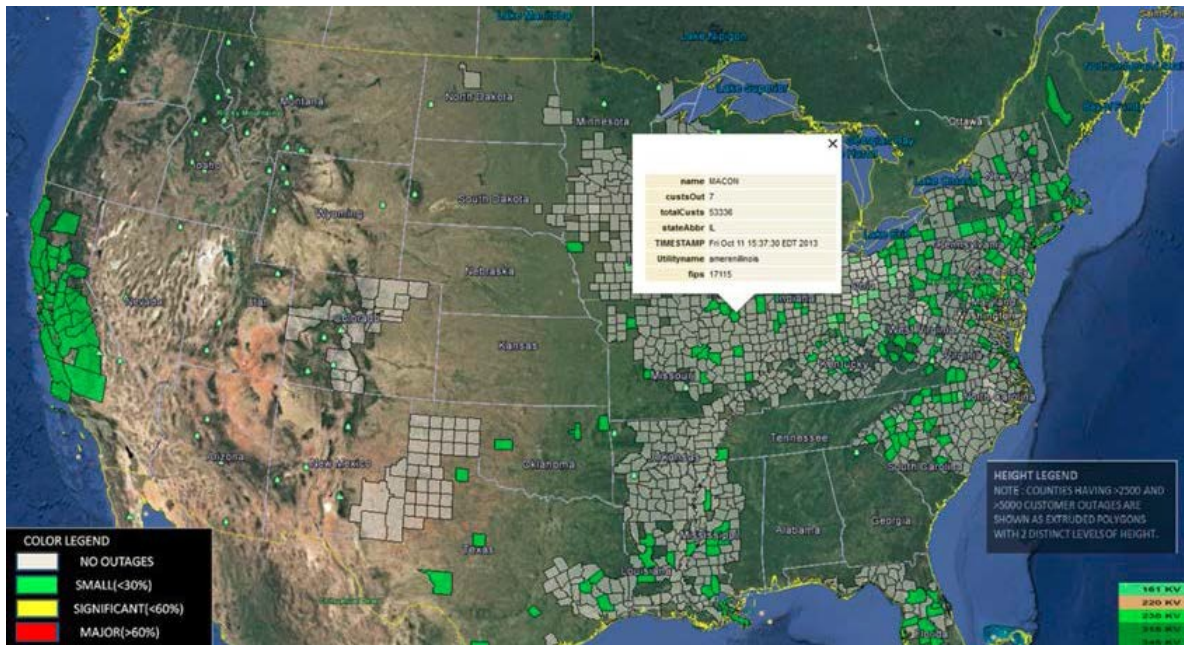
The Energy Assurance and Resiliency Standardized Services (EARSS) system was developed by Oak Ridge National Laboratory to disseminate the analysis of impacts of technological, man-made, and extreme weather events, such as hurricanes, wild fires, and ice storms, on energy hubs and energy delivery infrastructures. The system provides predictive and post-event impact analysis on energy infrastructure nodes and links, as well as population at risk.

The data and analyses are available both in a visualization platform called the EARSS CONNECTOR and/or as inputs into other models or overlays for additional analyses by the user communities through a geoserver platform called the EARSS Geo Server.

(<https://earss.extranet.ornl.gov/geoserver/web/>).

Figure 17 shows a screenshot from EARSS.

Figure 17: Screenshot from EARSS



HHS empower Mapping Tool

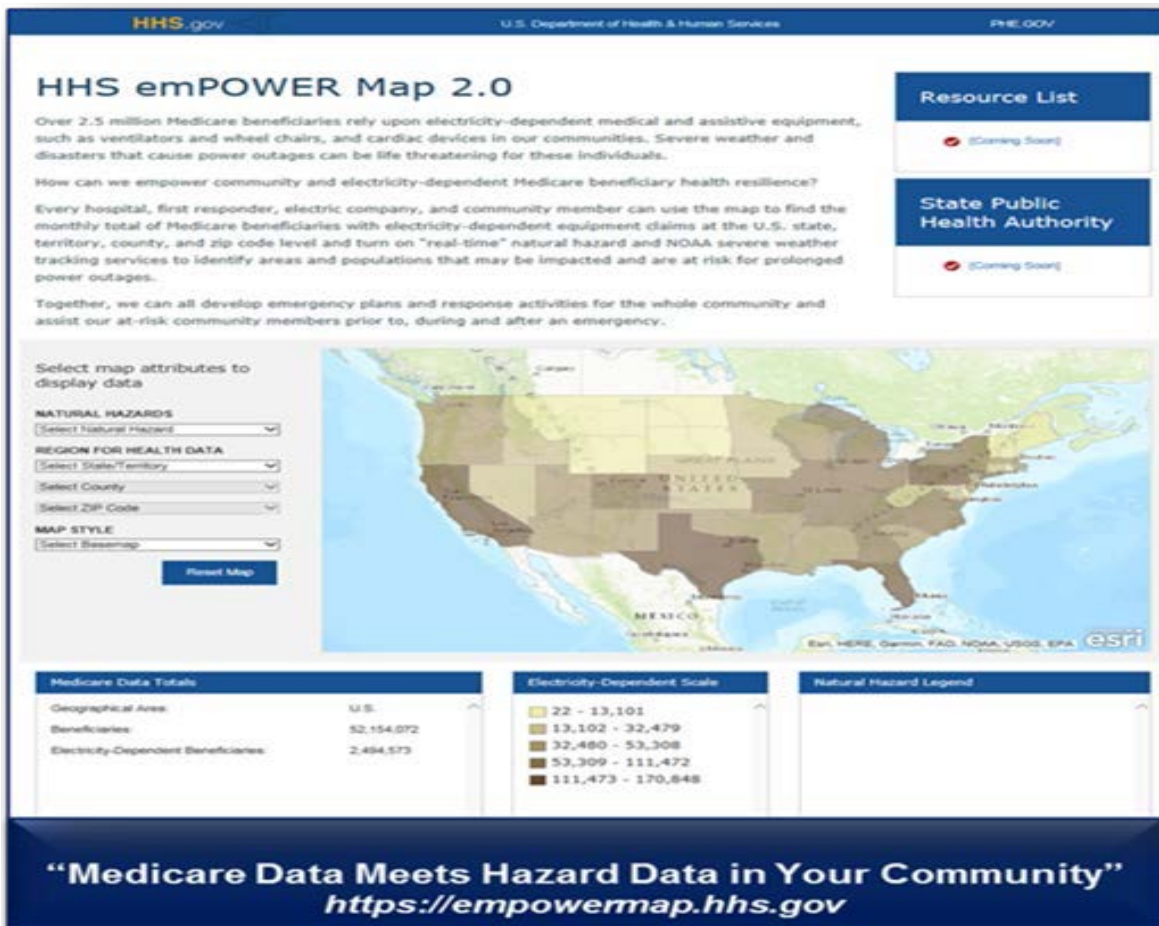
The HHS emPOWER Map Tool, owned by HHS, is an interactive online mapping tool that is helping community health and emergency management officials to better anticipate, plan for, and respond to the needs of at risk individuals that rely on electricity-dependent medical and assistive equipment and devices to live independently in their homes. The map provides a monthly total of Medicare beneficiary claims for electricity-dependent equipment and devices at the national, state, territory, county and zip code levels. The tools also provide near real-time National Oceanic and Atmospheric Administration (NOAA) severe weather and other natural hazard tracking services to help identify impacted areas and estimate the number of electricity-dependent individuals that may rapidly seek assistance from first responders, hospitals and emergency shelters and their equipment and batteries fail.

The integrated data accessible through the HHS emPOWER Map can help community organizations, including hospitals, first responders, and electric company officials, work with health officials to minimize health impacts of prolonged power outages due to storms and other disasters on vulnerable residents.

Emergency planners, using emPOWER, can participate and plan for emergency shelters that may experience greater electricity-dependent Medicare beneficiaries nearby. First responders and hospitals can better anticipate and plan for a surge in assistance calls and care demands. Local officials can also more accurately estimate transportation and evacuation assistance needs and identify areas that may require recharging stations or be prioritize for power restoration. (<https://empowermap.hhs.gov>)

Figure 18 shows a screenshot from emPOWER.

Figure 18: Screenshot from emPOWER



EPFAT

Following disasters that disrupt the commercial power service, generators are often required at critical public facilities such as water treatment plants, hospitals, wastewater treatment plants and shelters. USACE assists FEMA in providing temporary emergency power at critical public facilities identified by state officials. Facility assessment data is required before a generator can be sourced and installed.

The Emergency Power Facility Assessment Tool (EPFAT) is a secure web-based tool used by critical public facility owners/operators or emergency response agencies to input, store, update and/or provide temporary emergency power under Stafford Act Declaration events and for local responders to provide emergency power assessment data under non-Stafford events. Having pre-installation assessment data in advance expedites USACE's abilities to provide temporary power. (<http://epfat.swf.usace.army.mil>)

EPRAM (National Infrastructure Simulation and Analysis Center)

The Evolutionary Prototyping with Risk Analysis and Mitigation (EPRAM) electric restoration analysis model is a National Infrastructure Simulation and Analysis Center (NISAC) tool developed by Los Alamos National Laboratory. It determines the impact of network-level damage on electric power restoration by analyzing work rates and substation priorities, critical path activities, and time to restore. Model characteristics include national-scale data coverage, cellular automata technique, and simulation of work management practices used by electric companies during a variety of natural and manmade events.

EPRAM’s cellular automata approach builds on geo-spatial representations of electric substation service areas. Service areas are initially modeled as contiguous polygons at “normal” status. During a damage event, service areas progress from “outage” to “partially restored” to “fully restored.” The model incorporates constraints such as priority scheduling of field crews, availability of spares, line switching, generator black-start options, travel time across damaged areas, and the extent of debris. EPRAM provides a variety of outputs such as charts of aggregate event (time to restoration), geo-spatial restoration sequences, tabular lists of critical facility impacts, and work crew assignments.

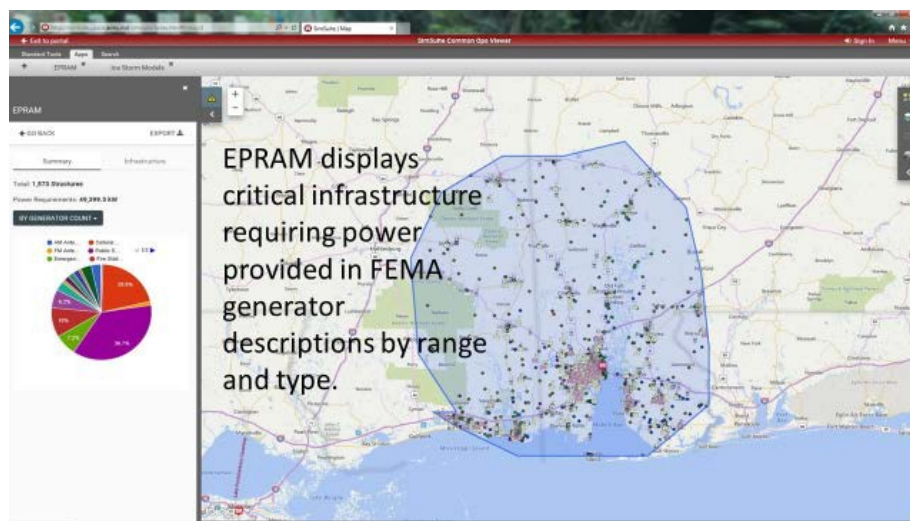
EPRAM (USACE)

The Emergency Power Readiness Assessment Model (EPRAM) is a modeling tool in the USACE SimSuite web-based series of planning tools. It allows USACE to identify a specific geographical incident impact area and then query critical facilities within that area to help determine potential requirements for temporary emergency power generators. This web site can only be accessed by a user who is operating on an “army.mil” IT network.

(<http://simsuite.usace.army.mil/simsuite/index.html#/portal>)

Figure shows a screenshot from USACE EPRAM.

Figure19: USACE EPRAM Screenshot



HAZUS-MH

Hazards U.S. Multi-Hazard (HAZUS-MH) is a nationally applicable standardized methodology that estimates potential losses from earthquakes, hurricane winds, and floods. FEMA developed HAZUS-MH under contract with the National Institute of Building Sciences.

HAZUS-MH uses state-of-the-art Geographic Information Systems (GIS) software to map and display hazard data and the results of damage and economic loss estimates for buildings and infrastructure. It also allows users to estimate the impacts of earthquakes, hurricane winds, and floods on populations. (<https://www.fema.gov/hazus>)

MoDI

The Model and Data Inventory (MoDI) is an interactive, web-based tool that provides an inventory of the datasets and models used across the federal interagency community to support operational decision making. The MoDI is a product of the ESF Leadership Group (ESFLG) Modeling and Data Working Group (MDWG). The Director of FEMA's Planning and Exercise Division, Response Directorate, chairs the MDWG. The ESFLG selects the members, who include subject matter experts, program managers, and program directors representing each of the federal ESFs.

The ESFLG MoDI contains information about individual models and datasets, including quick summaries and detailed technical information to support both end users and technical specialists. Access and point of contact information are provided for each dataset and model, and each entry is tagged with key information about when the dataset or model is useful during emergency response and to which hazard(s), core capabilities, and support functions it applies. An interactive analysis tool allows users to explore the connections between models and datasets and how information flows between them. (<http://gis.fema.gov/Model-and-Data-Inventory/>)

Figure 19 shows a screenshot from MoDI.

Figure 19: Screenshot from MoDI

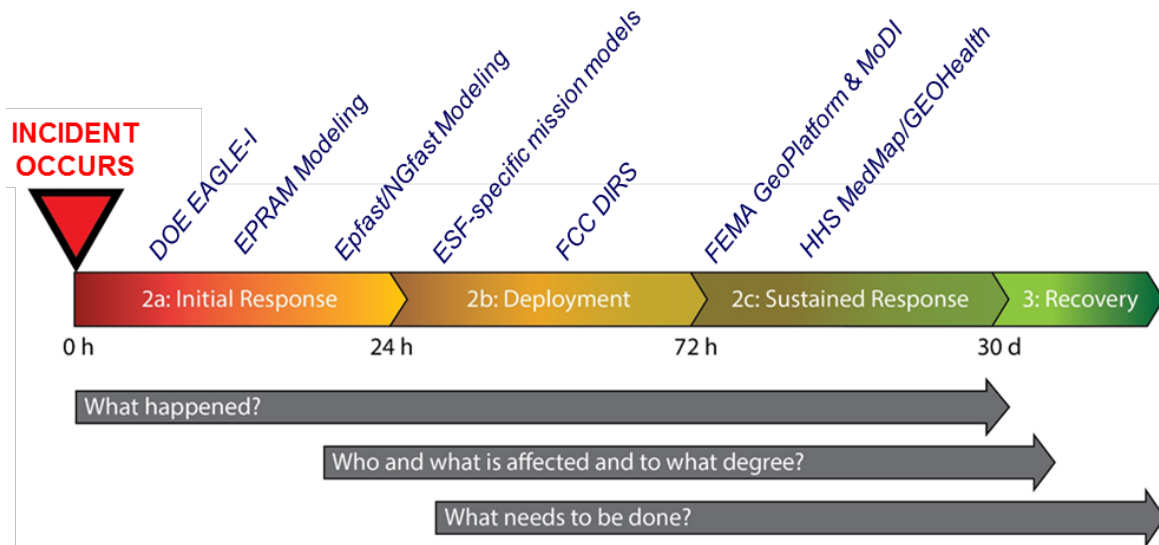
RAW DATA	EVENT CHARACTERIZATION	SITUATIONAL AWARENESS	CONSEQUENCE MODELS	IMPACT ESTIMATES	DECISION SUPPORT TOOLS	MISSION-SPECIFIC REQUIREMENTS
HSIP	HPAC	EAGLE-I	Hazus	NARAC Modeling System	Turbo FRMAC	SimSuite
US Census Data	SLOSH	CPHC Forecasts	Turbo FRMAC	PAGER	HURREVAC	DSARS
NHD Plus	NARAC Modeling System	NHC Forecasts	HPAC	ShakeCast	NUEVAC	HAvBED
Observational Weather Data	ShakeMap	NARAC Modeling System	NARAC Modeling System	DIRS	I-WASTE DST	DRC Locator
RAMS	ICWater	NWS River Forecasts	PAGER	GeoHEALTH	RESRAD	DTS
CAP Imagery	HEC-RAS	Red Cross NSS	EPfast	SimSuite	SHARC (Sandia)	Iron Sights
NWIS	WRF	ShakeCast	HotSpot	DSARS	SimSuite	LSCMS
River Gauge Observational Data	ADCIRC	AHPS	NGFast	ERMA	BT-GAM	NMETS
	HYSPLIT	DisasterAWARE	RESRAD	FEMA GeoPlatform	CoBRA	
Twitter Data	FLEXPART	Local NWS Forecasts	SHARC (Sandia)	USGS Flood Inundation Mapper	EPRAM	
CoCoRaHS	HEC-HMS		SimSuite	CFLA	REMM	
HDDS	HotSpot	NWIS	BT-GAM	PDA Data	RtePM	
LANCE	ORIGEN-ARP	RadResponder	EMPREP	SIMON	USACE Debris Estimating Model	
NLCD	RESRAD	GeoHEALTH	HEC-FIA		WEST	
Scribe	SHARC (Sandia)	JTWC Forecasts	N-ABLE		CWMS	
USGS Storm Surge Sensors	SimSuite	OnTheMap	REAcct		DCC Calculators	
	COAMPS	OnTheMap for	RVA Tool		NSA SMART	

Table 12 provides an at-a-glance summary of the modeling tools and their owners, availability, and method of access.

Table 12: Modeling Tools to Assist in a Power Outage Incident

Modeling Tool	Proprietary Owner/Source	Availability	Access
EAGLE-I	DOE/Sourced directly from utility companies as well as DOE, federal and private data sources	Federal employees only	Controlled by DOE: https://eagle-i.doe.gov/default.aspx
EARSS	Oakridge National Laboratory	Access from Oakridge National Laboratory required	Controlled by Oakridge National Laboratory: https://earss.extranet.ornl.gov/geoserver/web/
emPOWER	HHS	Publicly available for emergency planners	Controlled by HHS: http://empowermap.phe.gov
EPFAT	USACE	Critical Public Facility Owners/Operators	Controlled by USACE: http://epfat.swf.usace.army.mil/
EPRAM	NISAC	Federal employees only	Controlled by Los Alamos National Laboratory
EPRAM	USACE	Limited to army.mil users	Controlled by USACE: http://simsuite.usace.army.mil/simsuite/index.html#/portal
HAZUS	FEMA	Publicly available through web portal	Controlled by FEMA: https://www.fema.gov/hazus
MoDI	FEMA	Analysis available for response phases (recovery underway)	Controlled by FEMA: http://gis.fema.gov/Model-and-Data-Inventory/

Figure 20 shows a mapping of optimal tool usage against the incident response phases.

Figure 20: Power Outage Modeling Tools in the Response and Recovery Phases

Situational Awareness Reporting

EAD

The Energy Assurance Daily (EAD), produced by DOE, provides a summary of public information concerning current energy issues. Published Monday through Friday to inform stakeholders of developments affecting energy systems, flows, and markets, it provides highlights of energy issues rather than comprehensive coverage.

The EAD addresses:

- Major energy developments
- Electricity, petroleum, and natural gas industries
- Other relevant news
- Energy prices

The EAD is available to the public online (<http://www.oe.netl.doe.gov/ead.aspx>) and is posted on HSIN.

EARSS

In addition to its modeling, EARSS also provides situational awareness of various data sets required to respond to a long-term power outage.

- Monitoring capability:
 - Situational awareness of distribution outages
 - Real-time weather overlays
 - Real-time detection and notification of naturally occurring extreme events

- Energy infrastructure situational awareness:
 - Coal delivery and rail lines
 - Refinery and oil wells
 - Natural gas pipelines
 - Transportation and evacuation routes
 - Population impacts

FCC DIRS

The Federal Communications Commission (FCC) Disaster Information Reporting System (DIRS) is a voluntary, web-based system that communications companies, including wireless, wireline, broadcast, and cable providers, can use to report communications infrastructure status and situational awareness information during times of crisis. In the event of a major disaster, the FCC and DHS NPPD National Coordination Center for Communications (NCC) need accurate information regarding the status of communications services in the disaster area, particularly during restoration efforts. (<http://transition.fcc.gov/pshs/services/cip/dirs/dirs.html>)

When jointly activated by DHS and FCC, DIRS collects information concerning the following:

(<https://transition.fcc.gov/pshs/services/cip/dirs/dirs.html>)

Form OE-417

Through the Electric Emergency Incident and Disturbance Report (Form OE-417), information is collected on major electric system incidents and emergencies to inform DOE. Electric companies that operate as Control Area Operators and/or Reliability Authorities, as well as other electric companies as appropriate, are required to file the form whenever an electrical incident or disturbance is sufficiently large enough to cross the reporting thresholds. Reporting coverage for the Form OE-417 includes all 50 states, the District of Columbia, Puerto Rico, the United States Virgin Islands, and the United States Trust Territories. DOE uses the information to fulfill its overall national security and other energy emergency management responsibilities as well as for analytical purposes. While Form OE-417 Annual Summaries are available on the DOE website, the actual reports are protected, to the extent possible, consistent with federal law.

GeoHEALTH

GeoHEALTH (formerly MedMap) is a secure, GIS-based, electronic, interactive mapping application. This application incorporates information from numerous sources both internal and external to HHS. It includes other federal and public agencies such as NOAA and the United States Geological Survey, as well as other NGOs, into a single visual environment for enhanced situational awareness, assessment, and management of resources for planning and response to natural or manmade incidents.

This system supports functions such as policy analysis, planning, course of action comparison, incident management, and training. It supports the needs of decision makers at various levels within HHS and other federal agencies to provide enhanced situational awareness at a level of

granularity needed for all responders, including regional emergency coordinators and teams in the field. It also displays and provides details on medical care sites, resources, and mobilization points and provides analytical tools for planning and preparedness efforts. During a large event such as an improvised explosive device or hurricane, there is the need to immediately determine medical care sites, resources and mobilization points and modify information as it becomes available and changes. (<http://geohealth.hhs.gov>)

Outage Control

Outage Central is a portal that provides emergency response personnel with comprehensive outage links, severe weather alerts, and outage news. Operated by an independent company, it is accessible to the public, responders, and utilities. Information on outages is organized by states and regional mutual aid groups.

U.S. Electric System Operating Data Tool

Through Form EIA-930, the DOE Energy Information Administration (EIA) collects hourly forecast and actual demand data from all 66 U.S. balancing authorities operating in the lower 48 states. This data is collected 24/7/365 and made publicly available within an hour and a half of the end of the operating hour on EIA's website through the Electric System Operating Data Tool webpages.

Significant disruptions of balancing authority demand due to weather events or facility outages appear promptly in the tool. It allows users to track system recovery hourly by comparing current actual system demand with demand forecasts and historical actual demand for previous comparable periods.

Table 13 provides an at-a-glance summary of the situational awareness tools and their owners, availability, and method of access.

Table 13: Situational Awareness Tools to Assist in a Power Outage Incident

Situational Awareness Tool	Proprietary Owner/Source	Availability	Access
DIRS	FCC	Voluntary Access	http://transition.fcc.gov/pshs/services/cip/dirs/dirs.html
EAD	DOE	Available to the public, published M-F	http://www.oe.netl.doe.gov/ead.aspx
EARSS	Oakridge National Laboratory	Access from Oakridge National Laboratory required	Controlled by Oakridge National Laboratory: https://earss.extranet.ornl.gov/geoserver/web/
Form OE-417	DOE	Schedule 1 information may be publicly released, Schedule 2 information is protected in accordance with applicable laws	The form is available on DOE public website by date and time group; however, report information is controlled by DOE. Annual report summaries are available on DOE's public Web site.
GeoHEALTH	HHS	Some available to the public, restricted access for others	http://geohealth.hhs.gov
Outage Central	Macrosoft	Available to the public	http://www.outagecentral.com/
U.S. Electric System	U.S. Department of Energy/Energy	U.S. Electric System Operating Data Tool/Form EIA-930	http://www.eia.gov/beta/realtime_grid

Situational Awareness Tool	Proprietary Owner/Source	Availability	Access
Operating Data Tool	Information Administration (EIA)		

Appendix 6: Authorities and References

The tables in this appendix summarize specific authorities relevant to a long-term power outage. The NRF, NDRF, and the Response and Recovery FIOPs provide a list of overarching incident management authorities.

Nothing in this annex alters or impedes the ability of federal agencies to carry out their respective authorities and associated responsibilities under law. This annex does not create new authorities nor change existing ones.

Table 14: Applicable Statutes

Title	Date	Applicability to a Power Outage
Clean Air Act (42 U.S.C., Chapter 85)	1970	Section 211 (c)(4)(C) provision allows EPA (upon request from a governor) to issue waivers to motor vehicle fuel requirements to address short-term fuel supply shortages. Such waivers may also benefit first responders and emergency response equipment.
Clean Water Act (33 U.S.C.)	1972	Employs a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into the Nation's waterways, finance wastewater treatment facilities, and manage polluted runoff. It also gives the EPA authority to implement pollution control programs and to set wastewater standards for industry and limitations on contaminants in surface waters. Its broader goal is to help restore and maintain the chemical, biological, and physical integrity of the Nation's waters.
ritical Infrastructure Information Act of 2002 (P.L. 107-296)	2002	Establishes the Protected Critical Infrastructure Information (PCII) Program. It creates a framework that enables members of the private sector to voluntarily submit sensitive information regarding the Nation's CI to DHS with assurance that the government will not expose sensitive or proprietary data. It also establishes the PCII Program Office within DHS NPPD IP.
Cybersecurity Information Sharing Act of 2015 (P.L. 114-113)	2015	Enhances the ability of federal and non-federal entities to share information about cybersecurity threats.
Defense Production Act (DPA) (50 U.S.C.)	1950	Authority to require acceptance and priority performance of contracts and orders to promote national defense, which includes emergency preparedness activities conducted pursuant to Title VI of the Stafford Act and CI protection and restoration, or to maximize domestic energy supplies. The Federal Priorities and Allocations System administers the placement of DPA priority ratings in contracts involving industrial, agricultural, health, energy, and transportation resources and services. The President delegated authority to require acceptance and priority performance of contracts or orders for these categories of resources and services to DOC, USDA, HHS, DOE, and DOT, respectively. Through the placement of priority ratings in contracts, private sector contractors, subcontractors, vendors, and suppliers are required to give preferential treatment for contracts and orders. This authority can ensure timely delivery of materials and services from private businesses to restore power disruptions. Priority ratings can be placed on either government (local, state, federal) or private sector contracts. Additionally, the installation of government-owned equipment authority may expedite and prioritize restoration of both public and private power infrastructure disrupted by either natural or human-caused hazards. Voluntary agreements under DPA may facilitate cooperation among business competitors to protect or restore power systems in connection with natural disasters or acts of terrorism. Participants in a voluntary agreement are granted relief from antitrust laws.

Title	Date	Applicability to a Power Outage
DOE Organization Act (P.L. 95-91)	1977	Established DOE. DOE has the authority to obtain current information regarding emergencies in the electric supply systems in the United States as provided by other statutes such as the Federal Energy Administration Act of 1974. DOE has established mandatory reporting requirements for electric power system incidents or possible incidents to meet DOE's national security requirements and other responsibilities.
Emergency Reconstruction of Interstate Natural Gas Facilities Under the Natural Gas Act (18 CFR, Parts 153, 157, and 375)	2003	FERC regulations enable interstate natural gas pipeline companies, under emergency conditions, to replace mainline facilities using—if necessary—a route other than the existing right-of-way, and to waive the 45-day prior notice requirement and cost constraints.
Energy Policy and Conservation Act (EPCA) (P.L. 94-133)	1975	EPCA's goals are to increase energy production and supply, reduce energy demand, provide energy efficiency, and give the Executive Branch additional powers to respond to disruptions in energy supply. <ul style="list-style-type: none"> • Sections 151–191 authorize DOE to establish and operate the SPR, including the Northeast Gasoline Supply Reserve. • Section 161(h) empowers the President to draw down the SPR in circumstances other than a “severe energy supply interruption” or a need to meet United States obligations under international energy program. • Pursuant to section 181, the Secretary establishes and maintains the Northeast Home Heating Oil Reserve.
Energy Policy Act of 2005 (P.L. 109-58)	2005	Title XII, Electricity, Subtitle A: Reliability Standards, Section 1211: Electric Reliability Standards; Electricity Modernization Act of 2005 provides for federal jurisdiction over certain activities that are required to support reliability of the United States BPS. Title XII authorizes FERC to certify a national ERO to enforce mandatory reliability standards for the BPS. FERC oversee the ERO and approves all ERO standards. The ERO can impose penalties on a user, owner, or operator of the BPS for violations of any FERC-approved reliability standard, but such penalties are subject to FERC review and potential change.
Fixing America's Surface Transportation (FAST) Act (P.L. 114-94)	2015	<ul style="list-style-type: none"> • Amends Part II of the Federal Power Act by adding a new section 215(A) which authorizes the Secretary of Energy to order emergency measures to protect or restore the reliability of critical electric infrastructure or of defense critical electric infrastructure upon a presidential finding of a Grid Security Emergency. • Requires DOE, FERC, and other appropriate federal agencies, to the extent practicable and consistent with their obligations, to protect classified and critical electric infrastructure information and share timely actionable information regarding grid security with appropriate key personnel of owners, operators, and users of the critical electric infrastructure.
Federal Power Act (16 U.S.C, Chapter 12)	1920	<ul style="list-style-type: none"> • Created the Federal Power Commission as the licensing authority for hydroelectric plants; its authority was subsequently transferred to FERC upon its creation. • The Secretary of Energy, under Section 202(c), has authority in time of war or other emergency to order temporary interconnections of facilities and generation, delivery, interchange, or transmission of electric energy that the Secretary deems necessary to meet an emergency. • Establishes the Critical Electric Infrastructure Information (CEII) program. It authorizes DOE and FERC to designate certain sensitive information provided to the Federal Government as CEII and protect the information from disclosure under the Freedom of Information Act.

Title	Date	Applicability to a Power Outage
Foreign Assistance Act (P.L. 87-195)	1961	Reorganizes the structure of United States foreign assistance programs, separated military from non-military aid, and creates a new agency within DOS, the United States Agency for International Development (USAID) to coordinate the United States Government's response to disasters overseas.
Natural Gas Act (15 U.S.C., Chapter 15b)	1938	<ul style="list-style-type: none"> • Gives the President authority to declare a natural gas supply emergency. • Allows DOE to authorize imports and exports of natural gas. Provides FERC the authority to approve the siting of and abandonment of interstate natural gas facilities, including pipelines, storage, and liquefied natural gas facilities. • Delegates authority over the construction, operation, and siting of particular facilities to the FERC. • Provides DOE with the authority to order any interstate pipeline or local distribution company served by an interstate pipeline to allocate natural gas to help meet the needs of high-priority consumers during a natural gas emergency.
Power Plant and Industrial Fuel Use Act (FUA) (42 U.S.C.)	1978	<ul style="list-style-type: none"> • Under section 404(a), gives the President authority to allocate coal (and require the transportation of coal) for use by any power plant or major fuel-burning installation during a declared severe energy supply interruption as defined by section 3(8) of EPCA, 42 U.S.C. § 6202(8). • Section 404(b) authorizes the President to prohibit the use by any power plant or major fuel-burning installation of petroleum or natural gas, or both, as a primary energy source.
Safe Drinking Water Act (42 U.S.C., Section 300f et seq.)	1974, amended 1986 and 1996	Protects the quality of public drinking water supplies in the United States. Under the SDWA, EPA sets standards and treatment requirements for public water supplies. Regulations are in place for constituents that may pose health risks and that are likely to be present in public water supplies (microorganisms, disinfectants, disinfection byproducts, inorganic chemicals, organic chemicals and radionuclides.) After a power outage, water pressure fluctuation in the distribution system and/or loss of power at the treatment plant may increase contaminant intrusion or risk of compromised water quality. SDWA requirements require compliance monitoring to assure water quality meets safe drinking water standards.

Table 15: Applicable FERC Orders

Title	Date	Applicability to a Power Outage
Certifying NERC as the ERO (Docket No. RR06-1-000)	July 20, 2006	<p>Pursuant to Energy Policy Act of 2005, FERC conditionally certified the NERC as the Nation's ERO.</p> <ul style="list-style-type: none"> • NERC must make specified changes and file them with FERC to continue as the ERO. • Develops and enforces mandatory electric reliability standards under FERC's oversight. The standards will apply to all users, owners, and operators of the BPS.
Order on Application for Blanket Authorization for Transfers of Jurisdictional Facilities and Petition for Declaratory Order (Docket Nos. EC06-140-000, EL06-86-000)	September 22, 2006	The FERC Commission approved EEI to expand membership of the Spare Transformer Sharing Agreement that provides a blanket authorization for any jurisdictional public utility party to the Agreement to engage in future transfers of transformers pursuant to the Agreement, including transfers of transformers by public utilities to their affiliates.
Mandatory Reliability Standards for Critical Infrastructure Protection (CIP) (Docket No. RM06-22-000)	January 18, 2008	Pursuant to Section 215 of the Federal Power Act, FERC approved eight CIP Reliability Standards submitted by NERC. The standards require certain users, owners, and operators of the BPS to comply with specific requirements to safeguard critical cyber assets.

Title	Date	Applicability to a Power Outage
Approving Revised Reliability Standards for CIP and Requiring Compliance Filing (Docket No. RD09-7-000)	September 30, 2009	The FERC Commission approved the CIP Reliability Standards in Order No. 706 and directed NERC to develop modifications to the CIP Reliability Standards to address specific concerns. The order in Docket No. RD09-7-000 approves version 2 of the CIP standards by: (1) removing the “reasonable business judgment” language from each of the Standards; (2) removing the “acceptance of risk” exceptions from each of the Standards; (3) adding specific conditions that a Responsible Entity must satisfy to invoke the technical feasibility exception; and (4) adding review and oversight regarding creating a risk-based assessment methodology for critical cyber asset identification in CIP-002-1.
Order No. 761, Final Rule Approving Version 4 Critical Infrastructure Protection Reliability Standards (Docket No. RM11-11-000)	April 19, 2012	FERC approved eight modified CIP Reliability Standards, CIP-002-4 through CIP-009-4, developed and submitted by NERC. <ul style="list-style-type: none"> • The CIP Reliability Standards provide a cybersecurity framework to identify and protect “Critical Cyber Assets” to support the reliable operation of the BPS. • Reliability Standard CIP-002-4 requires the identification and documentation of Critical Cyber Assets associated with “Critical Assets” that support the reliable operation of the BPS and introduces “bright line” criteria for the identification of Critical Assets.
Order No. 791, Final Rule Approving Version 5 Critical Infrastructure Protection Reliability Standards (Docket No. RM13-5-000)	November 22, 2013	FERC approved the Version 5 CIP Reliability Standards, CIP-002-5 through CIP-011-1, submitted by NERC. <ul style="list-style-type: none"> • The CIP version 5 Standards adopt new cyber security controls and extend the scope of the systems that are protected by the CIP Reliability Standards.
Order No. 802, Final Rule Approving Physical Security Reliability Standard (Docket No. RM14-15-000)	November 20, 2014	FERC directed NERC to submit one or more Reliability Standards that require certain registered entities to take steps, or demonstrate that they have taken steps, to address physical security risks and vulnerabilities related to the reliable operation of the BPS. These steps require owners or operators of the BPS, as appropriate, to identify facilities on the BPS that are critical to its reliable operation. The owners or operators of those critical facilities should develop, validate, and implement plans to protect against physical attacks that may compromise the operability or recovery of such facilities.
Order No. 822, Final Rule Approving Revised Critical Infrastructure Protection Reliability Standards (Docket No. RM15-14-000)	January 21, 2016	FERC approved seven CIP Reliability Standards: CIP-003-6 (Security Management Controls), CIP-004-6 (Personnel and Training), CIP-006-6 (Physical Security of BES Cyber Systems), CIP-007-6 (Systems Security Management), CIP-009-6 (Recovery Plans for BES Cyber Systems), CIP-010-2 (Configuration Change Management and Vulnerability Assessments), and CIP-011-2 (Information Protection).
Order No. 829, Order Directing NERC to Develop Revised Critical Infrastructure Protection Reliability Standard that Addresses Supply Chain Risk Management (Docket No. RM15-14-002)	July 21, 2016	FERC directed NERC to develop a new or modified reliability standard to address supply chain risk management for industrial control system hardware, software, and computing and networking services associated with bulk electric system operations. The new or modified reliability standard is intended to mitigate the risk of a cybersecurity incident affecting the reliable operation of the BPS.

Table 16: Executive Orders and Presidential Directives

Title	Date	Description
Executive Order (E.O.) 12038, Relating to Certain Functions Transferred to the Secretary of Energy by the DOE Organization Act	February 3, 1978	Authorizes the Secretary of Energy to issue Presidential permits for the construction, operation, maintenance, and connection of electric transmission facilities at U.S. international borders, if it determines that the issuance of such a permit is in the public interest.
E.O. 13636, Improving Critical Infrastructure Cybersecurity	February 12, 2013	Directs the Executive Branch to— <ul style="list-style-type: none"> • Develop a technology-neutral voluntary cybersecurity framework; • Promote and incentivize the adoption of cybersecurity practices; • Increase the volume, timeliness, and quality of cyber threat information sharing; • Incorporate strong privacy and civil liberties protections into every initiative to secure our CI; and • Explore the use of existing regulation to promote cyber security.
PPD-21, Critical Infrastructure Security and Resilience	February 12, 2013	Addresses the roles and responsibilities across the Federal Government and establishes a more effective partnership with CI owners and operators and local, state, tribal, territorial, and insular area entities to enhance CI's security and resilience. Replaces HSPD-7, Critical Infrastructure Identification, Prioritization, and Protection.
PPD-41, United States Cyber Incident Coordination	July 26, 2016	Sets forth principles governing the Federal Government's response to any cyber incident, whether involving government or private sector entities. For significant cyber incidents, this PPD also establishes lead federal agencies and an architecture for coordinating the broader Federal Government response.

Table 17: Waivers and Other Regulatory Relief

Core Capability(s)	Lead Agency and Description
Economic Recovery	FERC: <ul style="list-style-type: none"> • During an emergency, FERC may consider waiving tariff provisions that may interfere with restoration efforts.
Environmental Response Health and Safety	EPA: <ul style="list-style-type: none"> • The Clean Air Act, Section 211 (c)(4)(C) allows EPA (upon request from a governor), to issue waivers to motor vehicle fuel requirements to address short-term fuel supply shortages. Such waivers may also benefit first responders and emergency response equipment. • In an extraordinary situation during an emergency, EPA could potentially issue a No Action Assurance that allows fuel loading and unloading without the use of vapor recovery or vapor combustion devices at bulk gasoline and marine loading terminals and associated truck racks, as otherwise required under the Clean Air Act.
Planning/ Operational Coordination	FEMA: <ul style="list-style-type: none"> • During an emergency, waivers can be offered on reporting requirements, enabling responders to focus more fully on the restoration efforts.

Core Capability(s)	Lead Agency and Description
Critical Transportation	<p>DOT:</p> <ul style="list-style-type: none"> The Federal Railroad Administration (FRA) Emergency Relief Docket (ERD) is a special provision regulation that provides expedited review and approval of waiver requests from railroads related to a specific emergency. The Administrator of the FRA can designate specific events, such as emergencies to trigger the opening of the ERD. Exemptions (“waivers”) from many of the Federal Motor Carrier Safety Regulations (FMCSRs) occur “automatically” in accordance with 49 CFR 390.23 when the President, a governor, or a local government official issues a declaration of emergency (as defined in 49 CFR 390.5). Presidential and state declarations are effective for up to 30 days, and local declarations are effective for up to five days. Only a Federal Motor Carrier Safety Administration (FMCSA) Field Administrator or Regional Field Administrator has authority to extend the waivers beyond the initial 30 days and to place additional restrictions on the waivers. The waivers apply to any commercial motor vehicle responding from anywhere in the United States to provide direct relief to the emergency. The Hours of Service limitations do not apply to a driver of a utility service vehicle as defined in 49 CFR § 395.2. The Federal Government does not issue permits for oversize or overweight vehicles. State DOTs may grant these permits. To obtain state permits, travelers need to contact the state(s) in which they need to travel. For more information see the following link: http://ops.fhwa.dot.gov/freight/sw/permit_report/index.htm. The Federal Government does not issue toll waivers. Toll waivers may be issued on a case-by-case basis by the state, local authority, or private entity that owns the specific piece of tolled infrastructure.
Mass Care	<p>FEMA:</p> <ul style="list-style-type: none"> Issues waivers of the GSA lodging rate used to determine allowable room night charges for survivors in the TSA program.

Table 18: Source Documents and References (Federal)

Department or Agency	Document or Reference	Year
DOE	<i>Energy: Critical Infrastructure and Key Resources Sector-Specific Plan as Input to the National Infrastructure Protection Plan.</i> http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/Energy_SSP_Public.pdf	2007
DOE	<i>Energy Infrastructure Risk Framework, United States DOE Office of Electricity Delivery and Energy Reliability, Infrastructure Security and Energy Restoration Division, Identifying Dependencies and Interdependencies, 2011.</i>	2011
DOE	<i>NERC: Severe Impact Resilience: Considerations and Recommendations.</i> http://www.nerc.com/docs/oc/sirtf/SIRTF_Final_May_9_2012-Board_Accepted.pdf	2012
DHS	<i>National Infrastructure Protection Plan.</i> https://www.dhs.gov/publication/nipp-2013-partnering-critical-infrastructure-security-and-resilience	2013
DOE & DHS	<i>2015 Energy Sector Specific Plan.</i> https://www.dhs.gov/sites/default/files/publications/nipp-ssp-energy-2015-508.pdf	2015
FEMA	<i>FEMA: ESF #12 Data Requirements for Emergency Management</i>	2015
DOE	<i>United States Electricity Industry Primer, Office of Electricity Delivery and Energy Reliability, United States DOE, DOE/OE-0017, August 2016 Revised Edition.</i>	2015
FEMA	<i>International Assistance Systems Concept of Operations</i> http://www.fema.gov/media-library-data/1444411200092-5b09869d53801ceb5640c00b2f337e64/2015_IAS_CONOPS_Public_Version_Accessible.pdf	2016

Table 19: Source Documents and References (Industry)

Industry Stakeholders (Private and Public Sector)	Year
EEI: "How the National Response Event Framework Is Different From the Current Mutual Assistance Program." http://www.eei.org	2014
EEI: "Responding with the Strength of an Industry: Understanding The Investor-Owned Electric Utility Industry's National Response Event Plan." http://www.eei.org	2014
American Public Power Association: "Public Power Mutual Aid Playbook." http://www.publicpower.org	2014
ESCC Playbook: "A Crisis Management Framework for the Electricity Subsector Coordinating Council (ESCC)."	2015
EEI: "Understanding the Electric Power Industry's Response and Restoration Process." http://www.eei.org/issuesandpolicy/electricreliability/mutualassistance/Documents/MA_101FINAL.pdf	2016

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Appendix 7: Glossary

Access and functional needs. Individual circumstances requiring assistance, accommodation, or modification for mobility, communication, transportation, safety, health maintenance, etc., due to any temporary or permanent situation that limits an individual's ability to take action during an incident.

American Public Power Association. The national service organization representing the interests of not-for-profit, state, municipal, and other locally owned electric companies in the United States. More than 2,000 public power utilities, doing business in every state but Hawaii, account for over 15 percent of all electric energy (kilowatt-hours) sales to ultimate consumers in the Nation and collectively serve over 48 million people. APPA utility members' primary goal is providing customers in the communities they serve with reliable electric power and energy at the lowest reasonable cost, consistent with good environmental stewardship.

American Public Power Association Mutual Aid Working Group. A mutual aid network for the Nation's public power utilities. Each of the ten regions has appointed a Public Power Network Coordinator who works with the public power utilities in the applicable regions on coordinating any federal/state support needed to APPA.

Assessment. The process of acquiring, collecting, processing, examining, analyzing, evaluating, monitoring, and interpreting the data, information, evidence, objects, measurements, images, and sound, among others, whether tangible or intangible, to provide a basis for decision making.

Black start resources. Generating units that have the ability to be started without support from the rest of the bulk power system, or are designed to remain energized without connection to the remainder of the bulk power system, and can be used to restart other generating units as part of the process of re-energizing the system.

Bulk Electric System. The electrical generation resources, transmission lines, interconnections with neighboring systems, and associated equipment, generally operated at voltages of 100 kilovolts or higher.

Bulk Power System. A large interconnected electrical system made up of generation and transmission facilities and their control systems. A BPS does not include facilities used in the local distribution of electric energy. If a bulk power system is disrupted, the effects are felt in more than one location. In the United States, the NERC oversees the BPS.

Collaborate. The process of working together to achieve shared goals.

Core Capabilities. Distinct critical elements necessary to achieve the *National Preparedness Goal*.

Critical Infrastructure. Systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or medical, or safety, or any combination of those matters. (Source: *NIPP*)

Cybersecurity. The prevention of damage to, unauthorized use of, or exploitation of, and, if needed, the restoration of electronic information and communications systems and the information contained therein to ensure confidentiality, integrity, and availability. Includes protection and restoration, when needed, of information networks and wireline, wireless, satellite, public safety answering points, and 9-1-1 communications systems and control systems. (Source: *NIPP*)

Defense Production Act. The Defense Production Act ³¹ (DPA) is the primary source of presidential authority to expedite and expand the supply of critical resources from the U.S. industrial base to support the national defense and homeland security. In addition to military, energy, and space activities, the DPA definition of “national defense” includes emergency preparedness activities conducted pursuant to Title VI of the Stafford Act, protection and restoration of critical infrastructure, and efforts so prevent, reduce vulnerability to, minimize damage from, and recover from acts of terrorism within the United States. The President’s DPA authorities are delegated to the head of various federal departments in Executive Order 13603. ³² DPA, however does not necessarily increase the production of critical resources if those production lines are already operating at a maximum capacity and the demand for such resources are high resulting in significant national shortages.

Electricity Information Sharing and Analysis Center. The E-ISAC gathers and analyzes security information, coordinates incident management, and communicates mitigation strategies with stakeholders within the electricity subsector, across interdependent sectors, and with government partners. The E-ISAC, in collaboration with DOE and the ESCC, serves as the primary security communications channel for the electricity subsector and enhances the subsector’s ability to prepare for and respond to cyber and physical threats, vulnerabilities, and incidents. The NERC operates the E-ISAC on behalf of the electricity subsector.

Electric grid. Layout of the electrical transmission system; a network of transmission lines and the associated substations and other equipment required to move power.

Emergency communications. The means and methods for exchanging communications and information necessary for successful incident management. (Source: *National Emergency Communications Plan*)

Emergency Management Assistance Compact. A congressionally ratified mutual aid compact that legally establishes a national system to facilitate resources across state lines during an emergency or disaster.

Emergency response providers. The Homeland Security Act of 2002 defines emergency response providers as local, state, and federal governmental and nongovernmental emergency public safety, fire, law enforcement, emergency response, emergency medical (including hospital emergency facilities), and related personnel, agencies, and authorities.

Emergency Support Functions. Used by the Federal Government and many state governments as the primary mechanism at the operational level to organize and provide assistance, ESFs align categories of resources and provide strategic objectives for their use. ESFs utilize standardized

³¹ Defense Production Act of 1950, as amended (50 U.S.C. § 4501 et seq.).

³² Executive Order 13603 of March 16, 2012: National Defense Resources Preparedness.

resource management concepts such as typing, inventorying, and tracking to facilitate the dispatch, deployment, and recovery of resources before, during, and after an incident.

Energy sector. The energy sector supplies fuels to the transportation industry, electricity to households and businesses, and other sources of energy that are integral to growth and production across the Nation. It is divided into three interrelated segments or subsectors—electricity, oil, and natural gas—to include the production, refining, storage, and distribution of oil, gas, and electric power, except for hydroelectric and commercial nuclear power facilities and pipelines. (Source: *Energy Sector Specific Plan*)

Energy Subsector Coordinating Council. The ESCC is the principal liaison between leadership in the Federal Government and in the electric power sector, with the mission of coordinating efforts to prepare for national-level incidents or threats to CI. The ESCC includes utility CEOs and trade association leaders representing all segments of the industry.

Federal Energy Regulatory Commission: An independent agency that regulates the interstate transmission of electricity, natural gas, and oil. FERC regulates the wholesale sale of electric energy in interstate commerce. FERC also reviews proposals to build liquefied natural gas terminals and interstate natural gas pipelines as well as licensing hydropower projects.

Federal Power Program. A government program that includes the TVA, BPA, SEPA, SWPA, and WAPA. These wholesale-only entities were created to provide their electric company and industrial customers with access to federally owned and operated hydroelectric dams for distribution to end users. TVA is an independent, government-owned corporation that provides electricity for business customers and local power distributors in parts of seven southeastern states and owns both generation and transmission facilities. BPA, SEPA, SWPA, and WAPA are Power Marketing Administrations or PMAs, which are federal agencies housed within the DOE (see *Power Marketing Administration*).

First responders. (also see *Emergency response providers*). The Implementing the 9/11 Commission Recommendations Act of 2007 states that the term “first responder” shall have the same meaning as the term “emergency response provider,” which is defined in the Homeland Security Act of 2002.

Generator. Machine that converts one form of energy into another, especially mechanical energy into electrical energy.

Government Coordinating Council. The government counterpart to the SCC for each sector, established to enable interagency coordination. The GCC comprises representatives across various levels of government (local, state, tribal, territorial, insular area, and federal) as appropriate to the security and operational landscape of each individual sector. (Source: *2013 NIPP*)

Independent power producers. Sometimes called non-utility generators, these are privately held businesses that own and operate their own generation assets and sell power to other utilities or directly to end users.

Information Sharing and Analysis Centers. Operational entities formed by CI owners and operators to gather, analyze, appropriately sanitize, and disseminate intelligence and information

related to CI. ISACs provide 24/7 threat warning and incident reporting capabilities and have the ability to reach and share information within their sectors, between sectors, and among government and private sector stakeholders. (Source: *Presidential Decision Directive [PDD]-63*)

Interdependency. Mutually reliant relationship between entities (objects, individuals, or groups); the degree of interdependency does not need to be equal in both directions.

Investor-owned utilities. For-profit companies owned by their shareholders. These utilities may have service territories in one or more states. State commissions will grant IOUs the license to operate in specific areas of the state under certain terms and conditions. Their interstate generation, transmission, and power sales are regulated by FERC, and state commissions regulate their distribution system and retail sales.

Jurisdiction. A range or sphere of authority. Public safety agencies have jurisdiction at an incident related to their legal responsibilities and authority. Jurisdictional authority at an incident can be political or geographical (e.g., local, state, tribal, territorial, insular area, and federal boundary lines) or functional (e.g., law enforcement, public health, medical).

Large power transformer. The term LPT is broadly used to describe a power transformer with a maximum nameplate rating of 100 megavolt-amperes or higher. (Source: *Large Power Transformers and the Electric Grid*, DOE, April 2014 Update)

Lifeline function. Per the *NIPP*, a lifeline function is a sector that provides indispensable services to enable the continuous operation of critical business and government functions that would risk human health and safety or national and economic security if compromised or not promptly restored. These sectors provide the most essential services that underlie a regional economy. Lifeline functions include communications, energy, transportation, and water.

Mutual Aid Agreement or Assistance Agreement: Written or oral agreement between and among agencies, organizations, or jurisdictions that provides a mechanism to quickly obtain emergency assistance in the form of personnel, equipment, materials, and other associated services. The primary objective is to facilitate rapid, short-term deployment of emergency support prior to, during, or after an incident.

National Disaster Recovery Framework. Defines how the whole community, including emergency managers, community development professionals, recovery practitioners, government agencies, private sector, NGO leaders, and the public, will collaborate and coordinate to more effectively utilize existing resources to promote resilience and support the recovery of those affected by an incident. (Source: *NDRF*)

National Incident Management System. The National Incident Management System (NIMS) is a comprehensive, national approach to incident management that applies at all jurisdictional levels and across functional disciplines.

National Preparedness Goal. The cornerstone for the implementation of PPD-8, it establishes the capabilities and outcomes for the Nation to accomplish across five mission areas (Prevention, Protection, Mitigation, Response, and Recovery) to be secure and resilient. The Goal establishes distinct core capabilities and corresponding target elements for each mission area.

National Response Coordination Center. When activated, the NRCC is a multiagency coordination center located at FEMA Headquarters. Its staff coordinates the overall federal support for major disasters and emergencies, including catastrophic incidents and emergency management program implementation. FEMA maintains the NRCC as a functional component of the National Operations Center for incident support operations. (Source: NRF)

National Response Event. A classification used by Edison Electric Institute to describe a natural or manmade event that is forecasted to cause or that causes long-term power outages affecting a significant population or several regions across the United States and requires resources from its multiple regional mutual aid groups. [Note: this term is not necessarily used by other components of the electric industry.]

National Response Framework. A guide to how the Nation responds to all types of disasters and emergencies. It describes specific authorities and best practices for managing incidents that range from the serious but purely local to large-scale terrorist attacks or catastrophic natural disasters.

National Rural Electric Cooperative Association. The national service organization for the Nation's 900-plus member owned not-for-profit electric utilities who keep the lights on for 42 million people across 47 states. Electric cooperatives bring power to 75 percent of the United States landmass and 12 percent of the U.S. population.

Network. Per the NIPP, a network is a group of components that share information or interact with each other to perform a function.

Nongovernmental organization. Voluntary, racial, ethnic, faith-based, veteran-based, and not-for-profit organizations that provide sheltering, emergency food supplies, and other essential support services. NGOs are inherently independent and committed to specific interests and values.

North American Electric Reliability Corporation. A not-for-profit international regulatory authority whose mission is to assure the reliability of the BPS in North America. NERC's area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico. NERC is the electric reliability organization for North America, subject to oversight by the FERC and governmental authorities in Canada.

Outage. Removal of generating capacity from service, either forced or scheduled.

Power grid. Layout of the electrical transmission system; a network of transmission lines and the associated substations and other equipment required to move power.

Power Marketing Administrations. PMAs provide public power and rural electric cooperative customers with cost-based hydroelectric power produced at federal dams operated primarily by USACE and the Bureau of Reclamation.

Private sector entity. Per the NRF, private sector entities include large, medium, and small businesses; commerce, private cultural and educational institutions; and industry, as well as public-private partnerships that have been established specifically for emergency management purposes.

Protective Security Advisors. Security SMEs who engage with local, state, tribal, territorial, and insular area governmental partners and members of the private sector stakeholder community to protect the Nation's CI. During incidents, PSAs provide infrastructure security and resilience expertise at the JFOs, RRCCs, and state and county EOCs to assist with response and recovery efforts.

Public power utilities. Not-for-profit utilities owned and operated by state or local governments or by agencies, authorities, or instrumentalities of such governments. City-owned utilities are also known as municipal utilities (munis). Public power utilities are regulated and governed by locally elected or appointed officials and are directly accountable to the communities they serve. Within the United States, there are more than 2,000 community-owned electric companies, serving more than 48 million people or about 14 percent of the Nation's electricity consumers.

Recovery Support Functions. Coordinating structures for key functional areas of assistance during recovery operations, RSFs support local governments by facilitating problem solving, improving access to resources, and fostering coordination among state and federal agencies, nongovernmental partners, and stakeholders. (Source: NDRF)

Regional Mutual Assistance Groups. Voluntary partnerships of investor-owned electric companies across the country, RMAGs are the mechanisms through which investor-owned electric companies request support for restoring power. These entities facilitate the process of identifying available restoration workers and help utilities coordinate the logistics and personnel involved in restoration efforts.

Regional Response Coordination Center. When activated, RRCCs are multi-agency coordination centers generally staffed by ESFs in anticipation of or immediately following an incident. Operating under the direction of the FEMA Regional Administrator, the staff within an RRCC coordinates federal regional response efforts and maintains connectivity with FEMA Headquarters and with state EOCs and state and major urban area fusion centers.

Resources. Personnel and major items of equipment, supplies, and facilities available or potentially available for assignment to incident operations and for which status is maintained. Resources are described by kind and type and may be used in operational support or supervisory capacities at an incident or at an EOC.

Rural Electric Cooperatives. Also known as co-ops, they are not-for-profit entities owned by their members and tend to serve in rural areas that are not traditionally served by other utilities. They must have democratic governance and operate at cost. Any revenue generated in excess of operating costs must be returned to the members. Members vote for representatives to the co-op's board of directors, which oversees operations.

Sector Coordinating Council. The private sector counterpart to the GCC, these councils are self-organized, self-run, and self-governed organizations that represent a spectrum of key stakeholders within a sector. They serve as principal entry points for the government to collaborate with each sector for developing and coordinating a wide range of CI security and resilience activities and issues. (Source: *NIPP*)

Sector Specific Agency. A federal department or agency designated by PPD-21 with responsibility for providing institutional knowledge and specialized expertise, as well as leading,

facilitating, or supporting the security and resilience programs and associated activities of its designated CI sector in the all-hazards environment. (Source: PPD-21)

Sector Specific Plans. Planning documents that complement and tailor application of the National Plan to the specific characteristics and risk landscape of each CI sector. SSAs develop them in close collaboration with the SCCs and other sector partners. (Source: NIPP)

SpareConnect Program. A program that establishes a confidential, unified platform for the entire electric industry to communicate equipment needs in the event of an emergency or other non-routine failure.

Spare Transformer Equipment Program. An electric industry program that requires each participating electric company to maintain a specific number of transformers and to sell its spare transformers to any other participating utility that suffers a “triggering event” (an act of terrorism that destroys or disables one or more substations and results in the declared state of emergency by the President of the United States).

Substations. Equipment that switches, steps down, or regulates voltage of electricity. Also serves as a control and transfer point on a transmission system.

Transformer. Electrical device that changes the voltage in alternating current circuits.

Whole Community. Per the National Preparedness Goal, the term “whole community” applies to the focus on enabling the participation in national preparedness activities of a wider range of players from the private and nonprofit sectors, including NGOs and the general public, in conjunction with the participation of local, state, tribal, territorial, insular area, and federal governmental partners to foster better coordination and working relationships.

Appendix 8: Acronyms

To promote readability, this annex utilizes acronyms only after the first occurrence of the proper name of a Federal Executive Branch department or agency or of a commonly used term. The exception to this rule applies to acronyms that only appear within tables and figures in the document, where space considerations and readability render the use of acronyms optimal.

APPA	American Public Power Association
ARC	American Red Cross
ASPR	DHS Office of the Assistant Secretary of Preparedness and Response
BES	Bulk Electrical System
BPA	Bonneville Power Administration
BPS	Bulk Power System
CAT	Crisis Action Team
CEII	Critical Electric Infrastructure Information
CFR	Code of Federal Regulations
CI	Critical Infrastructure
CI-CAT	Critical Infrastructure–Crisis Action Team
CIP	Critical Infrastructure Protection
CIR	Critical Information Requirement
Co-ops	Cooperatives
CS&C	Office of Cybersecurity and Communications
CWG	Communications Working Group
DCISE	Defense Inclusive Base Collaborative Information Sharing Environment
DHS	Department of Homeland Security
DHS NPPD IP	Department of Homeland Security National Protection and Programs Directorate Infrastructure Protection
DIB	Defense Industrial Base
DIRS	Disaster Information Reposting System
DLA	Defense Logistics Agency
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy
DoED	Department of Education
DOI	Department of the Interior

DOJ	Department of Justice
DOL	Department of Labor
DOS	Department of State
DOT	Department of Transportation
DPA	Defense Production Act
DRF	Disaster Relief Fund
E-ISAC	Electricity Information Sharing and Analysis Center
EAD	Energy Assurance Daily
EAGLE-I	Environment for Analysis of Geo-Located Energy Information
EARSS	Energy Awareness and Resiliency Standardized Services
EEAC	Energy Emergency Assurance Coordinators
EI	Edison Electric Institute
EIA	Energy Information Administration
EIDL	Economic Injury Disaster Loans
EMP	Electromagnetic pulse
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPCA	Energy Policy and Conservation Act
EPFAT	Emergency Power Facility Assessment Tool
EPRAM (Los Alamos)	Evolutionary Prototyping with Risk Analysis and Mitigation
EPRAM (USACE)	Emergency Power Readiness Assessment Model
ERD	Emergency Relief Docket
ERO	Electric Reliability Organization
ESCC	Electricity Subsector Coordinating Council
ESF	Emergency Support Function
ESFLG	Emergency Support Function Leadership Group
FAST	Fixing America's Surface Transportation
FBI	Federal Bureau of Investigation
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FIOP	Federal Interagency Operational Plan
FMCSA	Federal Motor Carrier Safety Administration

FRA	Federal Railroad Administration
FRB	Federal Reserve Board
FRCC	Florida Reliability Coordinating Council
FUA	Fuel Use Act
GCC	Government Coordinating Council
GIS	Geographic Information Systems
GSA	General Services Administration
HAZUS	Hazards U.S.
HAZUS-MH	Hazards U.S. Multi-hazards
HHS	Department of Health and Human Services
HSIN	Homeland Security Information Network
HSPD	Homeland Security Presidential Directive
IACP	International Association of Chiefs of Police
IOC	Infrastructure of Concern
IOU	Investor-Owned Utilities
IP	Office of Infrastructure Protection (DHS)
IPAWS	Integrated Public Alert and Warning System
ISAC	Information Sharing Analysis Center
IT	Information Technology
JFO	Joint Field Office
JIC	Joint Information Center
JOC	Joint Operations Center
LPT	Large Power Transformer
MAWG	Mutual Aid Working Group
MDWG	Modeling and Data Working Group
MoDI	Modeling and Data Inventory
MRO	Midwest Reliability Organization
NACCHO	National Association of County and City Health Officials
NARUC	National Association of Regulatory Utility Commissioners
NASEO	National Association of State Energy Officials
NBEOC	National Business Emergency Operations Center
NCC	National Coordination Center
NCCIC	National Cybersecurity and Communications Integration Center

NCTC	National Counterterrorism Center
NDRF	National Disaster Recovery Framework
NEF	National Essential Functions
NERC	North American Electric Reliability Corporation
NGO	Nongovernmental Organization
NICC	National Infrastructure Coordinating Center
NIMS	National Incident Management System
NIPP	National Infrastructure Protection Plan
NISAC	National Infrastructure Simulation and Analysis Center
NIST	National Institute of Standards and Technology
NMART	Edison Electrical Institute's National Mutual Assistance Resource Team
NOAA	National Oceanic and Atmospheric Administration
NPPD	National Protection and Programs Directorate
NPWS	National Public Warning System
NRC	United States Nuclear Regulatory Commission
NRCC	National Response Coordination Center
NRCS	National Response Coordination Staff
NRE	National Response Event
NRECA	National Rural Electric Cooperative Association
NRF	National Response Framework
NSA	National Sheriffs' Association
NTSB	National Transportation Safety Board
NVOAD	National Voluntary Organizations Active in Disaster
OCIA	Office of Cyber and Infrastructure Analysis
ODNI	Office of the Director of National Intelligence
OPM	Office of Personnel Management
PCII	Protected Critical Infrastructure Information
PEP	Primary Entry Point
PICCL	Private Sector Incident Communications Conference Line
PMA	Power Marketing Administration
POD	Point of Distribution
POIA	Power Outage Incident Annex
PPD	Presidential Policy Directive

PSA	Protective Security Advisor
RFI	Request for Information
RMAG	Regional Mutual Assistance Group
RRCC	Regional Response Coordination Center
RSF	Recovery Support Function
SBA	Small Business Administration
SCADA	Supervisory control and data acquisition systems
SCC	Sector Coordinating Council
SDWA	Safe Drinking Water Act
SEC	Securities and Exchange Commission
SEPA	Southeastern Power Administration
SERC	SERC Reliability Corporation
SME	Subject matter expert
SNAP	Supplemental Nutrition Assistance Program
SPR	Strategic Petroleum Reserve
SSA	Sector Specific Agency
STEP	Spare Transformer Equipment Program
SWPA	Southwestern Power Administration
TREAS	Department of the Treasury
TSA	Transportation Security Administration
TVA	Tennessee Valley Authority
UCG	Unified Coordination Group
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USPS	United States Postal Service
WAPA	Western Area Power Administration
WECC	Western Electricity Coordinating Council