Energy Assurance Plan 2023 - 2027

The Department of Energy and Environment

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List of Acronyms

API	American Petroleum Institute
BLS	Bureau of Labor Statistics
CIP	Critical Infrastructure Protection
CMT	Consequence Management
CUBDC	Consumer Utility Board
DC	District of Columbia
DCNG	District of Columbia National Guard
DoD	US Department of Defense
DOEE	DC Department of Energy and Environment
DOE	US Department of Energy
DDOT	DC Department of Transportation
DGS	DC Department of General Services
DLA	Defense Logistics Agency
DMME	VA Department of Mines, Minerals, and Energy
DPW	DC Department of Public Works
DRP	District Response Plan
EAP	Energy Assurance Plan
EBTR	Emergency Building Temperature Restrictions
EDC	Energy Distribution Company
EIA	Energy Information Agency
ELO	Emergency Liaison Officer
EMAC	Emergency Management Assistance Compact
EOC	Emergency Operations Center
EOM	Executive Office of the Mayor
EPA	US Environmental Protection Agency
EPC	Emergency Planning Council
ESDTP	Energy Supply Disruption Tracking Plan
ESF	Emergency Support Function
FBI	US Federal Bureau of Investigation
FEMS	DC Fire and Emergency Medical Services
FERC	Federal Energy Regulatory Commission
FMCSR	Federal Motor Carrier Safety Regulations
HSEMA	DC Homeland Security and Emergency Management Agency
GSP	Gross State Product
JIC	Joint Information Center
JFC	Joint Field Command

LDC	Local Distribution Company
MAPDA	Mid-Atlantic Petroleum Distributors Association
MAPGA	Mid-Atlantic Propane Gas Association
MEA	Maryland Energy Administration
MOU	Memoranda of Understanding
MPD	DC Metropolitan Police Department
MWCOG	Metropolitan Washington Council of Governments
NASEO	National Association of State Energy Officials
NCP	National Contingency Plan
NCR	National Capital Region
NDA	Non-Disclosure Agreement
NRP	National Response Plan
OC/EOM	Office of Communications/Executive Office of the Mayor
ONCRC	Office of National Capital Region Coordination
PACE	Property Assessed Clean Energy
Pepco	Potomac Electric Power Company
PGA	Propane Gas Association
PHMSA	Pipeline and Hazardous Materials Safety Administration
PJM	PJM Interconnection is a regional transmission organization (RTO)
PIO	Public Information Officer
PSC	DC Public Service Commission
RTO	Regional Transmission Organization
UASI	Urban Area Security Initiative
USACE	US Army Corps of Engineers
USCG	United States Coast Guard
WASA	DC Water and Sewer Authority (a.k.a. DC Water)
WMDA	Washington, MD, DE Service Station and Auto Repair Assoc.
WebEOC	Web Emergency Operations Center

1 Executive Summary

The Energy Assurance Plan (EAP) of the District of Columbia 2023-2027 updates the District's 2018-2022 Energy Assurance Plan, which describes the role of the Department of Energy and Environment (DOEE) in promoting energy assurance. In the 2005 Energy Emergency Plan, the role of the predecessor agency (i.e., District of Columbia Energy Office) to the current Energy Administration (EA) was an "operational role." Since then, that role has been significantly changed to information sharing and coordination. This role has been modified for DOEE recently, as the electric and gas utilities have begun directly sharing information with the District Homeland Security and Emergency Management Agency (HSEMA) to obtain greater efficiency in communication and coordinating action. Overall, this shift to a new role is due to: (1) the structure of the energy industry in the District, (2) the structure of HSEMA, (3) implementation of the Web-based Emergency Operations Center (WebEOC), and (4) the creation of the new DOEE.

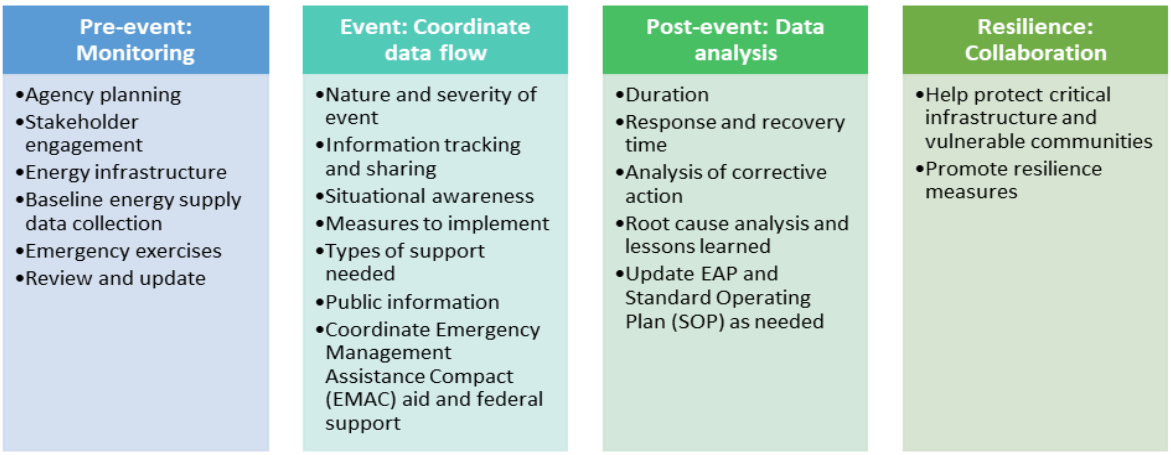


Figure 1 DOEE's role in emergency support

DOEE's information coordination roles cover four areas: pre-event, event, post-event, and resilience:

1. **Pre-Event Responsibilities:** These include comprehensive energy planning, maintaining a current energy profile of the District, and planning and participating in emergency planning exercises.
2. **Event Responsibilities:** These relate to gathering and sharing information during an energy emergency event.
3. **Post-Event Responsibilities:** These include developing and sharing lessons learned.
4. **Resilience Responsibilities:** These relate to participating in policy development related to critical infrastructure protection and promoting policies and programs that enhance the resilience of the District's energy systems.

Section 2: Purpose of the EAP

The purpose of the EAP is to provide information on how the District, in general, and DOEE, in particular, will: (1) respond in case of an energy emergency, and (2) promote the resilience of the District's energy systems to reduce vulnerabilities. This section provides the basic guide for what DOEE and other Emergency Support Function (E[1]SF) #12[2] organizations are responsible for pre- and post-event by addressing the following questions:

5. What types of energy emergencies can occur in the District?
6. Who responds to an energy emergency in the District?
7. What is the planned course of action when an energy emergency occurs?
8. What follow-up is conducted after an energy emergency?

Section 3: Energy Profile of the District of Columbia

Monitoring the energy profile includes keeping track of:

1. The drivers of energy supply, demand, and prices, which include trends in energy costs and expenditures;
2. The energy regulatory environment and the extent to which it supports energy assurance; and
3. The energy market structure and the extent that it fosters or hinders energy assurance.

Section 4: Energy Supply Disruption Tracking Plan (ESDTP)

The ESDTP provides a process by which energy supply and demand information is monitored and analyzed regularly.

Section 5: Resilience

One of the major goals of the Sustainable DC Plan is to promote the resilience of the energy systems in the District. DOEE's ongoing activities to enhance the resilience of the District's energy systems include (1) modernizing the District's energy delivery, (2) studying the technical potential of deploying microgrids with energy storage in new developments and retrofitting district energy systems, and (3) looking for opportunities to turn publicly owned buildings to serve as community resilience hubs, using onsite renewable generation and energy storage. DOEE's Energy Administration has been leading the effort on behalf of the District Government to modernize the District's energy delivery systems and developing neighborhood-scale energy systems. DOEE's Energy Administration (EA) is also assisting DOEE's Urban Sustainability Administration's (USA) implementation of Climate Ready DC, the District's climate adaptation plan, which includes plans for developing community resilience hubs. This section reproduces the full profile of ESF #12 – Energy from the 2015 District Response Plan (DRP).

[1] https://www.fema.gov/pdf/emergency/nrf/nrf-esf-12.pdf

[2] Emergency Support Function (ESF) #12 – Energy is intended to facilitate the restoration of damaged energy systems and components when activated by the Secretary of Homeland Security for incidents requiring a coordinated Federal response. Under Department of Energy (DOE) leadership, ESF #12 is an integral part of the larger DOE responsibility of maintaining continuous and reliable energy supplies for the United States through preventive measures and restoration and recovery actions.

2 What to do in Case of an Energy Emergency

This section outlines the roles, responsibilities and various steps the District, DOEE, and various partners will take during an energy emergency. The roles, responsibilities, and steps are outlined by providing answers to the following questions:

1. What is the purpose of the EAP?
2. What are the sources and uses of energy in the District?
3. What types of energy emergencies can occur in the District?
4. Who responds to an energy emergency in the District?
5. What is the planned course of action when an energy emergency occurs?
6. What follow-up is conducted after an energy emergency?
7. What can be done to create an increasingly resilient energy systems and protect critical infrastructure?

2.1 What is the Purpose of the EAP?

The purpose of the EAP is to provide information on how the District, in general, and the DOEE, will: (1) respond in case of an energy emergency, and (2) promote the resiliency of the District's energy systems to reduce vulnerabilities. This section provides the basic guide for what DOEE and other ESF #12 organizations are responsible for pre- and post-event by addressing the following questions:

1. What types of energy emergencies can occur in the District?
2. Who responds to an energy emergency in the District?
3. What is the planned course of action when an energy emergency occurs?
4. What follow-up is conducted after an energy emergency?

This EAP is a functional annex to the Emergency Operations Plans (EOP). The mission of the EOP is to identify priorities, applicable polices, and authorities of operations for management of the District's 24 threats and hazards. EOP transitioned from structuring the response of the DEP from Emergency Support Function Annexes to agency-owned service plans. The DSP links the District emergencies to responses by agencies of the District Government and its federal and regional partners.

The EAP identified the major operational roles of DOEE in the event of an energy emergency. Many of those roles were included in the DRP. The DRP functions as the District's manual for responding to any emergency. After the 2018 EAP and the DSP, particularly after the events of September 11, 2001, many major emergency functions are now carried out by HSEMA.

Given the characteristics of energy supply and distribution in the District, the energy suppliers

and distributors are the first responders to an energy emergency in terms of restoring service. Therefore, the District, and HSEMA, work closely and directly with the District's energy suppliers and distributors to ensure that responses to an energy emergency are timely and appropriate.

The EAP provides the context for how the District Government will interface with its energy suppliers and distributors, energy consumers, and the public. Clarifying this interface process is a key component of this update to the District's Energy Assurance Plan. In addition to this interface role, DOEE is responsible for promoting the resilience of the District's energy systems. Section 5 of this EAP includes a description of the steps the District has taken to increase energy systems resilience.

This update follows the Energy Emergency Response playbook for states and territories and National Association of State Energy Officials' (NASEO) State Energy Assurance Guidelines. This EAP focuses on energy emergencies, following the guidelines provided by NASEO, and incorporates the operational concept as expressed in the EOP.

2.1.1 Key Premises of this EAP

This EAP is based on two key premises:

- **HSEMA initiates notification of an energy emergency:** HSEMA initiates government responses to energy emergencies as outlined in the DRP. The DRP provides the mechanism for the District Government and Intergovernmental Network called WebEOC[3] to coordinate the responses of agencies and other groups.
- **The District's energy suppliers and distributors initiate the primary response in restoring service:** Energy suppliers and energy distributors are primarily responsible for identifying and responding to an energy emergency. To that end, DOEE needs to have an ongoing review process for how well its EAP works in conjunction with responses taken by energy suppliers and distributors during an energy emergency. DOEE will work with energy suppliers and distributors to ensure that the plans are adequate and that energy suppliers and distributors are prepared to provide appropriate, real-time information during an energy emergency.

2.1.2 DOEE's Responsibilities

DOEE has several key responsibilities. DOEE will:

- Review the emergency response plans of energy suppliers and distributors and make recommendations to them and/or to their regulatory bodies. In addition, DOEE will

[3] WebEOC is a web-based emergency management information system used by the state of Connecticut to document routine and emergency events/incidents. WebEOC provides a real-time common operating picture and resource request management tool for emergency managers at the local and state levels during exercises, drills, local or regional emergencies, and/or statewide emergencies.

work with the energy providers to ensure that the EAP contains adequate cybersecurity measures to reduce vulnerability from cyberattacks.

- Develop relationships and maintain regular communication with both internal and external partners that will be involved in restoring energy supplies and services.
- Coordinate the flow of information during an energy emergency and collaborate with HSEMA, energy suppliers, and distributors to determine the severity of an event.
- Gather real-time information on energy disruption and restoration time frames in order to provide the Consequence Management Team (CMT) with recommendations on the types of measures that need to be implemented.
- Coordinate an after-event assessment of response actions, develop lessons learned and update the EAP as appropriate.
- Promote policies and programs to improve the resilience of the District's energy systems.

2.2 What are the Sources and Uses of Energy in the District?

Typically, an energy emergency results from the disruption of the energy supply. Any energy supply disruption has the potential to cause economic, health, or other dangers. In the District, tracking and assessing energy emergencies are largely shaped by the relative proportions of energy consumed in the District. See Section 3 for the District's full energy profile.

Source	Annual consumption 2019 (therms)	Percentage of annual consumption
Gas	294,503,609	35.64%
Electricity	355,608,429.05	43.04%
Fuel oil	4,979,080.09	0.60%
Gasoline	167,034,001.95	20.22%
Diesel	4,139,442.93	0.50%
Total:	**826,264,563.02**	**100%**

Table 1 Citywide energy consumption by source.[4]

Based on the District's greenhouse gas inventory data for 2019 energy consumption data from DC's greenhouse gas inventory, electricity comprised 43.04% of the energy consumed, gas 35.64%, gasoline 20.22%, fuel oil 0.6%, and diesel 0.5%.

[4] Data were retrieved from the District's Greenhouse Gas Inventory here: https://doee.dc.gov/service/greenhouse-gas-inventories. Consumption figures from 2019 for residential, non-residential, and transportation sectors were combined and converted to therms in the table.

2.2.1 Brief Description of Petroleum, Diesel, and Fuel Oil Supply Chain

The Washington, DC region is served by two major fuel pipeline systems: The Colonial and Plantation. The Colonial Pipeline system (Colonial), one of the largest pipeline systems in the world, extends from Houston, TX to Linden, NJ with a system capacity of 2.5 million barrels per day (b/d). For the region, Colonial has two dedicated spur pipelines (Lines 3 & 4) that carry segregated batches of petroleum products from a logistics hub in Greensboro, NC to terminal points near Fairfax, VA and Baltimore, MD. Similarly, the Plantation pipeline system (Plantation), which shares the same general route as Colonial, pumps petroleum products from Baton Rouge, LA to Greensboro, NC. From Greensboro, the petroleum product pipeline moves fuel to distribution terminals in Newington, VA and Baltimore, MD.

These terminals are facilities with large storage tanks of varying sizes that can hold different types of refined petroleum products and additives, including petroleum, diesel, and home heating fuel oil. For instance, Plantation's Newington terminal has 25 tanks of differing sizes with a total storage capacity of 1.35 million barrels. At the terminals, petroleum is blended to meet District regulations or to create brand-specific blends. Once blended, local distribution companies or wholesale marketers (known as jobbers) use large (8,000 or 16,000 gallon) privately owned and operated tanker trucks to transport fuel to private-sector gas stations. Likewise, heating oil and propane are picked up by local wholesalers/retailers in smaller trucks and delivered to the tanks of individual customers.

As of 2019, according to the District's greenhouse gas inventory data in Table 1 above, fuel oil, diesel, and gasoline constituted 21.32% of the District's total energy consumption. Petroleum is used in the District for transportation fuel (gasoline and diesel) and heating.

The District's annual petroleum consumption of the transportation sector is provided in the District's greenhouse gas inventory as 3,648,374,326.11 vehicle miles traveled (VMT), which is equivalent to about 146,521,057.27 gallons. About 80% of the petroleum consumed in the District is used by the transportation sector. Most of the rest of the petroleum consumed in the District is used by the industrial sector, which includes a small amount of chemical product manufacturing. Approximately 5% is used in the commercial and residential sectors and fewer than 2% of District households heat with fuel oil.

2.2.2 Brief Description of Gas Supply Chain

Gas is supplied to the District by a single distribution utility, Washington Gas. Gas accounted for 35.64% of total energy consumption in 2019. Gas provides heat for half of all homes in the District.[5]

[5] According to data from the Census Bureau's American Community Survey in 2019, about half of all homes in the District are heated with gas. This figure is reported by the EIA here: https://www.eia.gov/state/analysis.php?sid=DC#67.

Sector	Consumption (billion cubic feet)
Residential	11.6
Commercial	15
Industrial	0
Vehicle fuel	1
TOTAL	**27**

Table 2 Sectoral consumption of gas in 2020[6]

2.2.3 Brief Description of Electricity Supply Chain

The District buys 98% of its electricity from outside the District. Of the 2% generated within the District as of 2020, 42% of this was generated from utility-scale and small-scale solar facilities, 41% was generated from gas, and 17% was generated from biomass. Electricity represents 41% of the total energy consumed in all sectors. Electricity is used for residential, institutional, and commercial buildings, as well as for operating public transit and other public utility facilities.

The electric supply system is comprised of electricity generation (and its fuel supply), high voltage transmission lines (hundreds of kilovolts) over long distances, and local distribution lines at lower voltage (tens of kilovolts). Electricity then flows to transformers where the voltage is reduced or "stepped down" to lower voltages for appropriate commercial, institutional, and residential uses.

Electricity has been difficult to store, which has led to the necessity of redundancies in equipment and generation reserves. In addition, because electricity is often distributed in overhead transmission and distribution lines vulnerable to storm damage, electricity is highly prone to outages. These considerations have necessitated redundant assets, including personnel, trucks, and other resources that are provided by pooling assets over a wide geographic region to respond to prolonged outages and disruptions. This asset sharing is coordinated rapidly to meet a fluctuating, instantaneous demand. The electricity distribution system is regulated and coordinated at the federal, regional, state, and local levels.

Recent innovations and price declines in distributed generation and energy storage, in particular battery storage, have made distributed energy resources an increasingly viable tool for resiliency. In addition, grid reliability enhancement technologies such as "fault location, isolation, service restoration" (FLISR) and "automated sectionalizing and restoration systems" (ASR) are being deployed by utilities to provide localized reliability and resilience. Lastly, planners and regulators are beginning to consider microgrids and district energy systems as a way of bolstering resiliency for critical infrastructure and communities most impacted by prolonged outages. These innovations and new practices may change how residents,

[6] Source: EIA, State Data Systems, District of Columbia

businesses, and institutions experience energy and energy emergencies in the future.

2.3 What Types of Energy Emergencies Can Occur in the District?

2.3.1 Definitions

The DRP uses the definitions of an emergency and a major disaster as defined in the Robert T. Stafford Disaster Relief and Emergency Assistance Act (as amended, 42 U.S.C. 5121 et seq.)

Emergency—any occasion or instance for which, in the determination of the president, federal assistance is needed to supplement state and local efforts and capabilities to save lives, protect property and public health and safety, or lessen or avert the threat of a catastrophe in any part of the United States.

Major disaster—any natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought), 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 this Act to supplement the efforts and available resources of states, local governments, and disaster relief organizations in alleviating damage, loss, hardship, or suffering.

An emergency, including a fuel shortage emergency, may sever key components of the District's energy infrastructure. This may constrain fuel supplies in the affected areas and will adversely impact adjacent areas, especially those with supply links to the directly affected areas. Such an event also could affect transportation, communications, and other infrastructure necessary for sustaining public health and safety. It also could affect continuity of government operations as well as several critical infrastructures within the District.

2.3.2 Energy Emergencies in the District

Energy emergencies in the District have traditionally fallen into three categories:

1. Supply Disruptions
2. Internal/Distribution Disruptions
3. Price Disruptions

Types of Energy Emergencies	
Supply Disruptions (Shortage)/ External	The District, except for a small amount of solar and co-generation (2% of total consumption), imports all of its energy (98%). Major potential supply disruptions, or delivery disruptions, may occur to the local Pepco distribution system or PJM's regional grid and interconnection system. The District's fuel supply chain is potentially vulnerable to fuel emergencies at any of the multiple dependent links in the delivery of fuel. All supplies are transported by truck from terminals located in Maryland and Virginia. Disruptions could occur along the pipelines, at product terminals, with fuel wholesalers and transporters, or along transportation routes to the District.
Internal/ Distribution Disruptions	Internal/distribution disruptions are interruptions to the distribution system that prevent a sufficient energy supply from being delivered to the end user in the District. Internal/distribution disruptions include equipment malfunction or power lines being down. Most local private fuel retailers are completely dependent on electricity to operate pumps that syphon fuel from underground tanks to end users and to operate sales registers. In addition, many gas stations have not invested in a back-up generator to produce the necessary power, so an electrical outage would render many gas stations inoperable.
Price Disruptions (External)	Price disruptions occur when there are rapid increases in the price of energy. Since prices are determined to a large degree in national or international energy markets, a jurisdiction that imports most of its energy has little control over the rates of change and level of prices. Rapid increases in energy prices and historically high levels of energy prices can alter public behavior.

Table 3 Types of Energy Emergencies

2.3.3 Past Energy Disruptions in the District of Columbia

Since the oil crisis in 1973, the District has experienced each type of energy emergency. For the District, weather-related events have been the major source of disruption of electricity. In 2010, major snowstorms in February and major thunderstorms in July significantly interrupted

electricity. Hurricane Katrina, in 2005, and the BP Oil Spill, in 2010, had the potential to disrupt the flow of gas and petroleum, but the District did not experience any adverse effects from these two major events.

In 2010, the reliability of electricity distribution in the District became an issue. In December 2010, a major newspaper article analyzed challenges to Pepco's ability to deliver electricity reliability. Several of the issues reported had been the subject of legislative and regulatory inquiries. In 2012, the June 29 Derecho raised additional questions on the reliability and resilience of the electricity grid in the District. More information about this event is presented in Section 5.6.2.

On May 7, 2021, Colonial Pipeline reported a ransomware cyberattack on its pipeline system and the pipeline was taken offline preemptively to avoid further compromising the system. More than 250 shippers and 270 terminals use the Colonial Pipeline system to transport refined petroleum products to locations in 14 states. Major markets served include Birmingham, AL; Atlanta, GA; Nashville, TN; Charlotte, NC; Norfolk and Richmond, VA; Washington, D.C.; Philadelphia, PA; and the New York City area. All were affected and over 76,000 stations were reported without gasoline.

The District followed its normal disaster response protocols during these major disruptions. Since the District does not have any direct control over the supply of energy, its role is mainly one of monitoring events, providing assistance to the private suppliers (for example, equipment and personnel), and mitigating the effects of energy disruptions (for example, encouraging the curtailment of non-essential uses; in the winter months, heating centers are opened and portable heaters provided; and in the summer months, cooling centers are opened and portable fans provided).

2.4 Who Responds to an Energy Emergency in the District?

The District of Columbia Homeland Security and Emergency Management Agency (HSEMA) was established under D.C. Code§ 7-2202.0-2208 as the lead agency formally designated with coordinating the emergency response in the nation's capital. HSEMA is the agency responsible for preparing comprehensive homeland security and the emergency management program that coordinates with the federal and private sectors and surrounding jurisdictions comprising the National Capital Region (NCR), which is shown in the map below.

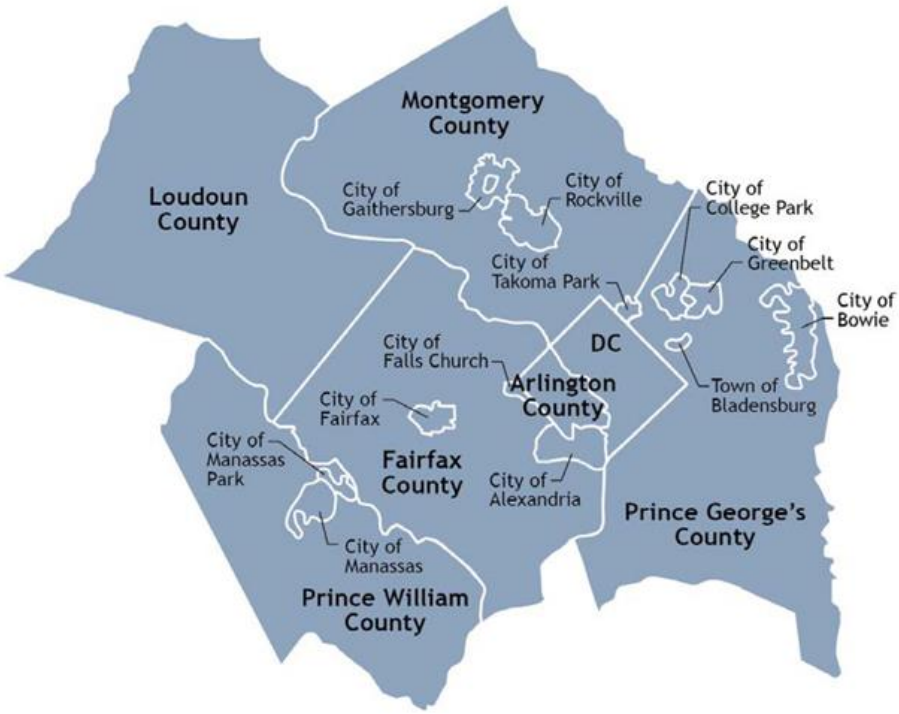


Figure 2 National Capital Region (NCR)[7]

In accordance with D.C. Code§ 7-2302-2303, HSEMA shall establish and maintain a program of public emergency preparedness. District government agencies shall organize as one team, under one plan, to seamlessly execute their DRP. Therefore, the precepts outlined in the DRP apply to all departments, agencies, and instrumentalities of the District Government that fall under the authority of the Mayor.

The District of Columbia Homeland Security, Risk Reduction and Preparedness Act of 2006 and the 300 Public Emergency Act of 1980, D.C. Law 3-149, designates the HSEMA Director to act on behalf of the 301 Executive Office of the Mayor in matters related to disaster management.

The DRP designates DOEE as the lead agency for Emergency Support Function (ESF) #12-Energy. As the lead agency, DOEE is expected to coordinate with supporting agencies to monitor and manage the efficient use of energy and fuel supplies, and work with private sector partners to restore fuel deliveries in the aftermath of a disaster. DOEE is also expected to gather real-time information to provide situational awareness about the impact of an emergency event on energy systems to the Consequence Management Team (CMT) and provide input as part of the decision-making team about measures and actions that the District should take to manage the disruption of energy supplies. The DRP states that DOEE activities are "directly related to an evolving incident or potential incident rather than steady-state preparedness." This means that DOEE activities should focus on developing internal capabilities to lead an effective response in coordination with support agencies, rather than measures to prevent a supply disruption.

[7] Source: DRP 2017

2.4.1 Legal Authorities, Roles, & Responsibilities

The 2022 DRP identifies several policy guidelines that the District follows in response to an emergency event, and it provides the roles and responsibilities for all Emergency Support Functions, including ESF #12 for Energy. This EAP is a functional annex to the DRP and incorporates the guidelines identified in the DRP for ESF #12.

The authorities, roles, and responsibilities flow from the federal level, starting with the Mayor of the District (See Figure 6 and Figure 7), to the Agencies in the District (See Figure 8).

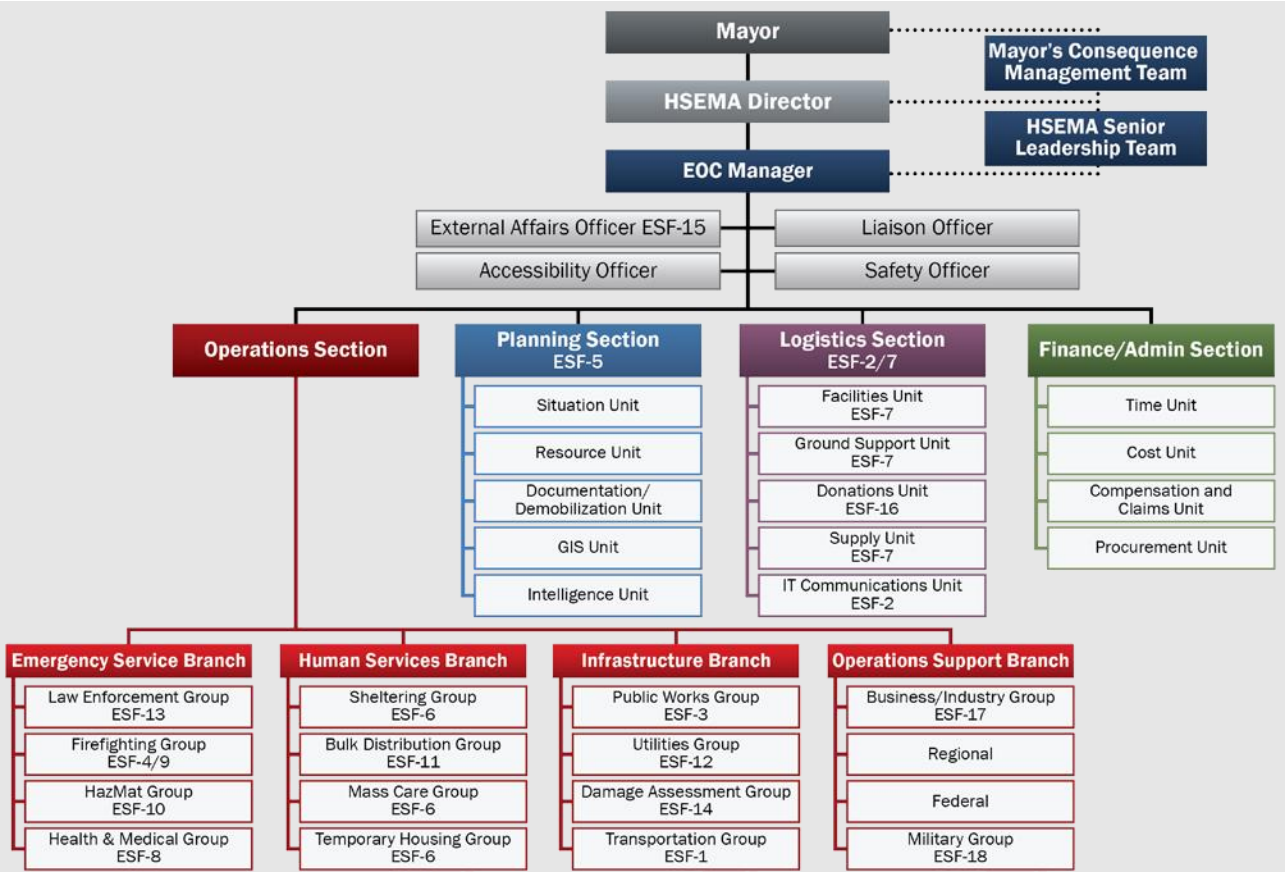


Figure 3 Incident Command: Federal (Source: DRP 2017)

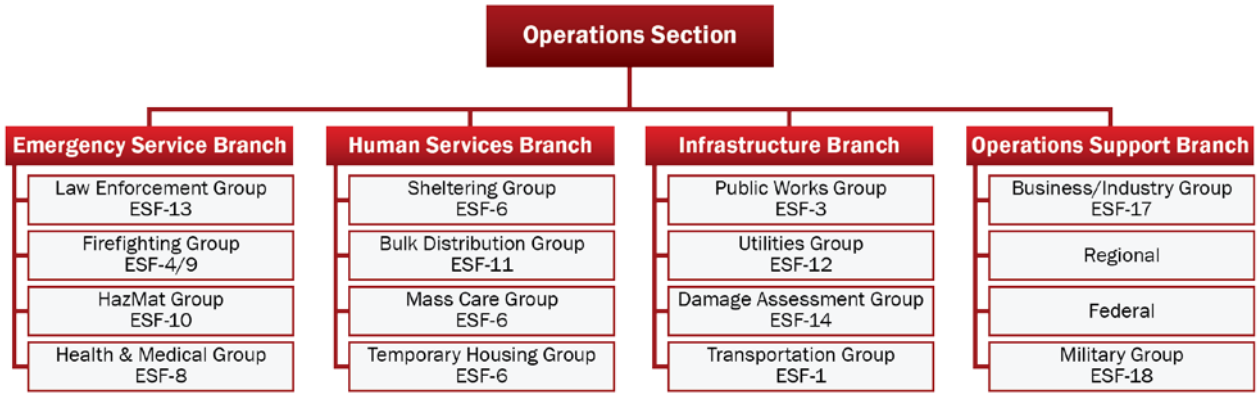


Figure 4 Incident Command: District of Columbia[8]

2.4.2 Relationship to Other Federal, Regional, and Local Plans

The following documents are applicable to the activation and initiation of tasks to ensure the safety of District residents, protect vital assets and mitigate the impact of an emergency or disaster in the District.

Title of Applicable Documents and Plan	Date of Plan
District Emergency Operation Plan (EOP)	March 2017
Energy Assurance Plan (EAP)	December 2022
DPW Fuel Station Emergency Operations Plan	December 2017
Clean Energy DC	August 2018
Climate Ready DC Plan	November 2016

Table 4 Other Applicable Documents

The EOP links District emergencies to responses by agencies of the District Government and its federal and regional partners. This EAP fits within the EOP's operational concept.

[8] Source: DRP 2017

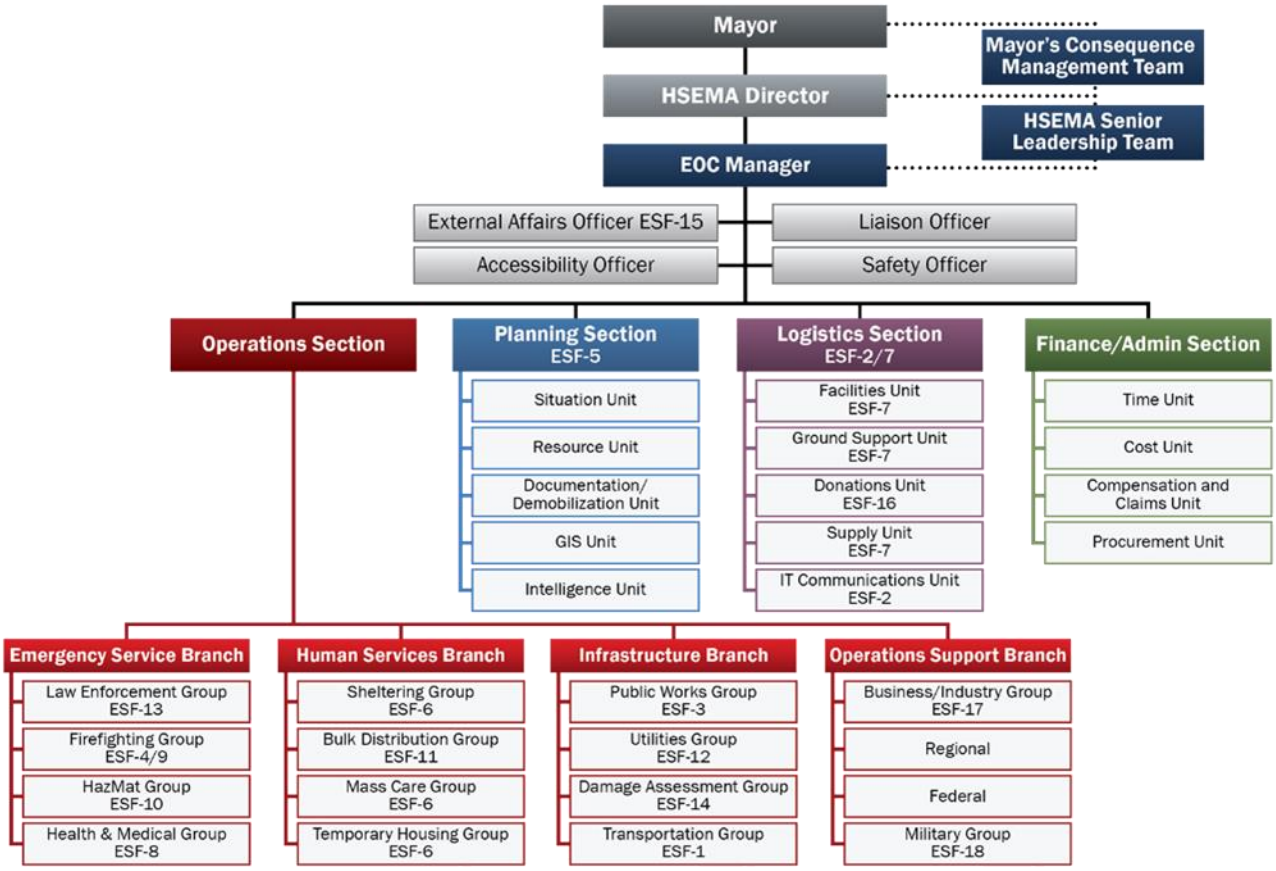


Figure 5 HSEMA Operations Section[9]

Parties responsible for implementing this EAP will receive training on the plan and tabletop exercises will be held. Based on the training and the exercises, the EAP will be evaluated and amended as necessary. Likewise, after a real-world event, this EAP will be evaluated and amended as necessary.[10]

[9] Source: DRP 2017

[10] https://hsema.dc.gov/sites/default/files/dc/sites/hsema/page_content/attachments/District%20Response%20Plan.pdf

Figure 6 DRP Operational Concept

While the DRP focuses on the coordination and capabilities of District Government agencies, the plan also recognizes limitations with actions that the District government can take in major disaster operations and the need for support from federal and regional partners.

The DRP is intended to address the functional interaction with jurisdictions outside of District boundaries in coordination with regional councils, especially in the areas of communications, public information, transportation, public safety, health, schools, and utilities. The District will continue to work with regional councils to enhance and maintain this functional interaction.

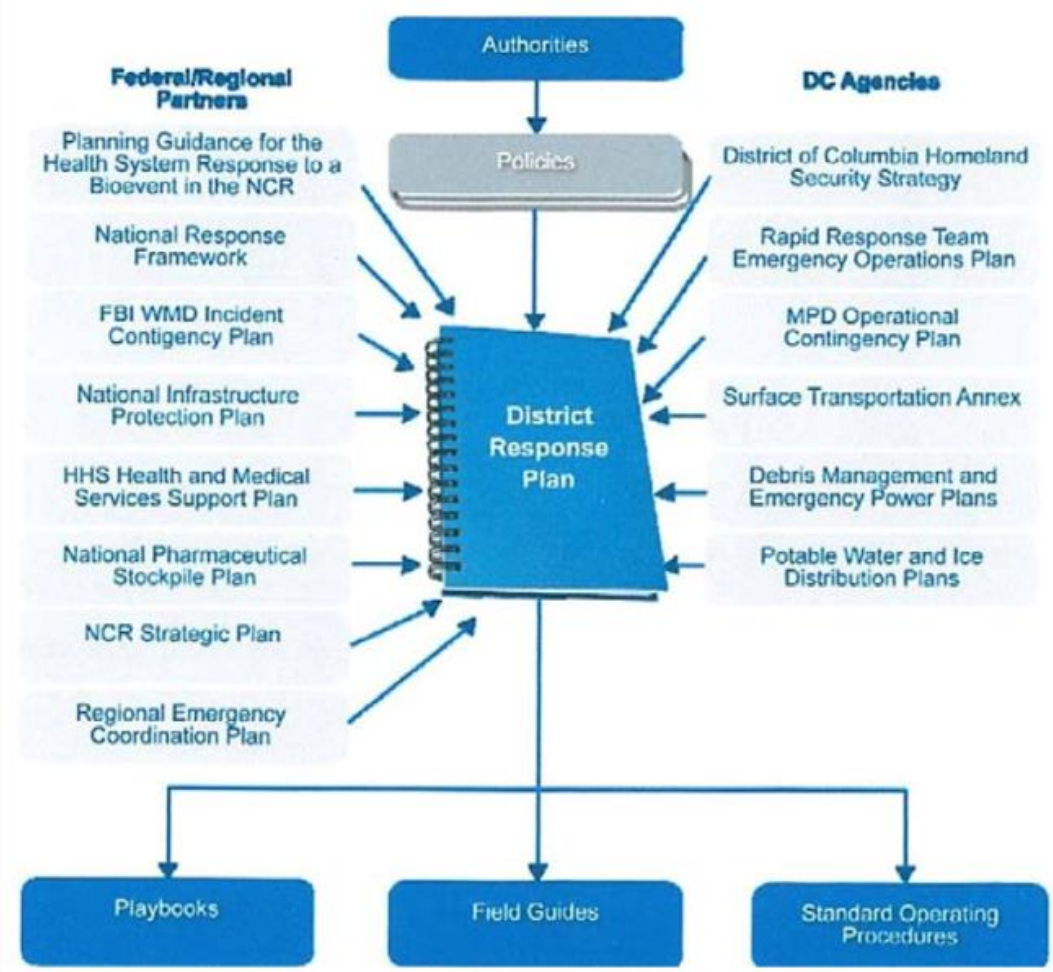


Figure 7 Relationship of the DRP to other planning processes[11]

The combined emergency management authorities, policies, procedures, and resources of the District, in addition to regional partners, the federal government, and other entities (e.g., international organizations, voluntary disaster relief organizations, and the private sector) constitute an intergovernmental emergency response network to aid following an emergency.

Within this network, the District may provide personnel, equipment, supplies, and facilities, as well as managerial, technical, and advisory services in support of emergency assistance efforts. Various District, regional, and federal statutory authorities and policies establish the basis for providing these resources. A list of emergency response and recovery-related directives, together with a summary interpretation of each legal citation, has been compiled in the DRP. The DRP may be used in conjunction with other state and local plans, federal emergency operational plans developed under statutory authorities, and Memoranda of Understanding (MOU) among various federal agencies.

[11] Source: DRP 2015

The DRP may be implemented concurrently with several federal and regional emergency operation plans (e.g., the National Contingency Plan and the Federal Bureau of Investigation Weapons of Mass Destruction Incident Contingency Plan). The DRP is supported by tactical policies and procedures (e.g., standard operating procedures). District agencies with major operational roles also maintain operations plans specific to their agencies' emergency response roles and responsibilities.

2.4.3 DOEE's Roles as Outlined in the Emergency Operations Plan (EOP)

The District of Columbia Emergency Operations Plan identifies and details the District's basic structure for event, incident, emergency, and disaster response actions, recovery coordination plans, and incident management plans. Further, the EOP provides guidance on how District Government and non-governmental organizations (NGOs), volunteer organizations, and regional and federal partners implement homeland security and emergency management operations within the District. The EOP emphasizes the goals of public safety, protecting property and the environment, and coordinating incident response. The EOP describes the District services provided to the community and partner organizations, outlines how the District will leverage and implement resources, and defines engagement with federal and regional governments, business, and nonprofit partners to support service delivery for incident and event operations. The EOP is modeled on the National Response Plan (NRP). The NRP organizes agencies into functional groups called Emergency Support Functions (ESF). The ESF provide an organizational means for agencies to coordinate their resources to respond to an emergency. ESF #12 is the designated ESF for the District's energy systems. The DRP identifies DOEE as the lead for ESF #12. Each lead ESF also provides support to other ESF leads. The ESF that are supported by DOEE are explained in more detail in Figure 13 below; those ESFs that are not included below are not supported by DOEE.

ESF	Area	DOEE's Primary Function
#12	Energy	Emergency Support Function (ESF) #12—Energy helps restore the District of Columbia's energy systems during and/or following an emergency. DOEE is the primary agency in the District responsible for coordinating with all other governmental department response elements and utilities to restore the District's energy systems. ESF #12 gathers, assesses, and shares information on energy system damage and estimates the impact of energy systems outages or shortages within the District. The purpose of this ESF is to facilitate restoration of energy systems and fuel supplies during and/or following an emergency. Power and fuel are critical to protecting lives and property and maintaining the continuity of the government.

#2	Public Works & Engineering	DOEE will coordinate with ESF #2 to help facilitate the restoration of energy systems and fuel supplies following an emergency.
#3	Communications	DOEE will coordinate with ESF #3 to help facilitate the restoration of energy systems and fuel supplies following an emergency. DOEE will also (with DC Water) provide the necessary representation at the Emergency Operations Center (EOC), and the Consequence Management Team (CMT) emergency liaison officer (ELO) will remain at the EOC until deactivated or released by the CMT Director.
#4	Firefighting	DOEE will provide air quality monitoring support, to include plume monitoring, collect surface water runoff samples for analysis, and other support to monitor the affected area of contaminants. DOEE will coordinate with the National Response Center (NRC) and the On-Scene Coordinator (OSC) in the monitoring and analysis of data and provide mitigation recommendations.

ESF	Area	DOEE's Support Functions
#5	Emergency Management	DOEE will provide and coordinate air quality monitoring and water runoff monitoring support, to include plume monitoring, collect surface water runoff samples for analysis, and provide other support to monitor the affected area of contaminants. DOEE may also monitor energy supply, and coordinate with energy providers to determine energy restoration to the District.
#7	Resource Support	DOEE will coordinate with HSEMA in managing critical resources and facilities under their control, including notification when resources are about to be or have been depleted.
#8	Public Health and Medical Services	DOEE will coordinate with DOH to monitor environmental quality during an emergency. DOEE will contact the NRC to report the declared incident and, if the OSC is deployed, DOEE will coordinate with the OSC in the monitoring and analysis of data.
#9	Search and Rescue	DOEE will provide air quality support, ground water runoff testing, and other support to monitor the affected area for contaminants. In addition, DOEE will contact the NRC to report the declared incident. If the OSC is deployed to the scene, DOEE will coordinate with the OSC monitoring and analysis of data and provide mitigation recommendations.

#10	Oil and Hazardous Materials Response	DOEE will provide and coordinate air quality monitoring and water runoff monitoring support, to include plume monitoring, collect surface water runoff samples for analysis, and provide other support to monitor the affected area of contaminants. DOEE will coordinate with the NRC and serve as the OSC in the monitoring and analysis of data and provide mitigation services and/or recommendations. DOEE shall also coordinate and assist with deployment of federal resources from EPA and U.S. Coast Guard (USCG) should they be needed.
#14	Damage Assessment	DOEE will support and serve on damage assessment teams to ensure environmental tests are conducted and damages are identified.
#15	External Affairs	DOEE will coordinate with ESF #15 via the Joint Information Center (JIC) to share and disseminate information to the public. DOEE will provide timely, effective, and accurate information to the citizens and visitors of the District. In the event of an emergency, each District entity shall coordinate the distribution of information to ESF #15. Information will be disseminated to the public, media, and other involved organizations through the Office of Communications, Executive Office of the Mayor (EOM) to ensure accurate, consistent, timely, and reliable information.

Table 5 DOEE's ESF #12 Primary and Support Functions[12]

2.4.4 Emergency management

Emergency management is a continuous cycle of preparedness, response, recovery, and mitigation. Responding to energy emergencies involves an iterative process of gathering information, assessing the actual or potential consequences of the incident, taking action to share critical information, facilitate system restoration, and mitigate impacts to dependent lifeline sectors and consumers. This process is repeated over the course of an emergency with response actions adapting to changing conditions as the situation evolves.

[12] Source: DRP 2017

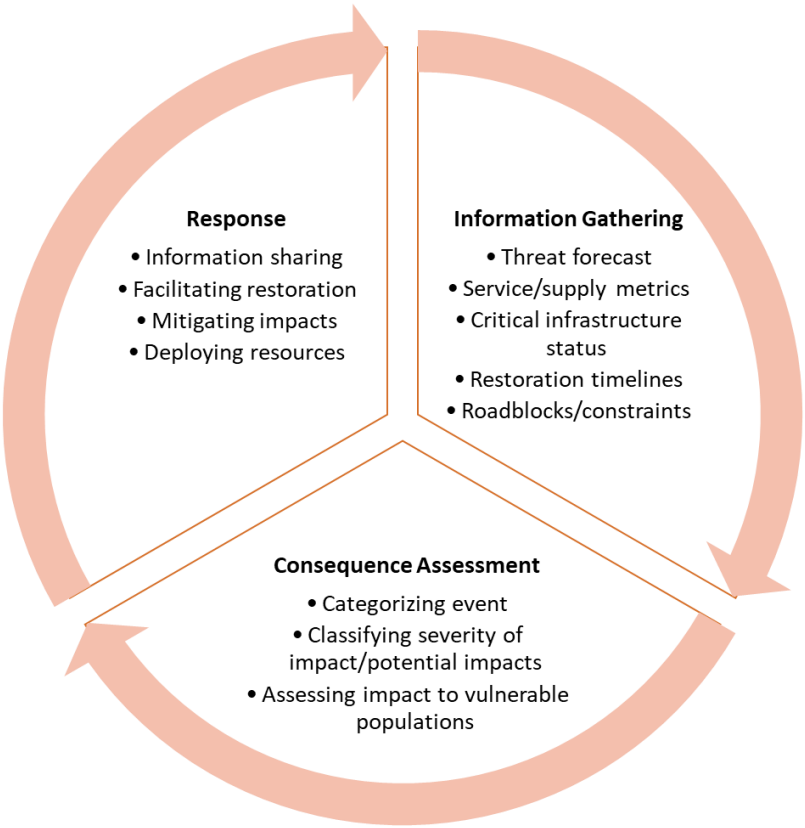


Figure 8 Cycle of emergency management

2.4.5 Overview of DOEE's Roles & Responsibilities

The DRP places management decisions for an energy emergency under ESF #12—Energy and describes the concept of operations and the incident life cycle for designating a particular agency as the lead agency or supporting agency. As the lead agency, DOEE has a significant role in providing input and assisting with making decisions related to energy disruptions.

DOEE's responsibilities fall into four broad categories, which are synthesized in Figure 9 DOEE's emergency responsibilitie:

1. **Pre-Event:** Responsibilities include DOEE's activities related to monitoring and readiness. They are part of the ongoing operations of the DOEE and include such activities as comprehensive energy planning, maintaining a current energy profile of the District, and planning and participating in emergency planning exercises.
2. **Event:** Responsibilities include DOEE's activities related to gathering and sharing of information during an energy emergency event.

3. **Post-Event:** Responsibilities include DOEE's activities related to developing "lessons learned" and to share those lessons.
4. **Resiliency:** Responsibilities include DOEE's activities related to participating in policy development related to critical infrastructure protection and promoting policies and programs that enhance the resiliency of the District's energy systems.

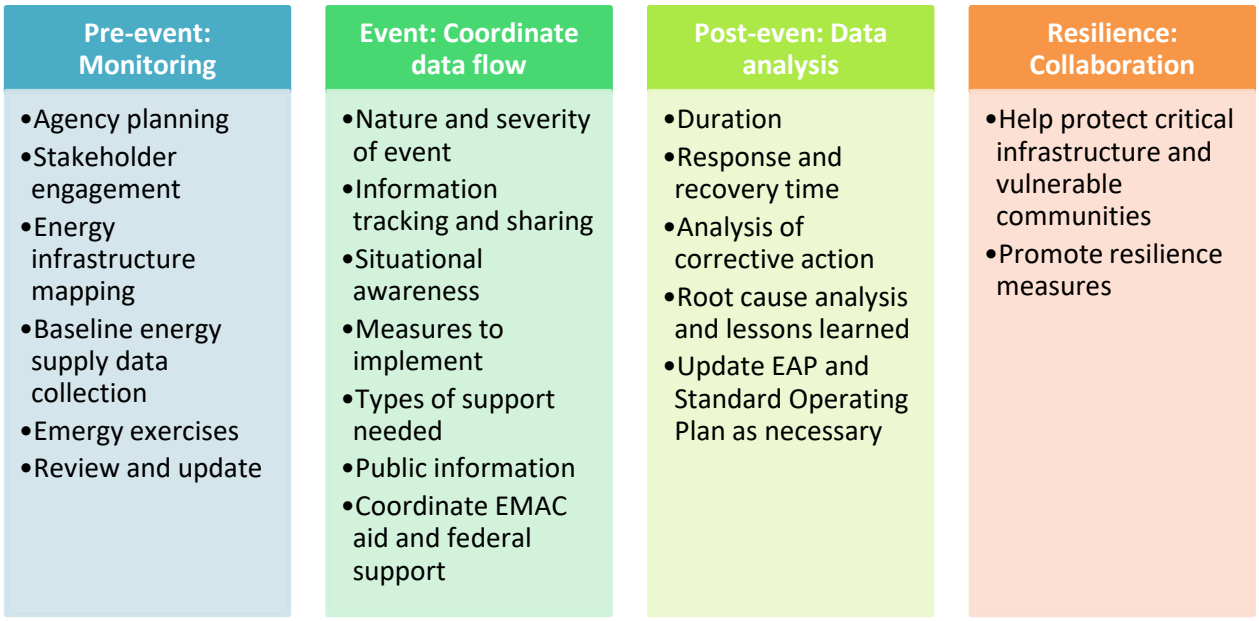


Figure 9 DOEE's emergency responsibilities

2.5 How Will DOEE Respond to an Energy Emergency?

In the event of an energy emergency, DOEE will:

1. Coordinate information flow
2. Provide situational awareness information during an event
3. Monitor energy disruptions and forecast shortages
4. Assist in developing management decisions to respond to the event

As part of DOEE's emergency management roles, there are several in elements that must be accounted for in an ongoing capacity as well as during an event. According to the 2017 DRP, the essential elements of information coordinated by ESF #12 – Energy include the following:

- Status of fuel transportation systems/corridors
- Status of key personnel
- Major issues/activities of ESFs
- Resource shortfalls
- Overall priorities for response
- Status of upcoming events
- Location of the impacted area
- Social and economic impacts
- Jurisdictional boundaries involved
- Status of ESF activation
- Historical and demographic information
- Status of energy systems
- Status and analysis of initial assessments (needs assessments and damage assessments, including preliminary damage assessments)
- Status of efforts under federal emergency operations plans
- Injuries and medical emergencies

The CMT and Mayor's Office play integral management and feedback roles in the event of an emergency. This is characterized by the interactions among various offices and protocols in the situational awareness flowchart below in Figure 10. In its fullest composition, the CMT includes the Mayor, City Administrator, Deputy Mayors, the Public Information Officer, and senior leadership from all District agencies with a primary role in an Emergency Support Function. The CMT is the established advisory body to coordinate with HSEMA in the event of an emergency. It advises specifically on such issues as priorities, policies, plans, procedures, training, exercises, funding, and public engagement. The CMT will implement its decisions through the HSEMA Director or the director's designee. During an actual or imminent major emergency, the Mayor (or designee) will call together the CMT to serve as the emergency policy group and recommend such actions as a Declaration of Emergency, an Evacuation Order, or other related executive orders and/or proclamations. CMT members who need to physically report to the EOC for any given incident will be determined based on the type of incident and discretion of the HSEMA Director. However, in all stages of Emergency Operations Center (EOC) activation, all CMT members will be continuously briefed and updated and they, in turn, must remain available.

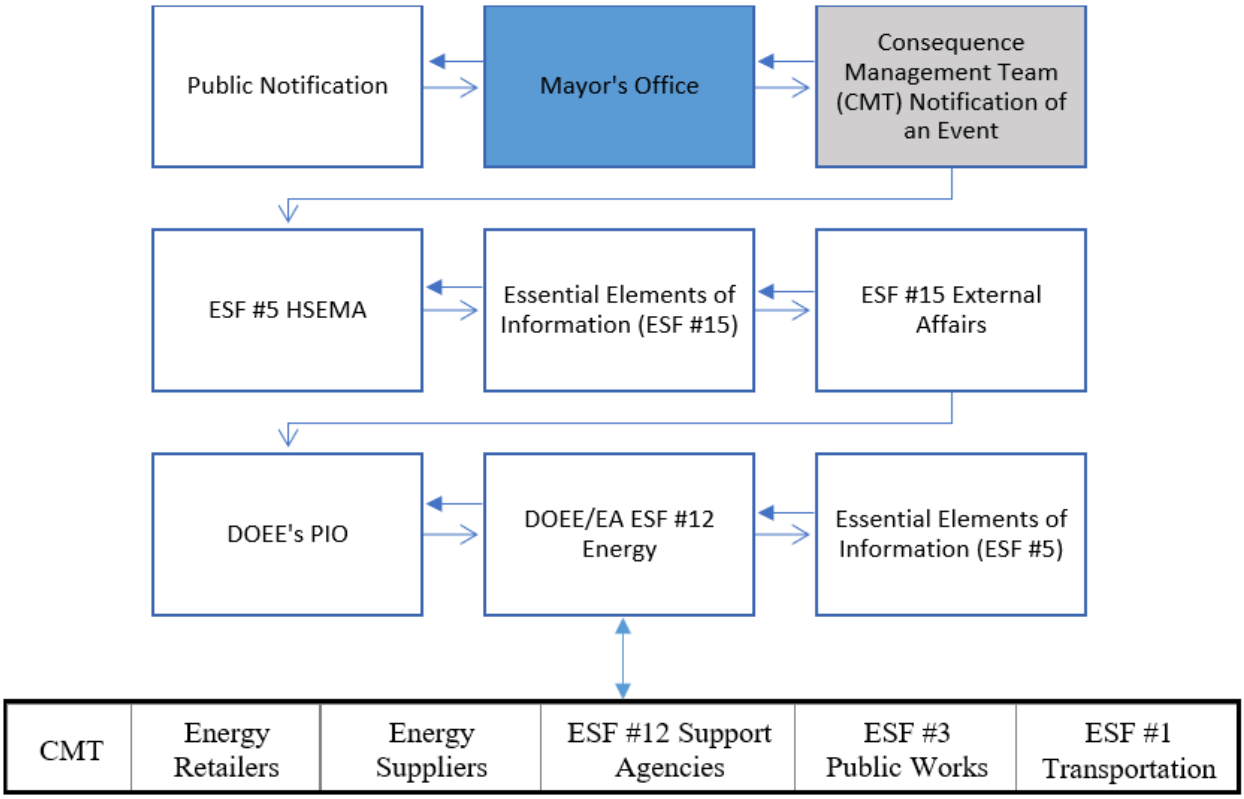


Figure 10 Flow of situational awareness during an emergency

2.5.1 Core capabilities

Presidential Policy Directive 8: National Preparedness (PPD-8)[13] describes the nation's approach to preparing for the threats and hazards that pose the greatest risk to the security of the United States. National preparedness is the shared responsibility of our whole community. Every member contributes, including individuals, communities, private and nonprofit sectors, faith-based organizations, and federal, state, and local governments. It describes our security and resilience posture through the core capabilities that are necessary to deal with great risks, and it will use an integrated, layered, and nationwide approach as a foundation. It defines success as: "A secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk." Capabilities-based planning focuses on planning under uncertainty because the next danger or disaster can never be forecast with complete accuracy. Therefore, capabilities- based planning takes an all-hazards approach to planning and preparation that builds capabilities that can be applied to a wide variety of incidents. Capabilities include planning, intelligence and information sharing, risk management, and supply chain integrity and security.

[13] More information on the Presidential Policy Directive 8 can be found here: https://www.dhs.gov/presidential-policy-directive-8-national-preparedness

DOEE and HSEMA did a study how well prepared the District of Columbia in 2019 on the preparedness of the District to withstand a disruption in the supply of fuel for transportation and emergency power generation. These vulnerabilities and lack of understanding of the gaps in fuel supply resilience are not well understood. This lack of knowledge impedes risk management and planning at both federal and state levels. This study identified potential points of failure in fuel availability for ground and air transportation and back-up power generation in order to help the stakeholder better coordinate their planning, exercises, and situational awareness regarding fuel emergencies.

The project will seek to answer the following key questions:

1. What are the key components of the fuel supply chain and how are they connected?
2. What are the key supply chain interdependencies?
3. How resilient are the key components of the fuel supply chain to a likely hazard scenario affecting the region?
4. What is the capability of the NCR to manage a fuel disruption?
5. How concentrated or diverse are the components of the supply chain? What vulnerabilities – due to distance, socioeconomic characteristics, infrastructure limitations, or legal/regulatory requirements – exist as a result?

The National Capital Region (NCR) Fuel Supply Chain Resilience Project will evaluate how well prepared the District is to withstand a disruption in the supply of fuel for transportation and emergency power generation. DOEE's The 2019 District of Columbia Energy Assurance Plan identifies key components of the supply chain but acknowledges the vulnerability of the District to an interruption of fuel supply. A 2015 regional assessment project focusing on the resilience of data centers in northern Virginia identified some of the important emergency management considerations facing the region related to emergency fuel supply management. Current NCR emergency operations plans do not address fuel interruptions.

This project was conducted to improve the understanding and management of vulnerabilities of fuel supply chain infrastructure to severe weather hazards among federal, state, local, and private sector partners in the NCR so they can better coordinate their planning, exercises, and situational awareness regarding fuel emergencies.

1. Identify potential points of failure in fuel availability for ground and air transportation and back-up power generation.
2. Identify the relative diversity in fuel supply and delivery, including trucking of fuel into the District and the NCR.

3. Assess the ability of each of the key components of the fuel supply chain to continue operations during a disaster.

4. Identify dependencies for the fuel supply chain, as well as critical dependencies on the fuel supply chain, including potential future needs.

5. Provide vulnerability mitigation actions/resilience enhancement options to DOEE, District CIP planners, and private sector operators to manage a fuel disruption.

2.5.2 Sharing and Providing Information

During an energy shortage, it is vital that accurate and timely information is provided to the public on the extent and expected duration of the shortage; what local government, business, and industry are doing; and what individual actions should be taken by the population to help reduce their energy consumption.

Coordinated messages and the timely dissemination of information will help dispel rumors and hearsay, minimize confusion, and boost public support and confidence. For that reason, effective communication is a vital instrument in reducing panic (e.g., it may prevent the public from stockpiling consumable energy resources like gasoline and heating oil).

DOEE will coordinate the information flow from both internal and external partners who would be involved in responding to an energy emergency. Internal partners include the District Department of Public Works (DPW), which manages and maintains the District's fuel facilities that supply fuel to all district agency vehicles; the District Department of General Services (DGS), which provides generators to supply electricity to critical facilities that provide essential city services; and the District Department of Transportation (DDOT) which is responsible for restoring damaged transportation infrastructure.

External partners include a complex set of industry stakeholders that are involved in controlling the movement of fuel across the segmented petroleum supply chain. These stakeholders include refineries in the Gulf Coast, bulk fuel terminals in the region, area fuel marketers and distributors, and local fuel retailers within the District. Unlike other forms of energy, such as electricity, which are operated and managed by a single large company, multiple companies operate and compete within each segment of the fuel supply chain, making coordination of response actions more complex. Multiple publications from the petroleum industry and National Association of State Energy Officials (NASEO) have recommended engaging with industry contacts to foster information sharing and promote improved coordination for greater situational awareness and reducing the duration of fuel disruptions. Therefore, DOEE is committed to establishing regular and ongoing communications with industry representatives including pipeline companies, terminal operators, and fuel suppliers.

INFORMATION FLOW – COORDINATING -- SITUATIONAL AWARENESS		
Energy suppliers & distributors: • Identify emergencies and their implications • Notify CMT via DOEE • Provide real-time information • Mitigate situation • Participate in after-event assessment	**CMT:** • Initiates response process	**DOEE:** • Coordinates information flows to promote real-time situational awareness • Assists in recommending emergency measures • Coordinates after-event assessment

Table 6 DOEE's coordinating role in the flow of information

2.5.3 Documenting Actions

DOEE will provide accurate and timely documentation of event actions for input into information systems and situation reports. This documentation will:

- Provide all agencies involved with the effective communication needed to maintain situational awareness.
- Provide individuals with emergency event information to inform future response actions.

2.5.4 Assisting in Developing and Implementing Management Decisions

Decisions about how to manage fuel disruptions will be directed by the Mayor through HSEMA, in consultation with the representatives of the CMT. DOEE will have a seat on the CMT in an energy emergency and will provide input on the options available to the District to manage the disruption of fuel supplies and impacts of a fuel shortage. As such, DOEE will dispatch an ELO to participate in decision making processes during an energy emergency.

There are three types of management decisions in which DOEE must participate (as outlined in Figure 21 below):

1. The nature of an event,
2. Measures to implement, and
3. Types of support needed.

Additionally, DOEE will submit requests to waive various federal requirements to facilitate the delivery of fuel during an energy emergency.

2.5.5 Decisions Regarding the Nature of an Event

During an event, sever decisions must be made about the nature of the event, measures that will need to be implemented, and the type of support that will be needed by various actors and the community. These management decision parameters are listed in Table 7 below.

Nature of an Event	Measures to Implement	Types of Support Needed
• Type of event • Level of severity of event • Duration of event • Remediation of event	• Supplier/distributor support measures • Demand reduction measures • User/consumer support measures • Other measures	• District • Regional partners • Federal government • International organizations • Voluntary disaster relief organizations • Private sector

Table 7 Management Decisions

The 2017 EOP-DEP outlines five operation levels to classify the estimated impact of an emergency event on the operations of the District Government. HSEMA will take the lead in making an initial determination of emergency event impact. DOEE will work with HSEMA to determine operation levels and the extent to which they must be modified throughout an incident cycle.

Operation Levels	Description
1 – Normal	Level 1 is the routine posture of District agencies as they carry out daily activities in the absence of an emergency while still ensuring readiness. During normal operations, agencies are engaged in preparedness, training, exercise activities, and maintaining resource activities to ensure continual readiness. Operational plans are reviewed, and equipment is checked to ensure that everything is ready, should the need arise.
2 – Guarded	Level 2 is triggered by a potential or actual emergency requiring the coordinated response of select District agencies. HSEMA alerts those District agencies and ESF agencies that will need to act if the potential event escalates. Throughout this level, HSEMA provides regular status alerts on the threat.
3 – Elevated	Level 3 is typically triggered by an emergency or threat that requires most or all District agencies to respond, or prepare to respond, for a localized event that threatens life or property.
4 – High Risk	Level 4 requires activation of those agencies within the CMT that are directly affected by the emergency. It is triggered by highly probable hazardous conditions and a strong potential for property damage or loss of life.

5 – Severe Risk	Level 5 requires full CMT activation and is triggered by extremely hazardous conditions that are imminent or in progress. All primary agencies and ESF agencies are notified. Regional or federal resources may be requested to support response activities.

Table 8 District Response Plan's Operation Levels[14]

DOEE will work with HSEMA and energy distributors to determine Operation Levels and the extent to which they must be modified throughout an incident cycle.

2.5.6 Decisions Regarding Types of Measures

In the event of an energy shortage or disruption, District Government personnel refer to three broad categories of measures that can be implemented—demand reduction measures, supplier/distributor support measures, and user/consumer support measures.

Demand Reduction Measures	Supplier/Distributor Support Measures	User/Consumer Support Measures
• Voluntary measures • Mandatory measures	• Personnel • Equipment • Supplies • Facilities • Managerial/technical	• Information • Advice • Appliances (e.g., portable fans, heaters, and generators) • Supplies (e.g., ice and sandbags)

Table 9 DOEE's Coordinating Types of Measures

2.5.7 Voluntary Demand Reduction Measures

The District Government may appeal to the public to implement voluntary demand reduction measures. These efforts will correspond to the types of shortages. Potential response measures are provided in Table 10 below.

Electricity Shortage
Encourage customers to: • Adjust indoor regulated space temperature • Reduce hot water temperature • Participate in demand response programs and opt-in programs sponsored by utilities

[14] Source: DRP 2017

Electricity customers can:

- Turn off lights, electronic equipment, and appliances when not in use
- Reduce wattage of light bulbs and use efficient bulbs
- Clean the lint screen on washers and dryers after each load of laundry
- Use electricity-intensive appliances during off-peak times only
- Reduce outdoor illumination to essential lighting only (e.g., security purposes)

Customers with electric heating/cooling systems should:

- Clean/replace air filters monthly
- Close off unused rooms and close vents in these rooms
- Reduce heat level when not using space
- Cover holes, gaps, and broken windows

Gas Shortage

Encourage customers to:

- Reduce indoor heated space temperature
- Reduce hot water temperature
- Reduce operating hours

Gas consumers can:

- Clean/replace air filters monthly
- Close off unused rooms and close vents in these rooms
- Reduce heat level when not using space
- Cover holes, gaps, and broken windows

Petroleum Shortage

Encourage the public to:

- Use public transportation
- Provide priority gasoline for vanpools
- Stagger retail service station operating hours
- Alter work schedules

Promote:

- Ridesharing
- Carpooling
- Trip consolidation
- Bicycle use
- Telecommuting/teleconferencing/videoconferencing
- Vehicle maintenance

Table 10 Voluntary measures by fuel type

2.5.8 Mandatory Demand Reduction Measures

If the voluntary measures are ineffective and/or the severity of the supply shortage worsens, the Mayor may declare a state of emergency so that the District may institute mandatory demand reduction measures. These measures are outlined in Table 11 below.

Electricity Shortage

Upon recommendation by DOEE, the Mayor may issue an Executive Order to:

- Reduce indoor regulated space temperature
- Reduce hot water temperature
- Reduce government facility hours
- Close government facilities
- Reduce advertising lighting

Gas Shortage

Upon recommendation by DOEE, the Mayor may issue an Executive Order to:

- Reduce indoor heated space temperature
- Reduce hot water temperature
- Notify interruptible gas customers
- Reduce government facility hours
- Close government facilities

Petroleum Shortage

Upon recommendation by DOEE, the Mayor may issue an Executive Order to:

- Limit the amount of fuel one can purchase at a time
- Institute odd-even days to purchase gasoline
- Mandate employer ridesharing
- Reduce vehicle use by District Government employees
- Mandate Emergency Building Temperature Restrictions (EBTR)
- Implement a compressed work week
- Mandate one- or two-day vehicle sticker plan
- Reduce retail hours

Table 11 Mandatory Measures

2.5.9 Decisions Regarding Types of Support Measures Needed

Within its emergency management authorities, the District may provide personnel, equipment, supplies, and facilities; and managerial, technical, and advisory services in support of emergency assistance efforts. Examples of these provisions are included in Table 12 below.

Types	Examples
Personnel	Workers to assist in supporting response efforts
Equipment	Tree and branch removal
Facilities	Staging areas for response events
Managerial, technical, and advisory services	Identifying expertise and making it available

Table 12 Supplier/Distributor Support Measures

Examples of types of user and consumer support measures are outlined in Table 13 below.

Types	Examples
Information	General information on emergency
Advice	Best practices
Appliances (e.g., portable fans & heaters & generators)	Government and relief agencies
Supplies (e.g., ice, sandbags)	Identification of pickup locations by supply type
Providing in-place assistance	Community Services and Infrastructure Support Branches of the Operations Staff Section
Providing recovery sites	Identification of staging sites and shelters, e.g., RFK stadium, DC Armory, etc.

Table 13 User/Consumer Support Measures

2.6 Follow-up to be Conducted Following an Energy Emergency

2.6.1 Stand Down

Once incident goals and objectives have been achieved, and/or a centralized District coordination presence is no longer required, the CMT implements the demobilization plan. This action will transfer responsibilities to recovery assistance for program oversight and monitoring. Following complete demobilization, responsibilities shift back to individual agencies' District offices.

2.6.2 Event Follow-Up

After an energy emergency has been resolved, DOEE will participate in a post-event analysis. The analysis will evaluate all events associated with the energy supply disruption from the first indication of a problem (including data monitored prior to the disruption) to its resolution.

Elements of a Post-Event Analysis:

- Duration—length of time of energy supply disruption
- Response—corrective actions taken
- Restoration and recovery time
- Analysis of corrective actions—determining effectiveness of actions taken bythe District, supply chain participants, end users, and the public
- Determination of root causes and lessons learned
- Revisions or enhancements to the EAP and the ESDTP

Questions to Answer:

- Would additional data or more frequent monitoring have provided earlier indications of the problem(s)?
- Was the data collected during the event adequate in determining effective corrective actions?
- Was the data helpful in managing the event?
- Were the corrective actions successful?

Based on the assessment of this information, recommendations to change the ESDTP, and possibly the EAP, will be made.

Following an energy emergency, DOEE will submit an after-action report through the CMT Information and Planning Section to HSEMA. The report will detail problems encountered and key issues affecting District response performance. Data from these issues and targeted reviews are analyzed and provided, as appropriate, to HSEMA management and to the Emergency Planning Council (EPC) for consideration. After a major disaster or unique emergency operation, HSEMA may convene an interagency forum to identify lessons learned. Each District agency involved is encouraged to keep records of its activity to prepare its own after-action report.

2.7 Enhancing the Resilience of Energy Systems in the District

There are two primary roles and responsibilities when considering the District's plan for energy resilience: (1) the pre-event roles and responsibilities of "overseeing and monitoring," and (2) the resilience roles and responsibilities of "collaborating on critical infrastructure protection and promoting measures to build resiliency."

Resilience defined: The U.S. Department of Energy (DOE) defines resilience as "the ability to respond effectively to an energy emergency and to recover quickly from damage."[15]

Urban resilience defined: Urban resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and thrive no matter what kinds of chronic stresses and acute shocks they experience.[16]

Developing a plan to increase resilience prior to an energy emergency ensures that the District can quickly mitigate or help lessen the impacts of an energy disruption or emergency. Section 5 outlines the full array of actions the District and its partners are taking, or should consider, to increase the resilience of its energy systems. One main area in which the District can provide energy resilience is by installing microgrids to support critical infrastructure.

[15]https://energy.gov/sites/prod/files/Enabling_States_and_Localities_to_Improve_Energy_Assurance_and_Resiliency_Planning.pdf.
[16] Resilient DC Strategy found here: https://resilient.dc.gov/

Additionally, DOEE will explore placing microgrids or solar panels on top of gas station canopies, which could provide a source of electrical power to operate pumps in order to build resilience in preparation for a fuel emergency. In a regional disaster that results in damage to transportation infrastructure and widespread power loss for an extended duration, the impact on fuel supplies could be severe due to the dependency on electricity to operate pumps that draw fuel from underground storage tanks. While the District's DPW fuel facilities are retrofitted with emergency generator hookups and would remain operational, fuel at private retailers would be inaccessible as most retailers do not have the ability to connect to an alternative power source.

DOEE has found that there are several companies with the capabilities and prior experience to manufacture and install solar powered microgrids. By working with DPW to pilot this concept at District-owned fuel facilities, DOEE can test the efficacy of such systems in generating sufficient clean electrical energy to power fuel pumps and other equipment while maintaining access and control of the equipment for the District. If successful, this could become a model that enhances the resilience of the District and could potentially protect private retailers against fuel disruptions.

DOEE has undertaken additional resilience efforts through its various strategic plans. Clean Energy DC,[17] the District's comprehensive energy and climate action plan, outlines the roadmap for modernizing the energy delivery system for greater resilience, efficiency, and sustainability. Climate Ready DC,[18] the District's climate change adaptation plan, covers the topics of protecting critical infrastructure and vulnerable communities. In addition, DOEE conducted a feasibility report in 2016 for deploying microgrids and district energy systems throughout the District, which is available on DOEE's website. Lastly, the District is a member of the 100 Resilient Cities Network, a peer-to-peer network that shares information and best practices on resilience planning and program implementation.

Resilience is enhanced by an effective EAP that will help restore energy services quickly following an energy disruption. Key steps include (1) identifying critical infrastructure facilities and communities most vulnerable from prolonged energy disruptions, (2) developing a plan to protect these facilities during an energy emergency, and (3) proactively developing resilience capabilities of these facilities and communities.

2.7.1 Ongoing Monitoring

DOEE's ongoing monitoring activities include the following:

5. Clean Energy DC
6. Promoting programs to enhance the resilience of the District's energy systems

[17] https://doee.dc.gov/cleanenergydc

[18] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://doee.dc.gov/sites/default/files/dc/sites/ddoe/service_content/attachments/CRDC-Report-FINAL-Web.pdf

7. Reviewing, as part of emergency planning exercises, the emergency plans of energy providers and suppliers in the District, noting possible gaps and suggesting ways to close those gaps
8. Reviewing, as part of emergency planning exercises, the related portions of emergency plans of federal agencies that relate to energy supply disruptions, noting possible gaps and identifying processes to close those gaps
9. Updating the District's energy profile
10. Continuing to monitor activities of the Metropolitan Washington Council of Governments (MWCOG) NCR Critical Infrastructure Protection (CIP) Working Group
11. Monitor the activities of MWCOG's Energy Advisory Committee, Climate, Energy, and Environment Committee, and the Chief Administrative Officer's Committee, and continue to coordinate response efforts in accordance with MWCOG's Regional Emergency Coordination Plan[19]
12. Periodically incorporating additional best practices and lessons learned from energy emergencies into the EAP as needed
13. Monitoring the progress of Pepco's installation of smart grid technologies and cyber security efforts
14. Researching the potential for creation of microgrids in the District and review the potential for energy storage solutions
15. Pre-event monitoring of energy supplies that includes understanding how fuel supply networks operate under normal conditions; who owns and distributes fuel in the region; and gathering baseline information and data on incoming fuel deliveries, existing fuel supplies, and fuel usage
16. Working with energy providers, critical infrastructure facilities, and the largest employers in the District to develop and implement adequate emergency operations plans or continuity of operations plans. The District may want to engage in ongoing coordination efforts with privately-owned facilities to ensure that adequate energy backup systems are in place prior to an energy emergency
17. Remaining aware of any changes in energy curtailment and restoration priorities of energy utilities

Monitoring is an ongoing activity that falls under Level 1 within the HSEMA operational procedures. It is also a major component of DOEE's Monitoring & Tracking Framework.

In the event of an energy emergency, information sharing and coordination with regional partners is vital to assessing the impact of a disaster on fuel terminals and transportation routes. Such coordination must occur when the District and regional agencies are at Level 1, which is the routine posture of District agencies, and when planning and exercise activities

[19] https://www.mwcog.org/about-us/newsroom/2003/04/28/cog-regional-emergency-coordination-plan-receives-unanimous-endorsement-from-area-local-governments-homeland-security-regional-emergency-coordination-plan-recp/

occur. As part of pre-event planning, DOEE will work with HSEMA and DDOT to incorporate into regional exercises the impact of damage to fuel terminals and transportation corridors from fuel terminals to test communication protocols for sharing such information and develop solutions. DOEE will also collaborate and hold discussions with MEA & DMME to promote information sharing about regional fuel disruptions and shortages, enhance regional assistance capabilities, and develop strategies and to mitigate the impact of fuel disruptions.

To accomplish this, DOEE will*:*

- Establish a working relationship with regional partners at MEA & DMME regarding EMAC and other concerns; and
- Include in regional drills, exercises related to fuel supply disruptions and damage to supply routes to test communication protocols, information sharing processes.

DOEE will monitor the energy profile of the District, resiliency, critical infrastructure protection, and emergency response planning, and specifically the following:

1. The energy profile of the District that is outlined in Section 3;
2. The energy regulatory environment and the extent to which it supports energy assurance;
3. The energy market structure and the extent that it fosters or hinders energy assurance;
4. Planning exercises and emergency response planning involving critical infrastructure;
5. Activities under Clean Energy DC and Climate Ready DC;
6. Programs to enhance the resiliency of the District's energy systems;
7. The emergency plans of energy providers and suppliers in the District, noting possible gaps, and suggesting ways to close those gaps;
8. The relevant portions of emergency plans of federal agencies that relate to energy supply disruptions, noting possible gaps, and identifying processes to close gaps if they exist;
9. Activities under the Metropolitan Washington Council of Governments (MWCOG) National Capital Region (NCR) Critical Infrastructure Protection (CIP) Working Group and the NCR Homeland Security Strategic Plan[20];
10. Activities of MWCOG's Energy Advisory Committee, Climate, Energy, and Environment Committee, and the Chief Administrative Officer's Committee, and the response efforts in accordance with MWCOG's Regional Emergency Coordination Plan[21];
11. Additional best practices and lessons learned from energy emergencies for incorporation into the EAP as needed;
12. Progress of Pepco's installation of smart grid technologies and cyber security efforts;

[20] https://www.mwcog.org/documents/2013/11/01/national-capital-region-homeland-security-strategic- plan-homeland-security-strategic-plan-uasi/

[21] https://www.mwcog.org/documents/2011/09/30/regional-emergency-coordination-plan-recp-homeland- security-regional-emergency-coordination-plan-recp/

13. Opportunities for microgrids and distributed energy resources, including energy storage solutions, in the District;
14. Emergency operations plans or similar instruments of critical infrastructure facilities and the largest employers in the District; and
15. Situational awareness of any changes in energy curtailment and restoration priorities in place made by energy utilities.

2.7.2 Reducing Vulnerabilities

The District has taken the following steps to proactively reduce vulnerabilities by:

- Supporting the deployment of smart grid technologies and leading modernization efforts of the District's energy delivery systems.
- Diversifying energy resources by developing clean, local sources of generation, including solar photovoltaic (PV) systems, low-carbon thermal energy, and battery storage to increase sustainability, efficiency, and resiliency.
- Conducting resilience audits for vulnerable communities and critical infrastructure.
- Studying opportunities to develop microgrids and retrofit District energy systems.

The District's efforts in promoting resilience are outlined in detail in Section 5.

2.7.3 Protecting Critical Infrastructure

HSEMA is responsible for maintaining the list of critical facilities in the District. HSEMA works with District agencies, regional organizations, federal agencies, and infrastructure owners and operators to help ensure that critical infrastructure is protected and that the restoration priority for critical facilities is set before an energy emergency occurs. This includes conducting risk assessments of critical facilities and identifying opportunities to enhance protective and resilient elements of those facilities against energy disruptions. Critical infrastructure information is protected and only authorized personnel are permitted to access this information. Due to the sensitive nature of the critical facilities list and the critical infrastructure protection plan, this information has not been included in this version of the EAP.

3 An Energy Profile of the District of Columbia

Monitoring energy in the District is an ongoing activity. Monitoring the energy profile includes tracking the following:

- The drivers of energy supply, demand and prices, which include trends in energy costs and expenditures.
- The energy regulatory environment and the extent to which it supports energy assurance.

- The energy market structure (i.e., the number of suppliers and distributors) and the extent that it fosters or hinders energy assurance.

Tracking these components of the energy profile provides (1) information on how well the District is meeting its overall energy goals and objectives and (2) information to support revising existing energy policies and programs or developing new ones. Examples of different types of information that are monitored are provided in Table 14 below.

Area		Information Monitored
1	Demographic	Income and population trends
2	Energy Demand	Energy consumption and usage by sector
3	Energy Supply	Energy sources and suppliers
4	Energy Prices	Price trends
5	Largest Energy Users	Largest employers as a proxy for largest energy users
6	Distributed Generation	Current status of distributed generation

Table 14 Information Monitored

Key findings for each informational area are provided in Table 15 below.

Area		Key Findings
1	Energy Demand	While overall economic activity has increased, energy consumption has increased at a slower rate, suggesting a trend towards greater energy efficiency. The commercial sector accounted for about two-thirds of the electricity retail sales in the District in 2020 and continues to be the major driver of energy usage in the District.[22]
2	Energy Supply	In 2020, the District imported about 98% of its energy. In 2020, of the 2% of total consumption from energy generated in the District, solar energy and biomass generated 59% of the electricity within the District, and gas accounted for 41% of the city's generation.[23] Both Pepco and Washington Gas are energy distributors in the District. There are many available suppliers in the District for electricity, gas, and petroleum.[24]
3	Energy Prices	Historically, energy prices in the District have been relatively high. In 2015, the District paid the 12th highest price per million Btu of any state in the country for electricity.
4	Large Energy Users	The largest employers act as a proxy for the largest energy users. In July 2022, there were about 778,900 jobs in the District. The Government sector accounted for 31% of jobs as of July 2022; the remaining 69% of jobs were those in the private sector, including trade, transportation, and utilities (~4%), information (~3%), financial activities (~3%), professional and business services (~23%), educational and health services (~15%), leisure and hospitality (~9%), and other services (~10%).[25]
5	Distributed Generation	Distributed generation provides a small portion of overall energy supply, but new programs and efforts to incentivize distributed energy resources could result in a significant amount of new local generation over the next decade.

[22] https://doee.dc.gov/cleanenergydc

[23]https://www.eia.gov/state/print.php?sid=DC

[24] https://www.dcpsc.org/getattachment/962d418b-6e50-4066-a5ba-bbb3c6a327c9/2016-Annual-Report.aspx

[25] Labor statistics as of July 2022 can be found on the District Department of Employment Services website here: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://does.dc.gov/sites/default/files/dc/sites/does/page_content/attachments/CESdcJuly22%5B3%5D.pdf

6	Demographic	**Income:** In 2020, the District had an annual median family income of $90,842 (in 2020 dollars), while the national median was $67,521. However, recent data shows that the District, in 2020, had an average poverty rate of 15%, which is above the national average of 11.4%.[26] Although middle- and upper-income households constitute the largest components of the residential sector, the District has many low-income households, which are vulnerable to rising energy prices. **Population:** Population in the District peaked at 802,178 in 1950. It began to decline after 1950 and reached its lowest point in 2000 at 572,059. Recent data (2020 estimate) indicates the District population is 689,545[27], and it is expected to grow steadily over the next decade. **Employment:** As of 2020, there were approximately 543,174 jobs.[28]

Table 15 Key Findings for monitoring informational areas

3.1 Energy Demand in the District

3.1.1 Income and Population

In general, the District is experiencing stable growth in the local economy, homeownership rates, per capita income levels, and expanded office construction. The District population continues to increase, while District-wide energy consumption remained relatively steady.

3.1.2 Economy

Gross state product (GSP) can be defined as the market value of goods and services produced in a particular area. In the District, the GSP rose steadily from 1997-2021. Growth was substantial in the 1980s, continued steadily at a somewhat slower rate throughout the 1990s, and began to grow more quickly again in 2000. In 2021, GSP experienced a –2.1% decrease due to the COVID-19 public health emergency.[29]

In 2020, Census data for the District reported an annual median family income of $90,842.[30] This figure was higher than the national median of $59,039. Still, recent data shows that the

[26] https://www.census.gov/library/publications/2021/demo/p60-273.html#:~:text=Median%20household%20income%20was%20%2467%2C521,median%20household%20income%20since%202011

[27] https://data.census.gov/cedsci/profile?g=1600000US1150000

[28] https://www.census.gov/quickfacts/fact/table/DC/BZA110215#viewtop

[29] https://www.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=10&isuri=1&7003=200&7035=-1&7004=naics&7005=-1&7006=11000&7036=-1&7001=1200&7002=1&7090=70&7007=-1&7093=levels

[30] https://data.census.gov/cedsci/profile?g=1600000US1150000

District had an average poverty rate of 18.6% in 2016, which is above the national average of 12.7%. However, the District's GDP has continued to grow steadily over the past two decades. Shown in Figure 11Figure 11 below, GDP has climbed from near $80,000 to $125,000 from 1998 to 2021. While middle- and upper-income households comprise a large percentage of the residential sector, the District has a significant number of low-income residents who will be vulnerable to rising prices.

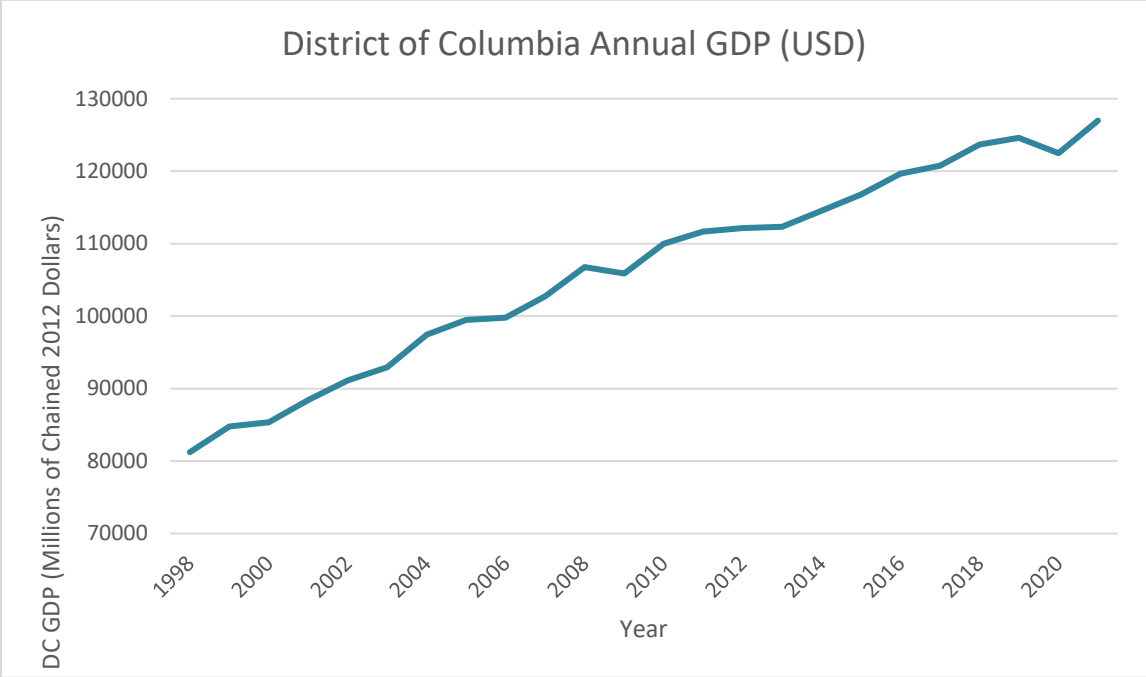


Figure 11 Gross Domestic Product for the District of Columbia (source: U.S. Bureau of Economic Analysis)[31]

3.1.3 Population and Employment

In 1980, the population was 638,432. The population dropped as low as 519,000 in 1999 but rebounded to 572,059 in 2000. Recent data in 2020 indicates the District population is 689,545.[32] In 2020, the District provided 543,174 jobs.

[31] Bureau of Economic Analysis. https://apps.bea.gov/itable/iTable.cfm?ReqID=70&step=1&acrdn=1. Chained (2012) dollar series are calculated as the product of the chain-type quantity index and the 2012 current-dollar value of the corresponding series, divided by 100. Because the formula for the chain-type quantity indexes uses weights of more than one period, the corresponding chained-dollar estimates are usually not additive. The difference between the United States and sum-of-states reflects federal military and civilian activity located overseas, as well as the differences in source data used to estimate GDP by industry and the expenditures measure of real GDP.

[32] https://data.census.gov/cedsci/profile?g=1600000US1150000

3.1.4 Energy Consumption in the District of Columbia

Figure 31 below illustrates total energy consumption in the District from 2005-2016. The District's residential, commercial, industrial, and transportation sectors consumed Btu directly using coal, gas, and petroleum products. In 2015, the electricity grid mix consisted of (PULL PJM mix) of the use of nuclear, gas, coal, and a very small contribution from fuel oil, along with increased utilization of renewable energy sources such as wind, solar PV, hydropower, and biomass.

Historically, energy prices in the District have been relatively high. In 2016, the District paid the 13th highest price per kWh in the United States. The District paid $0.1173 per kWh, while the national average was $0.1027 per kWh.[33] However, the District has spent less money for energy per person in the last five years. The District now ranks 41st (from 23rd in 2010) in annual energy expenditure per person, spending less than the national average, at $3,228.[34] Similarly, the District's energy consumption per capita has improved, now ranking 35th from the previous rank of 29th, consuming 266,700 kBtu per person in 2015, less than the national average of 303,100 kBtu.[35] District energy consumption (trillion Btu) from 1960-2020 is shown in Figure 12 Energy Consumption in the District of ColumbiaFigure 12 below.

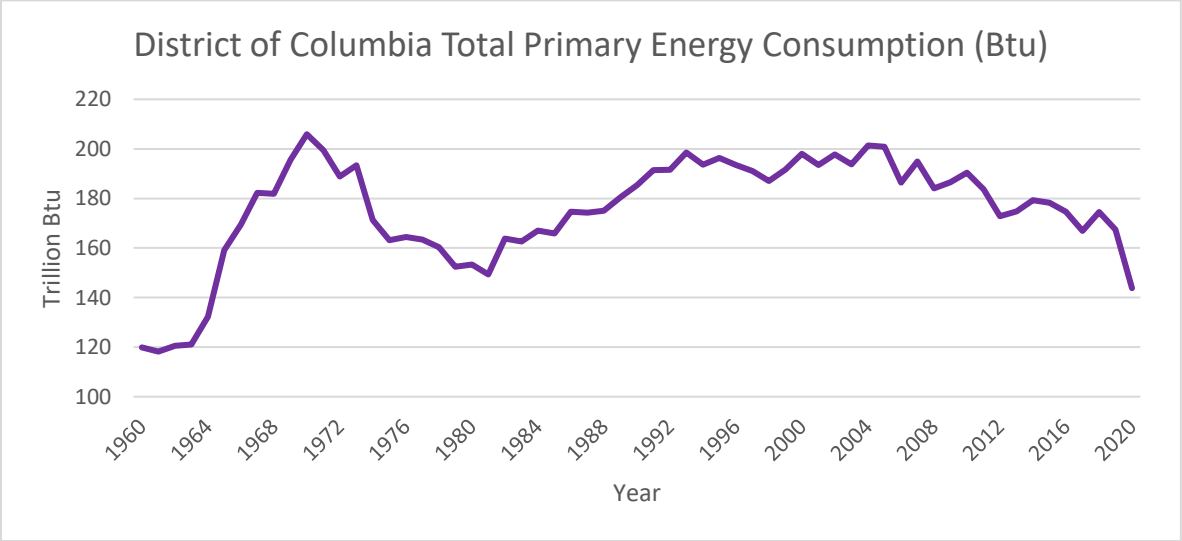


Figure 12 Energy Consumption in the District of Columbia

3.1.5 Usage by Sector

Residential Sector: Residential energy consumption accounts for approximately 23% of total

[33] https://www.eia.gov/electricity/data/browser/
[34] https://www.eia.gov/state/seds/archive/seper2015.pdf
[35] https://www.eia.gov/state/seds/archive/seds2015.pdf

energy use in the District. Only 1% of District households heat with fuel oil.[36]

There are several key factors that will drive residential energy demand in the District in the near future:

1. Continued increases in residential electricity and gas consumption in both single-family and multi-family dwellings will be driven by population increases in the District.
2. Projected increases in the residential population resulting from and causing new single- and multi-family housing buildings to be built, which leads to an increase in energy demand, particularly for gas and electricity.
3. Projected increases in the number and diversity of low-income households requesting energy-related financial and service assistance from utilities and the District Government.

Commercial and Industrial Sector: Commercial energy use accounts for approximately 51% of all energy use in the District.

Transportation Sector: Energy consumption in the transportation sector accounts for 26% of energy used annually in the District, from gasoline, diesel, and electricity for vehicles and public transportation.

Figure 32 and Figure 33 below and on the following page show 2019 energy consumption by sector and by type in the District based on data from the District's annual citywide greenhouse gas inventory.

[36] Household energy consumption by source as of 2019 is provided by the Energy Information Association here: https://www.eia.gov/state/print.php?sid=DC.

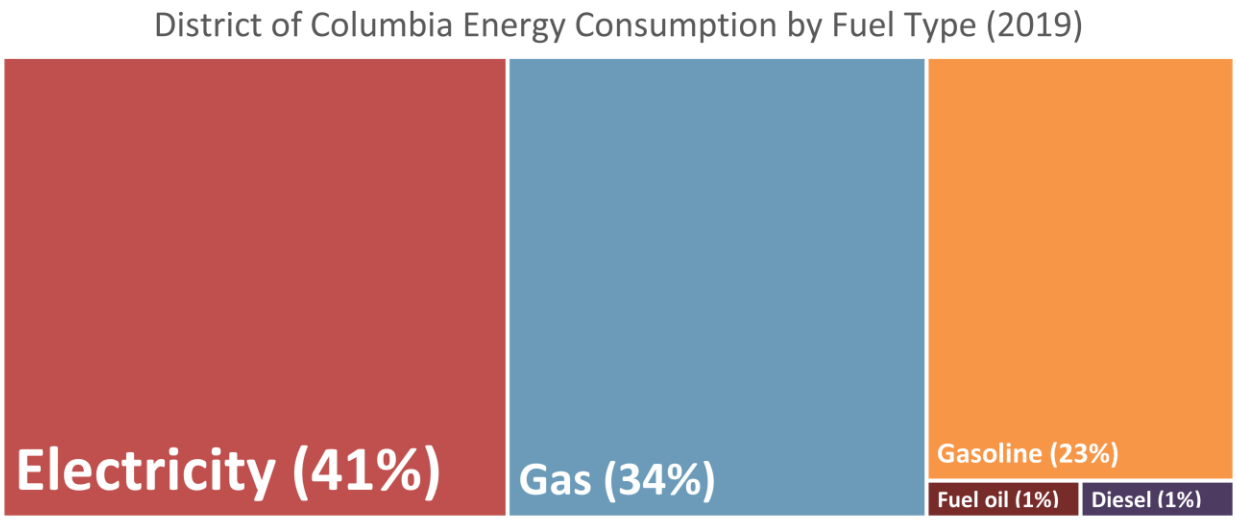


Figure 13 Energy Consumption by Fuel Source (2019)[37]

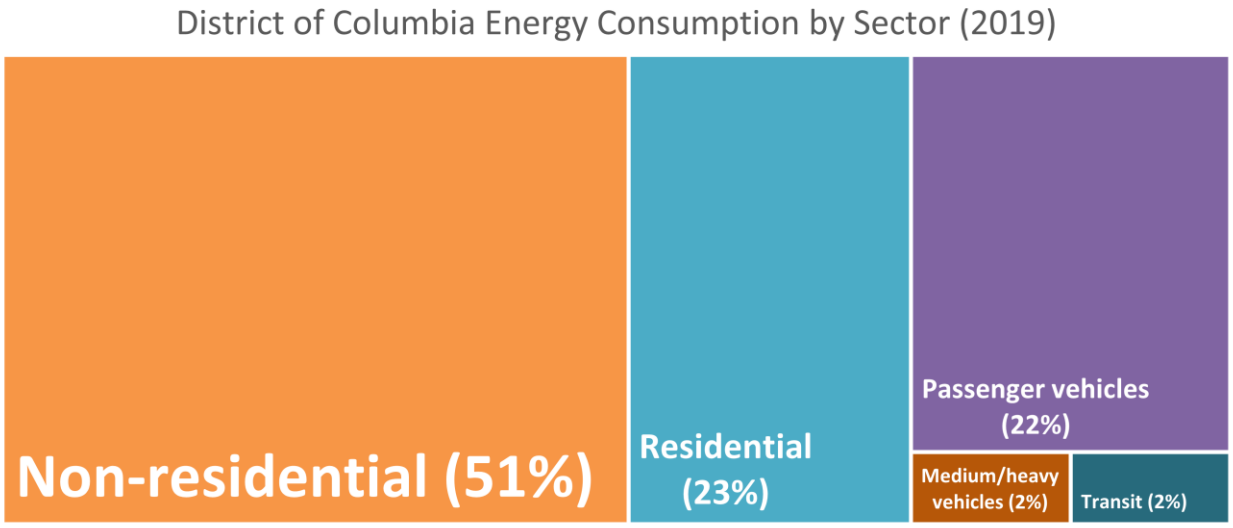


Figure 14 Energy Consumption by Sector (2019)[38]

3.1.6 Usage by Source

The District's energy consumption by fuel source is shown in Figure 15 below.

[37] Citywide Greenhouse Gas Inventory
[38] Citywide Greenhouse Gas Inventory (2019)

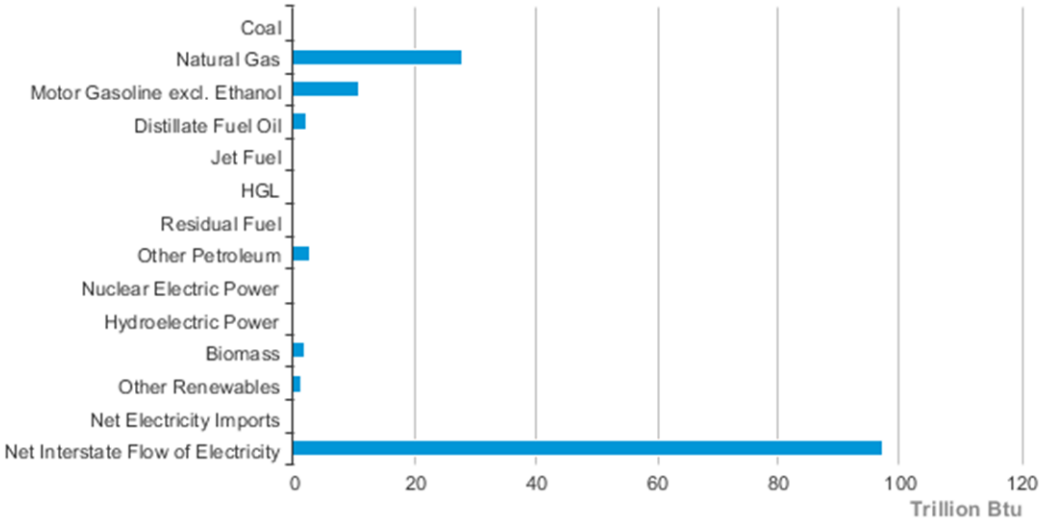


Figure 15 2020 Consumption by fuel source (trillion Btu)[39]

Fuel Oil, Diesel, and Gasoline: As of 2016, fuel oil, diesel, and gasoline constituted 28% of total energy consumption, which includes annual petroleum consumption of 3.8 million barrels. According to the 2017 Fuel Station Emergency Operations Plan, DPW is responsible for providing fuel to all District agencies with an average daily usage of 11,600 gallons of unleaded fuel, 4,150 gallons of biodiesel, and 835 gallons of diesel. To provide fuel to vehicles in the District government's fleet, DPW manages and maintains 10 fuel facilities

located across all quadrants of the city, as well as an additional distant facility in Laurel, MD. DPW fuel storage tanks can hold 56,000 gallons of biodiesel, 27,200 gallons of diesel, and 132,200 gallons of unleaded gasoline. However, the average fuel levels maintained at each of these facilities is roughly 50% of total capacity. In an emergency or fuel disruption, DPW will prioritize the refueling of vehicles for emergency service (MPD & FEMS) or equipment used to restore essential city services (DDOT, DPW, DC Water, National Guard). It also owns two tanker trucks to transfer supplies to another facility and deliver fuel to deployed equipment and portable generators.

Fuel oil consumption has generally decreased since 2006, with a small increase witnessed in 2015. Consumption of diesel has shown a strong decline since 2006. Finally, consumption of gasoline increased marginally, with about 3.2 billion VMT expended in 2006 to 3.6 billion VMT in 2019. Reasons behind declining, or relatively stable consumption in the case of gasoline, may include several factors, such as greater Metro ridership from locations outside the District, turnover in the vehicle fleet, or price fluctuations for gasoline In 2007, Federal Corporate Average Fuel Economy (CAFE) goals were raised with the passing of the Energy Independence and Security Act of 2007, requiring automakers to boost fleet-wide gas mileage to 35 mpg. However, the future of the CAFE rules and goals remain uncertain.

[39] Source: EIA State Energy Data System

Energy consumers, on average, paid a similar rate for all energy products combined from 2005 to 2020. In 2005, total energy products were priced at $20.08 per billion Btu. This price reached a peak of $27.52 in 2008 and has since declined overall to $22.56 in 2020.[40] The District had the fifth highest total end-use energy cost compared to all other states in the US. Only Hawaii, California, Connecticut, and Rhode Island paid higher end-use prices, respectively.[41] The District reported the third lowest expenditures per capita for energy products in 2020 as well as the lowest overall expenditures as a percent of GDP.[42] This suggests that the District's use of energy is significantly more efficient than the national average.

Gas: Between 1980 and 2006, gas consumption increased modestly due to growth in the commercial sector. The use of gas declined between 2006 and 2012, before increasing slightly between 2013 and 2019. Overall consumption increased between 1980 and 1990 and has remained relatively flat since then. Increases in gas use by the commercial sector have been offset by decreases in use by the residential sector. Gas accounted for 35.6% of total energy consumption in the District in 2019, a sizeable increase when compared to 18.5% in 1980. The District anticipates gas usage to continue to decrease as the city works to phase out fossil fuels.

Electricity: Electricity, as a share of total energy consumed in the District between 2006 and 2015, has shown some measure of volatility. Since 1990, electricity consumption relative to total energy use in the District has slowed to 43% in 2019. Electricity consumption in the District is shown below.

3.1.7 Electricity Consumption Trends

Total electricity consumption declined between 2006 and 2009. Consumption picked up briefly between 2009 and 2010, and then rose again in 2014. Since 2014, electricity consumption in the District has remained mostly flat, with a modest decrease in 2016 and 2017, which was followed by a slight increase. The historical (2010-2016) values of electricity consumption are presented in **Error! Reference source not found.**[43] below.

[40] Data were retrieved from EIA State Energy Data System, which is found here: https://www.eia.gov/state/seds/seds-data-complete.php?sid=DC#PricesExpenditures.
[41] Data were retrieved from EIA's State Energy Data Systems, which can be found here: https://www.eia.gov/state/seds/seds-data-complete.php?sid=DC#PricesExpenditures
[42] Data were retrieved from EIA's State Energy Data Systems, which can be found here: https://www.eia.gov/state/seds/seds-data-complete.php?sid=DC#PricesExpenditures
[43] Source: EIA State Energy Data System

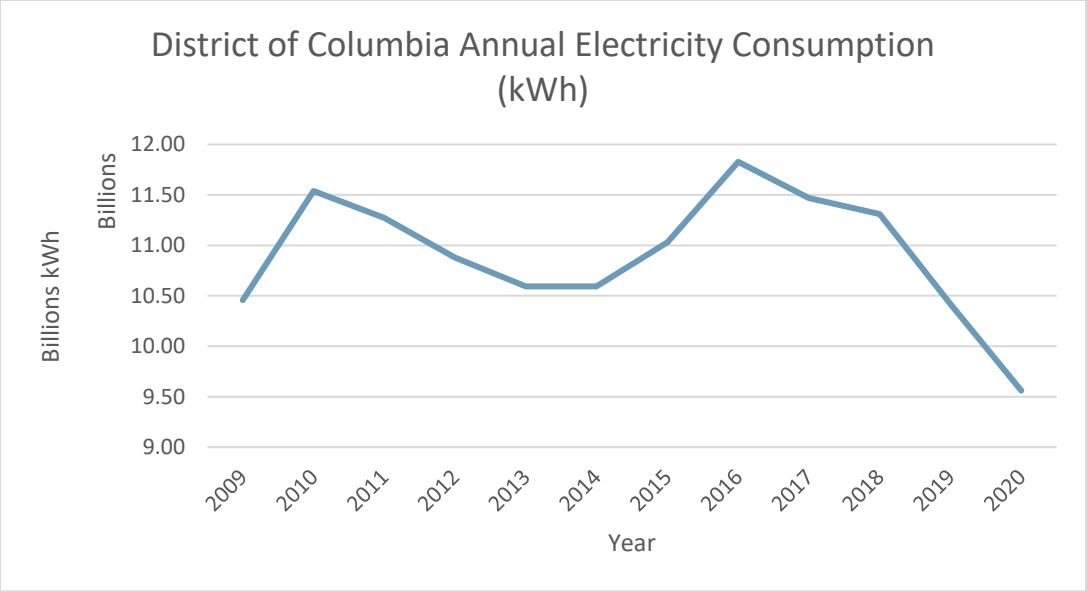
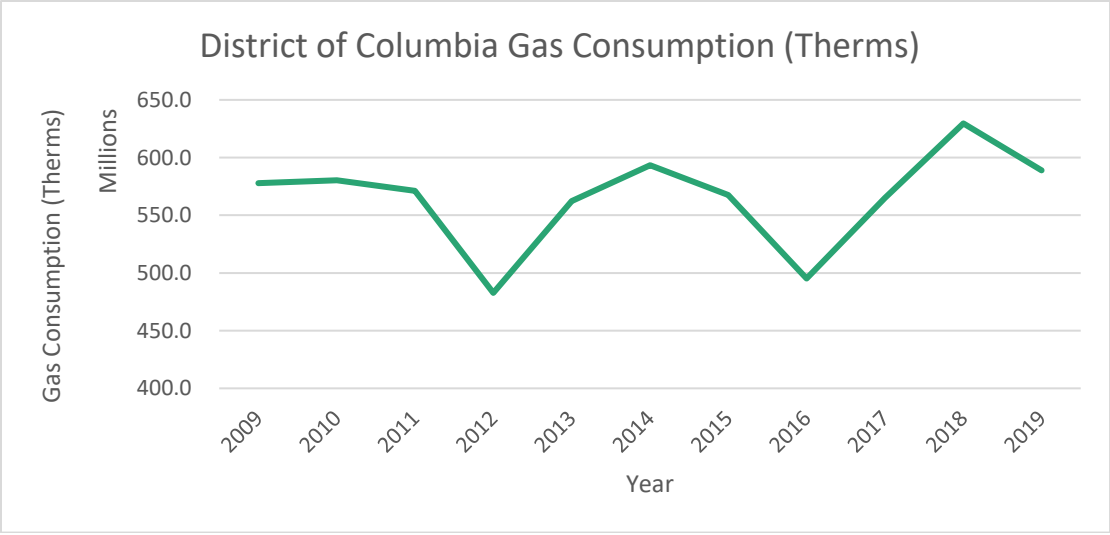


Figure 16 District Electricity Consumption (kWh)

3.1.8 Gas Consumption Trends

The weather-normalized consumption of gas in the District has fluctuated unevenly in the recent past, but the overall trend is a decline in total gas usage. There was a drop in usage in 2009, in part due to the recession. The forecast prepared by Washington Gas shows a slow decline in consumption in 2010 and 2011. District gas usage is presented in Figure 17 District Gas UsageFigure 17[44] below.



[44] Source: Clean Energy DC Interactive Dataset

Figure 17 District Gas Usage

3.1.9 Increasing Renewable Energy Generating Capacity in the District of Columbia

The District increased its Renewable Portfolio Standard requirements, with the passage of the Clean Energy DC Act of 2018. The District has set a target of procuring 100% of retail electricity supplies from renewable sources by 2032, increasing the previous requirement of procuring 50% renewable supplies by 2032. The Act also increased the local solar carve-out, which requires the procurement of local solar generation, from 5% by 2032 to 10% by 2041. As of May 2022, more than 10,000 solar PV systems are in operation in the District, representing 154.7 MW.[13]

3.1.10 Reducing Growth of Peak Demand in the District of Columbia

Reducing peak demand remains a critical task in the District in order to ensure affordability and minimize outages and other reliability issues. In 2015, Pepco DC's monthly average demand was approximately 2275 MW, for a total annual consumption of 11.3 million MWhs. This yields an approximate grid utilization rate of 57%, which is inefficient. Overall, the monthly average peak demand has been declining steadily since 2011 when the monthly average exceeded 2400 MW.

Peak demand stresses the grid and its equipment, and it can lead to equipment failures. Therefore, reducing peak demand will enhance grid reliability. A high peak demand has two price implications: higher prices at the wholesale market during peak demand hours, and higher distribution costs. Reducing peak demand can lower energy generation and transmission costs, and it can help defer or avoid the need to build new utility infrastructure. DOEE has been seeking to develop a holistic way of reducing peak demand for each substation zone through targeted zonal analysis and assessing the potential to meet load growth through the use of distributed energy resources.

3.1.12 Energy Efficiency and Conservation Programs

To the extent that reducing energy consumption reduces the dependence on imported fuels and envelope and insulation measures can improve passive survivability in case of an outage, energy efficiency is an important preventive measure for energy emergency. To promote energy efficiency, the District is engaged in several efforts, notably through the DC Sustainable Energy Utility, Property Assessed Clean Energy financing, DC Green Bank, Energy Conservation Code development, Building Energy Performance Standards (BEPS) program, Energy Benchmarking, the Affordable Housing Retrofit Accelerator, and the Weatherization Assistance Program.

The District's Clean and Affordable Energy Act of 2008 (CAEA) requires the Mayor, through DOEE, to contract with a private entity to manage sustainable energy programs in the District.

The CAEA authorized the creation of the DCSEU and designated the DCSEU to be the primary resource for energy efficiency and renewable energy services for District residents and businesses[12]. The DCSEU contractor serves under a performance-based contract with DOEE. On October 10, 2021, DOEE executed a 5-year option period in the contract with the Vermont Energy Investment Corporation to continue serving as the DCSEU. The period of performance for the option period is October 1, 2021, through September 30, 2026. The not-to-exceed amount for the entire five-year option period is $240,000,000.

The Property Assessed Clean Energy (PACE) program is a voluntary program to finance energy efficiency retrofits in residential and commercial properties. Typically, property owners borrow money from this financing program and repay their energy retrofit loan over a 10 to 20-year period through a special assessment on their property tax bill. The District of Columbia authorized PACE in April 2010 with up to $250 million worth of PACE bonds targeting commercial property owners. As of October 1, 2021, DC Green Bank is the administrator of the DC PACE program.

DC Green Bank mobilizes private investment to provide gap financing, remove up-front costs, and maximize the impact of public investments in carbon neutrality, climate resiliency, and inclusive economic growth. The DC Green Bank seeks to be the go-to financing resource for District residents, small business owners, and commercial developers interested in EE improvements, clean energy installations, and green infrastructure construction.

Benchmarking requirements were originally signed into law through the Clean and Affordable Energy Act of 2008 (CAEA).[45] The Clean Energy DC Omnibus Act of 2018[46] expanded the benchmarking requirements to cover smaller buildings and added data verification requirements. Under these mandates, building owners are required to track the energy and water usage for their building(s) using the US EPA's ENERGY STAR® Portfolio Manager[47] and report that data to DOEE on an annual basis. This information is then publicly disclosed on DOEE's website. The annual reporting deadline is April 1st of each year for the previous calendar year's energy and water consumption. Building owners are required to have their benchmarking data verified by a third party every three years, starting in 2024 (with the calendar year 2023 data).

The BEPS Program was created in Title III of the Clean Energy DC Omnibus Amendment Act of 2018.[48] BEPS was initially introduced as a concept in the Sustainable DC Building Energy Performance Standards Task Force[49] in 2014. It was also identified as a significant action item that contributes to the District's Clean Energy DC[50] goals and is supported by technical

[45] Clean and Affordable Energy Act of 2008 (CAEA)
[46] Clean Energy DC Omnibus Act of 2018
[47] US EPA's ENERGY STAR® Portfolio Manager
[48] Clean Energy DC Omnibus Amendment Act of 2018
[49] Building Energy Performance Standards Task Force
[50] Clean Energy DC

analysis[51] by C40 Cities and the Lawrence Berkeley National Laboratory, published in 2019. The BEPS are a minimum threshold of energy performance by property type created to drive energy performance in existing buildings to help meet the energy and climate goals of the Sustainable DC[52] plan — to reduce greenhouse gas emissions and energy consumption by 50% by 2032. BEPS are set by property type and are no lower than the local median ENERGY STAR score (or the equivalent metric of Source EUI). The 2021 Building Energy Performance Standards[53] and a Guide to the 2021 BEPS[54] are available for viewing. BEPS will be re-established every 6 years, creating BEPS Periods (BEPS Period 1, BEPS Period 2, etc.). Buildings that do not meet the BEPS for any specific BEPS period are placed on a compliance cycle. Owners of these buildings will need to increase the efficiency of their buildings by completing energy performance and reporting requirements of an approved pathway to comply with the BEPS Program.

The Weatherization Assistance Program (WAP), funded by the U.S. DOE, provides technical and financial assistance to help low-income residents reduce their energy bills. WAP performs energy audits and installs audit-recommended energy efficiency measures to help families maintain energy-efficient, safe and healthy homes. In the District, WAP is administered through selected Community Based Organizations that hire local contractors to install the energy efficiency measures recommended by the energy audit. Typical weatherization measures may include insulation, duct sealing, heating and cooling systems repairs or replacement, air infiltration mitigation; and reducing electric base load consumption through measures such as energy efficient lighting and appliances.

3.2 Energy Supply in the District of Columbia – Electricity

Since the 1980s, over 90% of the District's annual electricity needs have been met by importing electricity from outside the city. As of 2017, approximately 98% of all electricity consumed in the District was imported. Since January 2001, all residential and commercial electricity customers were allowed to choose their supplier of electricity generation and transmission services.

Pepco is the sole provider of electricity distribution services in the District. The electricity distribution network in the District includes 28 transmission lines, more than 800 distribution lines, and 61 substations. Sixty percent (2,636 miles of lines) of Pepco customers are served by underground power lines. The remaining 40% of customers (1,433 miles of lines) are served by above-ground power lines that are vulnerable to heavy winds, fallen trees, and other natural and man-made hazards. Pepco is an active member of PJM Interconnection (PJM), the regional power pool that oversees the operation of the largest wholesale electricity market in the United States. The PJM structure helps ensure an adequate supply of electricity within the region and the economical use of available generating and transmission facilities.

[51] technical analysis
[52] Sustainable DC
[53] 2021 Building Energy Performance Standards
[54] Guide to the 2021 BEPS

Since 2007, all electricity suppliers (including Pepco) have been required to meet minimum requirements for fuel resources derived from renewable energy. The Clean Energy DC Act increased the requirement from 50% to 100% by 2032. In addition, 10% of total electricity must come from local solar energy systems by 2041.

In the event of a potential energy emergency in the District, additional energy supplies can be purchased through PJM by submitting an Emergency Energy-Bid form. The form indicates when additional electricity will be needed, how much will be needed, and the proposed bid price. The form is sent to PJM, which calls the bidder to verify the request and evaluate the bid based on price, minimum run time, and notification time.

Currently, there are more than 199 approved electricity generation and transmission providers eligible to supply electricity to District ratepayers, and the list can be obtained from the Public Service Commission website.[55]

3.3 Energy Supply in the District of Columbia – Gas

The District does not have gas reserves and therefore does not produce, process, or store gas or supplemental supplies. Gas supplies are delivered to the District primarily from Virginia pipelines, but a small amount is delivered from Maryland pipelines.

There are four pipeline systems (Williams Transeo, Columbia, Dominion Transmission, and Dominion Cove Point) that supply the District with gas. Washington Gas is the primary distributor and supplier of gas in the District. However, there are 102 approved competitive gas suppliers in the District, with about 27 active suppliers. A list of active suppliers can be obtained from the DC PSC's website.

3.4 Energy Supply in the District of Columbia – Petroleum

According to the EIA, the District does not produce or refine petroleum products, nor is there any major distribution pipelines located in its borders. The District market receives all of its fuel supplies (gasoline, diesel & fuel oil) by two major fuel pipeline systems from the Gulf Coast: The Colonial and Plantation. The Colonial Pipeline system (Colonial), one of the largest pipeline systems in the world, extends from Houston, TX to Linden, NJ with a system capacity of 2.5 million barrels per day (b/d). For the region, Colonial has two dedicated spur pipelines (Line 3 & 4) that carry segregated batches of petroleum products from a logistics hub in Greensboro, NC to terminal points near Fairfax, VA and Baltimore, MD. Similarly, the Plantation pipeline system (Plantation), which shares the same general route as Colonial and has a system capacity of 700 thousand b/d, pumps petroleum products from Baton Rouge, LA to Greensboro, NC. From Greensboro, the petroleum product pipeline moves fuel to distribution terminals in Newington,

[55] https://www.dcpsc.org/PSCDC/media/PDFFiles/Electric/EGTS_Approved.pdf.

VA and Baltimore, MD.[17]

These terminals are facilities with large storage tanks of varying sizes that can hold different types of refined petroleum products including petroleum, diesel and home heating fuel oil and additives such as ethanol and biodiesel. For instance, Plantation's Newington terminal has 25 tanks of differing sizes with a total storage capacity of 1.35 million barrels. At these terminals, petroleum and diesel are blended with ethanol, biodiesel and other fuel additives to meet District regulations or create brand specific fuel blends as the fuel is loaded onto tanker trucks. Then, wholesale marketers (aka jobbers) purchase the finished product and hire local distribution companies with large privately owned and operated tanker trucks (9,000 gallons) to transport fuel to private retail gas stations. Similarly, heating oil and propane are picked up by local wholesaler / retailers in smaller trucks and delivered to the tanks of individual customers.

The District can also work with the following organizations to identify potential sources of petroleum products during an energy emergency:

[16] https://www.dcpsc.org/PSCDC/media/PDFFiles/NaturalGas/NaturalGasSuppliers_ApprovedContacts.pdf https://www.dcpsc.org/PSCDC/media/PDFFiles/NaturalGas/CurrentCommodityGasSuppliers.pdf
[17] https://www.eia.gov/analysis/transportationfuels/padd1n3/

Mid Atlantic Petroleum Distributors Association (MAPDA)	This organization consists of independent marketers of branded and unbranded petroleum products (fuel oil, gasoline, and diesel) who can supply retail outlets that do not obtain their products directly from a refiner.
Washington, Maryland, Delaware Service Station and Automotive Repair Association (WMDA)	This trade association serves independent service stations, repair facilities, convenience stores, and others; it also represents retail outlets that purchase their fuel directly from refiners.
American Petroleum Institute (API)	This organization is the primary association for the petroleum and gas industries. The Eastern Region of the API, which includes the District of Columbia, represents distributors in the Eastern U.S.

Table 16 Petroleum Associations

The D.C. Department of Public Works (DPW) is responsible for ordering and verifying the delivery of gasoline and diesel to the District's fuel facilities for use by the fleet of District government vehicles. To provide fuel to vehicles in the fleet, DPW manages and maintains 10 fuel facilities dispersed across all quadrants of the city, as well as an additional distant facility in Laurel, MD. DPW fuel storage tanks can hold 56,000 gallons of biodiesel, 27,200 gallons of diesel, and 132,200 gallons of unleaded gasoline. However, the average fuel levels maintained

at each of these facilities is roughly 50% of total capacity.

In the private fuel market, the District has approximately 100 permitted gas stations of which 83% are “branded” retail stations. Branded stations are associated with and display a major oil

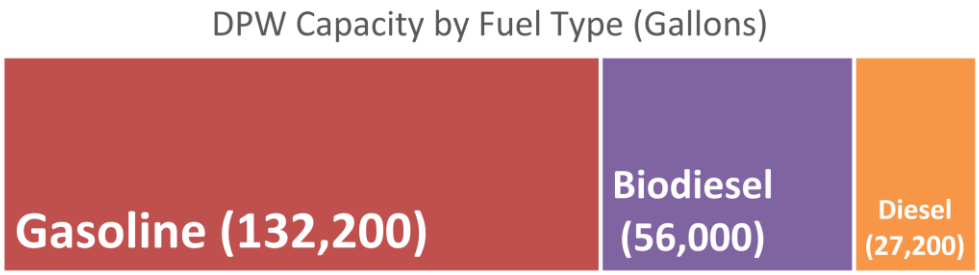


Figure 18 DPW Capacity

company brand while “unbranded” stations are not affiliated with a major oil company brand. ExxonMobil and BP/Amoco retailers make up more than 60% of the private fuel retailers in the District. Research on fuel tanks has revealed that most gas stations would have at least two tanks to hold different grades of gasoline (87 & 91 octane). The size of the tanks can vary from 12,000 gallons for low volume retailers to 24,000 gallons for large volume retailers. Based on this information, we can estimate the total capacity of fuel tanks in the private fuel market to be between 2.4 million and 3.6 million gallons of fuel.

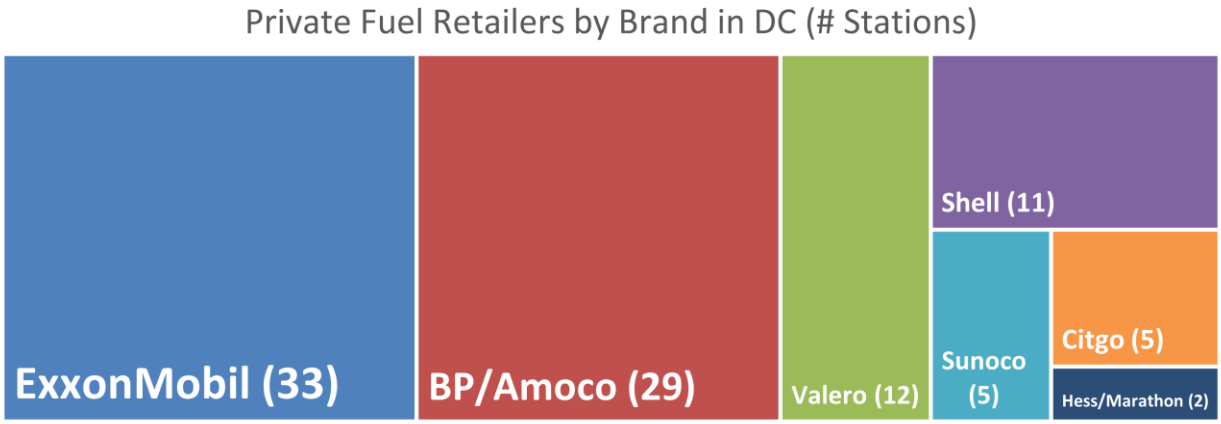


Figure 19 Private Fuel Retailers

3.5 Energy Prices in the District

Total energy prices in the District in 2015 have increased by approximately 58% from the 2000 levels at $21.12 as an average of the residential, commercial, industrial, and transportation sectors. Energy prices in all sectors have increased, as shown below.

Energy Price Estimates for the District of Columbia for Four Sectors, 2000-2016 (Nominal Dollars per Million Btu)				
Year	**Residential**	**Commercial**	**Industrial**	**Transportation**
2000	13.05	16.25	11.95	12.27
2005	18.82	20.77	28.27	18.69
2007	20.92	26.4	23.59	23.45
2009	21.79	28.05	13.72	19.63
2011	22.36	28.52	30.39	27.44
2013	20.76	25.99	16.59	29.48
2015	21.4	25.4	15.91	21.77
2016	21.11	25.03	12.79	19.28
Source: EIA, State Data Systems, District of Columbia (1970-2015)				

Table 17 Energy Price Estimates

The period-to-period analysis of energy prices (in nominal dollars) indicates that the rate of increase rose sharply from 2000-2015. The figure below shows the period-to-period percentage change in energy prices for the District.

Energy Price Estimates for the District of Columbia (Period-to-Period Percentage Change)				
Year	**Residential**	**Commercial**	**Industrial**	**Transportation**
2000-2005	31%	22%	58%	34%
2005-2007	10%	21%	-20%	20%
2007-2009	4%	6%	-72%	-19%
2009-2011	3%	2%	55%	28%
2011-2013	-8%	-10%	-83%	7%
2013-2015	3%	-2%	-4%	-35%
Source: EIA, State Data Systems, District of Columbia (1970-2015)				

Table 18 Energy Price Change Percentage

The average retail price per gallon has increased, decreased, and increased again as of 2021. Figure 20[56] shows the fluctuation of gasoline in retail price per gallon through 2021. Prices are projected to increase as supply markets remain tight and demand remains constant or continues to increase.

[56] https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=emm_epm0u_pte_swa_dpg&f=a

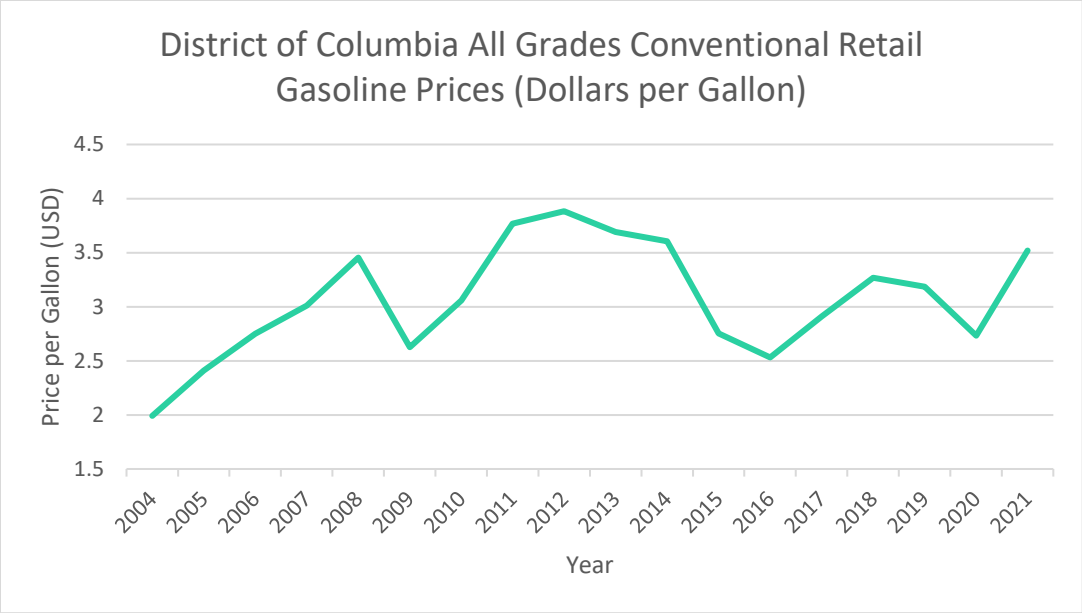


Figure 20 District gasoline prices per gallon

The price of gas for residential, commercial, and vehicle use has been at historic lows, ranging from $2 to $3.50, due to the abundant supply of gas from hydraulic fracturing in the US. It is uncertain how long these low prices will remain, but they have lowered the cost of electricity, making gas-fired generation much more competitive, and putting significant economic pressure on coal-fired generation, as well as renewable generation. Data from the EIA indicates that the average gas price for 2014 was about $3.314. The average trained down from roughly $0.94 per therm by 2017. EIA expects gas prices, on average, to experience some downward pressure on prices over the forecast period, due to strong growth in gas production. Average annual gas prices for the District are shown in Figure 21[57] below.

[57] https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_prices/total/pr_tot_DC.html&sid=DC

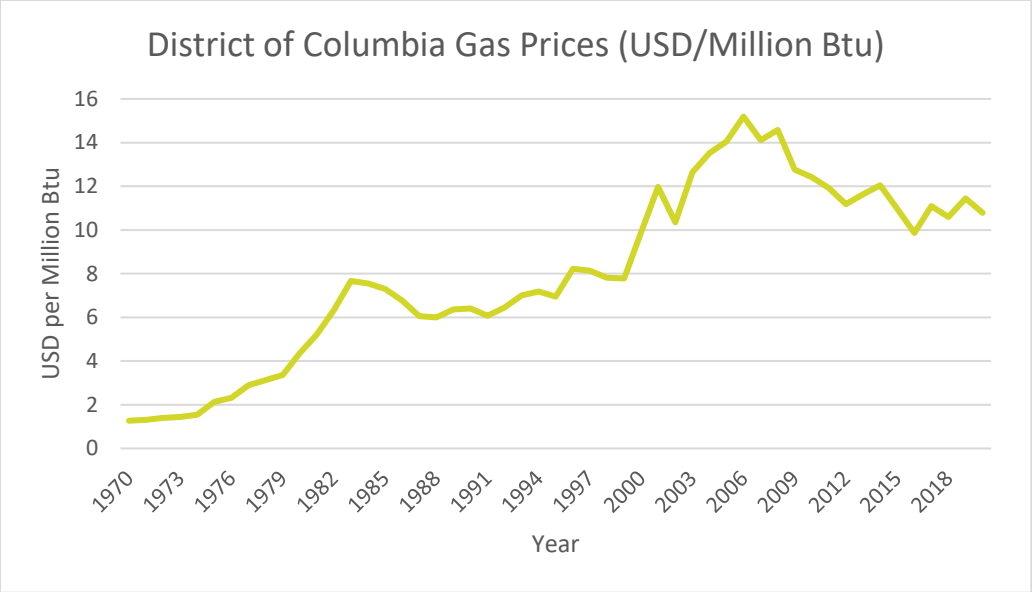


Figure 21 Average annual gas prices in the District

3.6 Largest Energy Users in the District of Columbia

The commercial building sector is the largest energy consumer in the District. Large privately owned properties over 50,000 square feet and publicly owned buildings over 10,000 square feet have been reporting whole building energy data to DOEE since 2013. This data is then publicly disclosed on DOEE's website. The largest energy users in the building sector are university campuses and hospitals, followed by large office and multifamily buildings. In total, the building sector is responsible for nearly 75% of the District's greenhouse gas emissions and accounts for roughly 22,182,856 MMBtu of energy consumed each year.

3.7 Distributed Generation in the District

The DC PSC's interconnection regulations apply to systems up to 5 MW that are operated in conjunction with the electric distribution system and are not subject to the interconnection requirements of PJM.[58] While those regulations have not yet been updated for clear enabling of islanding of distributed generation, interconnection of islandable systems such as solar PV and battery storage or microgrids can provide back-up power in the event of a grid outage. While interconnection regulations have also not yet been updated to enable streamlined interconnection of energy storage, doing so will make it easier for distributed energy resources, including solar PV, to provide back-up power.

As of September 7, 2022, the solar energy systems eligible for the District's RPS solar requirement include 11,208 solar PV systems (including 283 community renewable energy

[58] District of Columbia Municipal Regulations, Title 15, Chapter 40

facilities, or CREF) totaling 170.67 MW of capacity. There are also 109 solar thermal systems in the District, totaling 5.15 MW of capacity. In addition, 3,337 solar energy systems outside of the District are eligible, totaling 983.49 MW of capacity. The total reported capacity associated with eligible systems both in the District and outside the District is 1,159.31 MW.[59] .

DOEE expects to see a robust increase in the number of distributed generation systems in the near future for several reasons: (1) the local solar carve-out (10% of all electricity by 2041) under the District's Renewable Portfolio Standard; (2) development of microgrids; and (3) net-zero building codes coming into effect that will require many new buildings to be equipped with onsite renewable generation.

A large amount of distributed generation, when interconnected to Pepco's grid, require sophisticated smart grid technologies that can control the two-way power flows through advanced sensors and two-way communication systems, as well as changes to the planning and operation of the electric distribution system to accommodate distributed energy resources and to allow them to serve as assets to the distribution system. In May 2015, the DC PSC initiated a grid modernization proceeding through Formal Case 1130 to investigate and address these issues. The implementation of the DC PSC's grid modernization is ongoing, including working groups to address data access and transparency, improved interconnection regulations, the implementation of advanced inverter functionalities, and grid modernization pilot projects and DER valuation.

3.8 Microgrids & Energy Storage

Microgrids and energy storage are tools to provide resiliency to critical infrastructure and communities most vulnerable to extreme weather events. DOEE's climate adaptation plan, Climate Ready DC, calls for the use of microgrids and district energy systems, where appropriate, to provide resilience to critical infrastructure and vulnerable communities. According to Pepco, there are currently approximately 40 integrated storage assets in the District.

[59] Eligible_Renewable_Generators_List_12.xls (live.com)

Through its preliminary screening, DOEE has identified dozens of opportunities to deploy microgrids that would provide multiple benefits including resiliency, reliability, efficiency, and sustainability. DOEE is actively working with key stakeholders to help facilitate the development of innovative microgrids, including at the St. Elizabeth's East Campus where the Department of General Services has released an RFP for the development of a campus microgrid serving the hospital, 911 call center, and men's shelter with funding from FEMA.[60] DOEE also works with stakeholders before the DC PSC to ensure that microgrid regulations under Formal Case 1163 will create an enabling environment for the proliferation of renewable microgrids providing back-up power and electric distribution grid services in the District.

4 District of Columbia Energy Supply Disruption Tracking Plan

4.1 Purpose of the ESDTP

An Energy Supply Disruption Tracking Plan (ESDTP) is utilized during an energy emergency event to track basic information regarding the duration and severity of the event and the response actions taken. Additionally, the ESDTP reports measurement of the outcome in relation to the event. The purpose of the ESDTP is to assist with restoration of energy delivery and fuel supplies during and/or following an emergency. Power and fuel are critical to protecting lives and property and maintaining the continuity of the government, business, transportation, emergency services, and other critical infrastructure within the District.

The District's ESDTP provides a process by which energy supply and demand information is monitored and analyzed on a regular basis. Outlined in the ESDTP is the framework to implement specific data collection or tracking mechanisms during significant energy disruptions up to, and including, a declared energy emergency.

[60] https://dgs.dc.gov/event/dcam-22-cs-rfp-0011-redevelopment-st-elizabeths-east-campus-%E2%80%93-microgrid-project

4.2 DOEE's Roles & Responsibilities in Tracking & Assessing Energy Supply Disruptions

DOEE has been delegated vital roles in the implementation of energy emergency and contingency response planning. In the DRP, DOEE is designated as the primary District agency for ESF #12. DOEE gathers, assesses, and shares information on energy system damage and estimates the impact of energy system outages within affected areas during plan activation.

In the case of an energy supply disruption event, DOEE must (1) participate in the pertinent decision- making processes, (2) help determine the level of severity of the event, and (3) suggest the types of measures to implement, if necessary. DOEE must have a process in place to help monitor, track, and assess an event.

In the event of an energy supply disruption, DOEE will complete the following actions:

1. Coordinate information gathered from external sources. The District will use its tracking and assessment plan as a framework for working with other supporting organizations. This framework ensures that there is a timely flow of information to the Mayor, energy users, and the public in the case of an energy supply disruption.
2. Coordinate with all ESF #12 support agencies to help facilitate the flow of information needed by the Mayor, energy users, and the public about the restoration of energy systems and fuel supplies following an emergency.
3. Monitor energy supply prior to an event
4. Assist in determining the level of event severity
5. Assist in identifying measures to be implemented
6. Track information during the event
7. Provide situational awareness of the event
8. Assist in developing management decisions to respond to the event
9. Coordinate the assessment of how an energy supply disruption was handled so that "lessons learned" can be shared with the Mayor, supporting agencies, and the public.
10. Use the tracking and assessment plan to monitor and share information that the CMT, Mayor, and public need to know during and after an energy disruption.
11. Work with the Council and the Public Service Commission (PSC) to ensure that there is an appropriate level of regulation of energy suppliers, particularly in reporting on and responding to energy emergencies.
12. Use energy programs to promote energy resilience.
13. Review, execute, and re-evaluate existing plans, policies, and procedures.

4.3 Pre-Event Monitoring

Pre-event, DOEE will evaluate whether Cobra could be used to collect baseline data on fuel tank capacity, average fuel supplies, and whether a station has an alternative source of power.

All fuel sources are important for tracking and assessment purposes. Based on data from the District's citywide greenhouse gas inventory, which is updated annually,[61] energy consumption is as follows:

Source	Annual consumption 2019 (therms)	Percentage of annual consumption
Gas	294,503,609	35.64%
Electricity	355,608,429.05	43.04%
Fuel oil	4,979,080.09	0.60%
Gasoline	167,034,001.95	20.22%
Diesel	4,139,442.93	0.50%
Total:	**826,264,563.02**	**100%**

Table 19 District Energy Consumption by Source (2019)[62]

This distribution of energy consumption in the District frames how DOEE will track and assess energy supply disruptions.

4.3.1 Stakeholder Engagement

It is important for the District to have an established structure to work with energy suppliers and distributors to carry out the following critical functions:

- Understand the energy supply infrastructure, related interdependencies, and capabilities
- Coordinate real-time information flow about the event
- Assist in determining the level of severity and impact of an event
- Assist in identifying measures to be implemented
- Coordinate post-event analysis, and
- Build resilience against energy disruptions and supply shortages

61

Clean Energy DC figures for consumption diverge from EIA figures due to methodological differences in reporting.

62 City Greenhouse Gas Inventory (2019). Figures were used from 2019 and a pre-Covid-19 measure of consumption.

DOEE activities under this task have added complexity because of the number of companies that are involved in the supply chain from terminal operators and fuel marketers to distributors and tanker truck operators, in addition to the nearly 100 local small business fuel retailers in the District. Due to the potential for an incident at one site to have cascading effects on other parts of the supply chain, the interdependencies among the key links in the chain, and the logistical challenge of communicating with many operators in the fuel market, DOEE will engage with private fuel companies to build trusted relationships that can serve as a foundation for receiving accurate information on the impact of a disaster on fuel delivery.

DOEE may explore the option of entering into a Non-Disclosure Agreements (NDA) or Memorandum of Understanding (MOU) with fuel suppliers to facilitate information sharing and alleviate concerns that shared information will not be revealed to industry competitors. DOEE will endeavor to establish trusted lines of communication with key stakeholders in the fuel supply chain, such as companies that control or operate pipelines, bulk fuel terminals, and finished product distribution networks. These relationships can allow DOEE to receive timely notification of incidents and disruption to fuel deliveries, which will enable the District to develop pre-event response options.

To connect with the local retail market, DOEE will establish a communication system or network to reach private fuel retailers in the District, so that retailers can report the operational status of their gas stations in emergency situations.

4.3.2 Energy Supply Data Collection and Infrastructure Mapping

In an emergency, DOEE must have timely and accurate information about the impact of the event on fuel infrastructure and fuel supplies to carry out the monitoring and tracking functions, particularly because the District imports all its energy except for a small amount of solar and co- generation.

DOEE will work with energy companies and local and national regulators for tracking data. To facilitate the receipt of specific data, DOEE must have systems and processes in place that collects such data on an ongoing basis which can then be used during an emergency to make decisions regarding fuel supplies and forecast fuel shortages. Based on research, DOEE has identified the following information that will be gathered and the potential sources of that data:

Information and Data Needs	Source	Systems in Place?	Schedule
District Government			

Fuel Facility Locations	DPW	YES	One time
Existing Fuel Stock and Reserves	DPW	YES	Ongoing
Pre-Event Fuel Deliveries	DPW	YES	Real time
Damage & Operational Status	DPW	YES	Real time
Fuel Usage and Rate of Depletion	DPW / DGS	YES	Real time
Post-Event Fuel Delivery Status	DPW via Vendor	YES	Real time
Alternate Fuel Sources	DPW via Vendor	NO	Real time
Private Retailers			
Gas Station Locations	DOEE	PARTIAL	One time & annual update
Existing Fuel Stock	Local Retailers	NO	Ongoing & Real time
Pre-Event Fuel Deliveries	Private Suppliers & Local Retailers	NO	Real time
Damage, Operational Status & Outage	Local Retailers	NO	Real time
Post-Event Fuel Delivery Status	Private Suppliers & Local Retailers	NO	Real time
Regional Information			
Supply Chain Disruptions	Private Suppliers	NO	Ongoing & Real time
Damage to transportation corridors	MDA & DMME & DDOT	Reestablish & YES	Real time

Table 20 District fuel data profiling and tracking

In addition to monitoring publicly available information in listed in Figure 47, DOEE will proactively gather additional baseline data on existing fuel supplies, particularly in the retail market, since such information is currently unavailable. While the agency has been able to develop a conservative estimate of the total fuel capacity of all retailers in the District, the agency will attempt to establish a system for collecting information directly from independently owned fuel retailers. Establishing such a system address one of the key questions presented in this plan: “how much fuel is available in the private market?” To answer this critical question, DOEE will develop an organized and systematic process for mapping and gathering baseline and ongoing data:

- Map the location of private fuel retailers (gas stations);
- Record the total capacity of fuel tanks by fuel type at each station;
- Collect data on average fuel levels or supplies that is normally available;
- Gather information on schedule of fuel deliveries to each station; and
- Compile data on whether these retailers can connect to or have a portable generator.

4.3.3 Electricity

In the District, there is one electricity distribution company (Pepco) which is regulated by the DC PSC, including performance requirements. This oversight includes enforcement of electric

reliability standards under 15 DCMR §36. Pepco has also recently been required by the DC PSC to begin instituting five new Performance Tracking Mechanisms (PTM). Among these PTMs is a measurement of Customers Experiencing More than Three Outages, or CEMI-3. This CEMI-3 metric will be displayed on a web portal by neighborhood and Ward.[63]

The DCPSC also regulates the licensing of competitive electric suppliers under 15 DCMR §46.

Many of the tracking and assessment activities outlined in this plan will fall within the purview of the PSC and Pepco. DOEE's responsibilities will mainly consist of an informational coordinating and sharing role to ensure that the Mayor, electric customers, and the public have adequate information in case of an electricity supply disruption.

4.3.4 Gas

In the District, there is gas distribution company (Washington Gas) which is regulated by the DC PSC, including performance requirements. This oversight includes enforcement of gas quality of service standards under 15 DCMR §37. The DCPSC also regulates the licensing of competitive gas suppliers under 15 DCMR §47.

Many of the activities in the tracking and assessment plan will be under the purview of Washington Gas and the PSC. DOEE's responsibilities will be mainly information coordinating and sharing.

4.3.5 Petroleum, Diesel, Fuel Oil

The shipment of fuel from refineries to retailers involves a diverse, complex, and sizable number of companies who control various segments of the fuel supply chain. At the same time, there currently is no local regulatory body for petroleum products to facilitate networking and trusted collaborations. As a result, DOEE will develop the competency on how fuel supply networks operate and the interdependencies between terminal operators, fuel purchasers/suppliers and transporters that supply the District.

Most private fuel retailers are completely dependent upon electricity to operate, as many do not have sufficient back-up generation needed to operate the fuel pumps that syphon fuel from underground fuel tanks. Therefore, a power outage would render many gas stations inoperable.

The Texas Gulf Coast region is the United States' largest producer of transportation fuels, producing over 3 million b/d. Of this volume, more than 40% is transported on the Colonial Pipeline. Consequently, any extended disruptions along this mainline would impact refinery output. The primary threat along the Gulf Coast is the impact of hurricanes that can shut down

[63] DC PSC, Order No. 21416, Formal Case 1156, pg. 6-9

refineries and disrupt pipeline operations. Likewise, a disruption at a terminal point at which a batch of petroleum product is moving along the pipeline can cause a cascading disruption of supplies, as all subsequent batches of petroleum products would get backed up as far back as the pipeline point of origin. Southeast US does not have any refining capacity, so all fuel is transported into the region through pipeline or ship. Colonial Pipeline supplies about 2.5 million barrels per day and Kinder Morgan Plantation pipeline about 0.8. Together, they supply nearly half of the East Coast region's consumption of refined fuels (gasoline, diesel, jet). Colonial Pipeline alone supplies nearly 1/3 of gasoline for the region.

DPW is currently completely reliant on one fuel vendor to deliver fuel from a terminal in the Baltimore region to District. Any emergency or disaster that significantly damages the transportation corridors linking Baltimore and Washington D.C. could cause a fuel disruption that may lead to a shortage of fuel supplies for the District government. DOEE gave a recommendation to DPW to expand the number of fuel suppliers that are contracted to provide emergency petroleum, diesel and fuel oil from different fuel terminal i.e., Virginal. If a regional fuel emergency were to occur and Mansfield could not deliver needed fuel supplies, DPW and the District may be unable to get fuel from other sources in the region due to the unique ownership construct of fuel products.

DOEE has mapped the locations of public fuel facilities and local fuel retailers.[64] Mapping these facilities reveals which District fuel facilities and private retailers could be impacted by a major flood event. DOEE has also conducted a vulnerability assessment to predict the impact of a flood event in the District and overlaying this vulnerability data with the fuel facilities and retailers' location data highlights which facilities and retailers are most vulnerable to flooding impacts, such as underground storage tank[65] leakage into the freshwater system in the city. DOEE will also pursue uploading retailer location information into DOEE's incident management tracking system named "Cobra."

4.3.6 Ongoing Monitoring

Thoughtful data monitoring is critical to DOEE's capability to identify energy supply disruption triggers and to provide guidance during disruptions or declared energy emergencies. The monitoring effort serves as the foundation of the entire energy assurance planning effort, as it utilizes data and information to determine whether the energy supply is adequate to meet the demands of end users and to determine whether the delivery system is functioning normally.

[64] This data can be found at DC Open Data here: https://opendata.dc.gov/datasets/DCGIS::gas-stations/explore?location=38.899703%2C-76.907178%2C11.14

[65] Locational data for underground storage tanks can be found on DC Open Data here: https://opendata.dc.gov/datasets/DCGIS::underground-storage-tanks/explore?location=38.890772%2C-77.021832%2C12.25.

Monitoring efforts may include a review of the following:

- Annual forecasts of energy consumption and supply;
- Daily or weekly information on supply system status;
- Weather forecasts;
- Alerts indicating a supply system problem; and
- Requests for exemption from various rules or regulations that suppliers may need relief from in order to respond more effectively.

The following information will help identify a potential energy supply disruption event:

- Supply
  - Current/recent information
  - Forecasted information
- Demand
  - Current/recent information
  - Forecasted information
- Weather
  - Forecast of several days of very hot or cold weather
  - Forecast of heavy winds, rain, snow or icing conditions
  - Forecast of tornadoes or hurricanes
  - Atlantic storms interfering with shipping
- Infrastructure
  - Significant electric generation capacity outages
  - Failures of major electric transmission lines and/or major electric substations
  - Failures in the propane, petroleum, or gas supply system (equipment, refineries, trucking, shipping, roadways, etc.)
- Other
  - Geological events causing interruption of energy supply system (earthquakes, tsunamis, volcanic activity, etc.)
  - Solar flares and eruptions
  - Attack on physical infrastructure
  - Cyberattack or hack
- Price
  - Increases in spot prices
  - Strikes involving energy supply or delivery systems

- International embargoes of energy supplies

4.4 Coordination During Event

During and in the immediate aftermath of a disaster, gathering and tracking information is critical for DOEE to provide timely and accurate situational awareness to the CMT and the Mayor on the evolving conditions during and immediately following an emergency.

4.4.1 Providing Situational Awareness by Coordinating Information Flows

Situational awareness refers to the quick and efficient communication of reliable information between the private sector and public officials, which is critical to understanding the status of the energy supply network and making response decisions. DOEE is designated to serve as the primary recipient of reports on damage to energy supply and distribution systems and requirements for system restoration. DOEE will assist with the flow of information regarding an event by communicating with key partners and providing real-time analysis and recommendations to decision-makers, stakeholders, and the public. From the CMT's perspective, this means (1) knowing where emergency needs are greatest, (2) what assets are needed, (3) how to get assets into areas where they are needed, and (4) what the status of assets are as they move on scene and perform actions.

One of the support agencies for ESF #12-Energy is the District Department of Public Works (DPW). DPW plays a critical role in providing real-time information about fuel supplies, usage, and fuel reserves to forecast a fuel shortage. DPW is responsible for managing fuel deliveries, maintaining fuel storage facilities, and dispensing fuel to the fleet of District agency vehicles. Another support agency for ESF #12-Energy is the District Department of Transportation (DDOT) which, in coordination with DPW, will inspect and report on the stability and availability of transportation infrastructure, including emergency routes, streets, bridges, and ports. The existing process followed by these support agencies has been to submit information directly to HSEMA. As the lead agency for ESF #12-Energy, DOEE must develop the internal capabilities and establish a process for receiving real-time data from support agencies, which will then be shared with the CMT and the Mayor to make decisions on whether any mitigating actions or Executive Orders might be warranted. Information from these agencies – coupled with information from the electric utility, gas utility, and/or petroleum industry – is critical to developing situational awareness on potential fuel supply disruptions and providing the most up-to-date information to the CMT and the mayor. As such, DOEE will initiate activities and undertake efforts to:

- Communicate with terminal operators, private fuel suppliers, and jobbers to assess potential fuel delivery disruptions;
- Gather data from DPW for each facility that includes pre-event fuel deliveries and event-time fuel levels of petroleum and diesel;
- Gather information about the operational status of District government fuel facilities

and any damages that were sustained;

- Gather information about any potential or ongoing cybersecurity breaches;
- Gather information through DDOT and regional partners in the NCR to monitor damage to fuel transportation corridors; and
- Provide periodic situation reports to the EOC and CMT on fuel supplies.

This information will provide the CMT with a reasonably accurate assessment of the impact on energy supply to the District. To inform the District's response to energy emergencies, DOEE must gather timely, reliable intelligence from a variety of sources, forecast depletion and shortages, estimate supply restoration time frames, and share that information with the CMT and the mayor. DOEE's responsibilities under this function will include working with regional partner agencies in Virginia and Maryland to gather information from bulk fuel terminal operators on their operational status, key fuel suppliers and distributors to determine any impediments to maintaining fuel deliveries and communicating with regional partners to assess whether transportation corridors that are used to transport fuel to the District have been damaged, which could result in fuel shortages.

During and immediately following the event, DOEE will:

- Assist with the development, implementation, and review of the emergency action plan,
- Gather real-time data from DPW on fuel usage to determine the burn rate and calculate the "days to empty without a delivery;"
- Compile data from DGS on the distribution of portable generators and their location;
- Establish a hotline for private fuel retailers in the District to report:
  - The operational status of their gas station (no electricity to operate);
  - Any damage sustained during the emergency event;
  - Estimated available fuel supplies by fuel type (unleaded vs. diesel);
  - Any incidents of fuel leaking out of fuel tanks; and
  - If gas station run out of fuel.

At the District level, DOEE will work with DPW to gather critical information on damage sustained by fuel infrastructure, determine the operational status of District-owned and private local fuel facilities. Together, these data points can provide DOEE with an accurate assessment of the status of the fuel infrastructure, which can then be shared with the CMT to make strategic decisions on fuel conservation measures to ensure that adequate supplies are available to first responders.

4.4.2 Information Tracking

To track an event, DOEE will need to obtain information from multiple sources including energy suppliers and distributors, support agencies, and local fuel retailers. Assessing and sharing real-time data is critical for decision makers to understand the status of energy systems, forecast

potential energy shortages, and make informed decisions about conservation measures to initiate. Within the District government, this will involve collecting information on the status of fuel facilities, fuel levels at each location, and the rate of fuel usage from DPW facilities, as well as the distribution of emergency generators to key location from DGS that would need periodic refueling. DOEE will utilize the connections developed during pre-event planning with terminal operators and regional fuel suppliers to gather real-time data about the impact of an incident on fuel delivery and supplies.

DOEE will seek information necessary to maintain a real-time log—an Energy Supply Disruption Tracking log. When conditions return to normal, the log will be used to prepare the post-event analysis report for the event. The log will typically contain the information shown in Figure 17.

Time and date of each entry	2:00 PM April 28, 2021 (examples only)
Name of person making the entry	Jane E. Wind (examples only)
Source of information	EIA, Pepco, US DOE, Washington Gas (examples)
Type of disruption	Supply Disruptions (Shortage)/External
Start date of disruption	April 26, 2021
Duration to date	April 28, 2021
Estimated Recovery Amount (prior estimate and current estimate)	25,000 gallons and 15,000 gallons
End date of disruption	July 10, 2021
Symptoms	Long gasoline lines
Impact on end users	Closure of neighborhood gasoline stations
Number of end users affected	Number of registered vehicles in District
Region of state affected	Region-wide
Corrective actions being taken or planned	Odd and even day purchases; work schedule alteration for District employees; limited fuel purchases
Date and time when each corrective action is initiated	7:00 am July 1, 2021
By whom	Mayor
Effect of each corrective action	Orderly distribution of limited supplies
Was the issue resolved	Yes
Is the situation improving or worsening	Improving
Date and time when each corrective action is completed or terminated	7:00 am July 15, 2021

Table 21 DOEE's Energy Supply Disruption Tracking Log Example

Data monitoring will assist in the following:

- Identifying levels at which energy supply chain action is required;

- Identifying levels at which public action or government action is required;
- Identifying abnormalities due to unusual weather conditions;
- Making strategic plans for how the private market can supplement the stock of fuel at District-owned facilities;
- Maintaining regular updates of key information, including storage status, expected outages for maintenance, and other information obtained from automated data reporting systems and contacts with key sources of information. This not only defines data, but also serves as a check on availability of contacts and changes in contact information;
- Reviewing media reports regarding supply source status, including refinery shutdowns, and international events or problems;
- Reviewing key news media to identify problems involving customers; and
- Issuing alerts when increased monitoring frequency and/or state action is required.

If monitoring indicates a stress condition either in the supply of or demand for energy, additional information or more frequent updates will be used to gain a better perspective on the situation. Furthermore, it will help determine whether action by industry, suppliers, or governmental entities is required. Over time, regular monitoring efforts will indicate the parameters on which determinations of stress conditions can be based. Once corrective actions are deemed to be necessary, the tracking phase begins.

4.4.3 Monitoring the Petroleum and Propane Supply Chain

A number of issues can interrupt the supply of petroleum products. This section focuses specifically on issues that may arise after the product reaches bulk fuel terminals or the distribution point. The following may require monitoring:

- Supply
  - Widespread and long-lasting loss of electrical power to one or more terminals;
  - Damage to transportation infrastructure from terminals;
  - A strike by tanker truck drivers;
  - A cyber-attack on systems that controls the movement of refined petroleum products to or from regional fuel transit hubs;
  - Construction projects interfering with transportation; or
  - Storage capacity at site of distribution.
- Demand
  - Excessive demand for heating fuel oil in other parts of the country that causes shortages locally;
  - Curtailment of interruptible fuel oil supplies; or
  - Weather (may impact both supply and demand):

    - Forecast of several days of very cold weather;
    - Forecast of heavy winds, rain, snow or icy conditions that interfere with bulk trucking or shipping schedules; or
    - Forecast of tornadoes or hurricanes, which affects oil production or refining along the Gulf Coast.
- Infrastructure
  - Loss of electricity needed to operate pumps and controls throughout the petroleum or propane distribution system; or
  - Equipment failures in the petroleum or propane distribution system.
- Price
  - Increases in spot prices;
  - Strikes involving energy supply or distribution systems;
  - International embargoes that interrupt shipments to the seaports serving the Northeast; or
  - Increasing crude or refined product futures speculation attributed to various
- Potential or anticipated market conditions (e.g., predicted but unrealized political or natural disaster situations).
- Other
  - Geological events causing interruption of energy supply system (earthquakes, tsunamis, volcanic activity);
  - Terrorist attacks (physical or cyber); or
  - Solar flares (in cases where controls could be subject to solar flare interruptions).

Data that might be monitored fall into two general categories:

1. Data that represent months and years tend to provide forecasted information related to supply and demand.
2. Data that represent days and weeks tend to provide current or recent information related to actual supply and demand.

4.4.4 Petroleum and Propane Supply Disruption Event Monitoring and Tracking Log

Section 4.10 Energy Supply Disruption Tracking Log of the ESDTP applies to all energy forms and details information to be logged during an energy supply disruption event.

Monitoring and tracking requires that DOEE coordinate with District agencies, particularly DPW, to establish an information sharing process on fuel deliveries, existing supply levels, and daily usage. DPW collects or can readily produce reports on average fuel levels and average daily fuel usage for each facility. By establishing a mutually agreed upon process and schedule that includes a finite set of data points, DOEE will have a tested process for monitoring fuel supplies during an energy emergency. DPW is prepared to provide such data to DOEE during normal

conditions so as to detail a concise process for submitting such data during an energy emergency.

DOEE will establish a process for coordinating with DPW to receive regular reports on existing DPW fuel supplies, usage, and fuel deliveries to the District's 11 fuel facilities; DOEE will work with DPW to develop a purchase program for priority acquisition of petroleum products in reaction to potential shortages; and
DOEE will explore the use of the priority end-user program to meet District Emergency Fuel needs.

With respect to private fuel retailers, DOEE does not have a pre-established channel for retailers to communicate damage to their facilities, the operational status of fuel stations, or fuel inventory levels. However, DOEE does have an online incident management system called "Cobra" which is currently used to track small-scale accidents and emergencies.
Cobra should be expanded to also house fuel supply data, as it can track and monitor the potential or actual impact of an incident on public fuel facilities or private fuel retailers.

This data is important for DOEE to ascertain the amount of fuel that is available within the District at the time of an energy emergency and to estimate a timeframe for a potential fuel shortage. Mapping and uploading the locations of all District fuel facilities and private gas stations would enable the DOEE to:

- Pre-identify facilities and retailers that may be inoperable by a major flood event;
- Monitor the availability of fuel supplies and reserves at both District facilities and at private fuel retailers;
- Track incoming reports on damage to gas stations or District fuel facilities; and
- Strategically pre-stage and deploy emergency generators to maintain fuel supplies.

Over time, this database could be populated to include contact information, fuel tank capacity, the amount of available fuel, and the operational status of these facilities.

4.4.5 Monitoring the Gas Supply Chain

Several issues can interrupt the supply of gas. The following may require monitoring:

- Supply
  - Transportation of supply (including shortage of transportation vehicles) once it reaches distribution
- Demand
  - Curtailment of gas supplies
- Weather

  - Forecast of several days of very cold weather;
  - Forecast of heavy winds, rain, snow, or icing conditions that will interfere with bulk trucking or shipping schedules;
  - Forecast of tornados or hurricanes in or along the Gulf of Mexico; or
  - Atlantic storms interfering with shipping.
- Infrastructure
  - Loss of electricity needed to operate compressors and controls throughout the gas distribution system;
  - Equipment or pipeline failures in the distribution system; or
  - Tanker accidents.
- Price
  - Strikes involving tanker trucks or ships;
  - Market pricing diverting supply from the US; or
- International embargoes that interrupt shipments to the seaports serving the Northeast.
- Other
  - Geological events causing interruption of energy supply system (earthquakes, tsunamis, volcanic activity);
  - Terrorist attacks (physical or cyber); or
  - Solar flares (in cases where controls could be subject to solar flare interruptions).

Data that might be monitored fall into two general categories:

1. Data that represent months and years tend to provide forecasted information related to forecasts of supply and demand.
2. Data that represent days and weeks tend to provide current or recent information related to actual supply and demand.

4.4.6 Monitoring the Electricity Supply Chain

Several issues can interrupt the supply of electricity. The following may require monitoring:

- Supply
  - Offline or under-generation of gas, coal, nuclear, fuel oil, solar power, or wind plants
- Demand
  - Extreme temperature conditions lasting several days
- Weather
  - Forecast of several days of very cold or hot weather;
  - Forecast of heavy winds, rain, snow, or icing conditions; or
  - Forecast of major storms such as tornados, derechos, or hurricanes.

- Infrastructure
  - Loss of major equipment in the generation, transmission, or distribution system;
  - Loss of a major transmission line;
  - Failure of protective relays to isolate a fault; or
  - Loss of a large generating station.
- Other
  - Geological events causing interruption of energy supply system (earthquakes, tsunamis, or other events.);
  - Solar flares or eruptions; or
  - Terrorist attacks (physical or cyber).
- Price
  - Strikes involving generation plants

Data that might be monitored fall into two general categories.

1. Data that represent months and years tend to provide long-term information related to forecasts of supply and demand.
2. Data that represent days and weeks tend to provide short-term information related to actual supply and demand.

4.4.7 Tracking Supply Disruptions

Tracking involves enhanced data monitoring to maintain awareness throughout an energy supply disruption. It also includes tracking corrective actions taken by industry, suppliers, and/or the state based on the severity of the disruption.

Additional information to be monitored will depend on the specific disruption and could include:

- Status of storage inventories of propane, petroleum, diesel, gas, and electricity through storage batteries;
- Estimated timing of departure and arrival of additional shipments of resources by truck or boat;
- Estimated restoration times for equipment outages and clearing of transportation corridors;
- Effectiveness of demand reduction efforts;
- Weather forecasts indicating the end of extreme conditions;
- Other appropriate information indicating system stress, including the settlement of a rail strike, which involves propane shipments from Canada; accidents with marine, pipeline, rail, or truck shipping; and easing of an international dispute that could lead to

an embargo.

The following data sources may be useful in tracking potential supply disruptions:

- US Weather forecasts for Mid-Atlantic, East Coast states, and the Gulf of Mexico;
- International Energy Agency;
- EIA of the US DOE;
- Data on the supply situation from the Propane Gas Association (PGA), Mid Atlantic Propane Gas Association (MAPGA), and PJM;
- Operating information for District of Columbia EDC (Pepco) and LDC (Washington Gas), gas pipeline companies, propane suppliers and the petroleum product supply chain;
- DDOT as a source of information on road conditions and traffic problems;
- District of Columbia Department of Motor Vehicles as a source of information on requests for driver service hour waivers; and
- Financial reporting organizations as a source for spot pricing information for energy to indicate when a supply problem is expected.

Tracking a disruption event includes the collection of all relevant information associated with the corrective actions taken. Examples of such information include: the number of customers without service, geographic areas impacted, resources required to resolve or mitigate consequences of the problem, resources deployed for restoration activities, progress on restoration activities, estimates of time required for restoration of normal conditions, effectiveness of industry/supplier actions on resolution of the problem, and effects of the disruption on public health, safety, and the economy.

All pertinent planned and ongoing activities taken to resolve an energy supply disruption will be documented using a real-time log—the Energy Supply Disruption Tracking Log. When conditions return to normal, the log will be used to prepare the post-event analysis report. The log will normally contain the following:

- Time and date of each entry;
- Name of person making the entry;
- Source of information;
- Type of disruption;
- Start date of disruption;
- Duration to date;
- Estimated Recovery Time (prior estimate and current estimate);
- End date of disruption;
- Symptoms;
- Impact on end users;

— Number of end users affected

- Region of state affected;
- Corrective actions being taken or planned;
- Date and time when each corrective action is initiated;

  — By whom

  — Effect of each corrective action
- Was the issue resolved;
- Is the situation improving or worsening; and
- Date and time when each corrective action is completed or terminated.

4.4.8 Assessing Supply Disruptions

Energy supply disruptions in the District fall into two major categories: 1) disruptions that are external to the District; and 2) disruptions that are internal. External disruptions can occur anywhere along the supply chain from emergencies in the Gulf Coast, at bulk fuel terminals, or damage to transportation infrastructure.

Figure 48 depicts the progression of an energy disruption when intervening corrective actions cannot resolve the issue. It follows the disruption from the initial stages to the declaration of an energy emergency. These activities are similar for each form of energy but may differ to a degree due to differences in regulation, complexity of the supply and delivery system, and the ability to store energy. Generally, the order of complexity and formality of the supply and delivery system increases from petroleum to gas and, finally, to electricity.

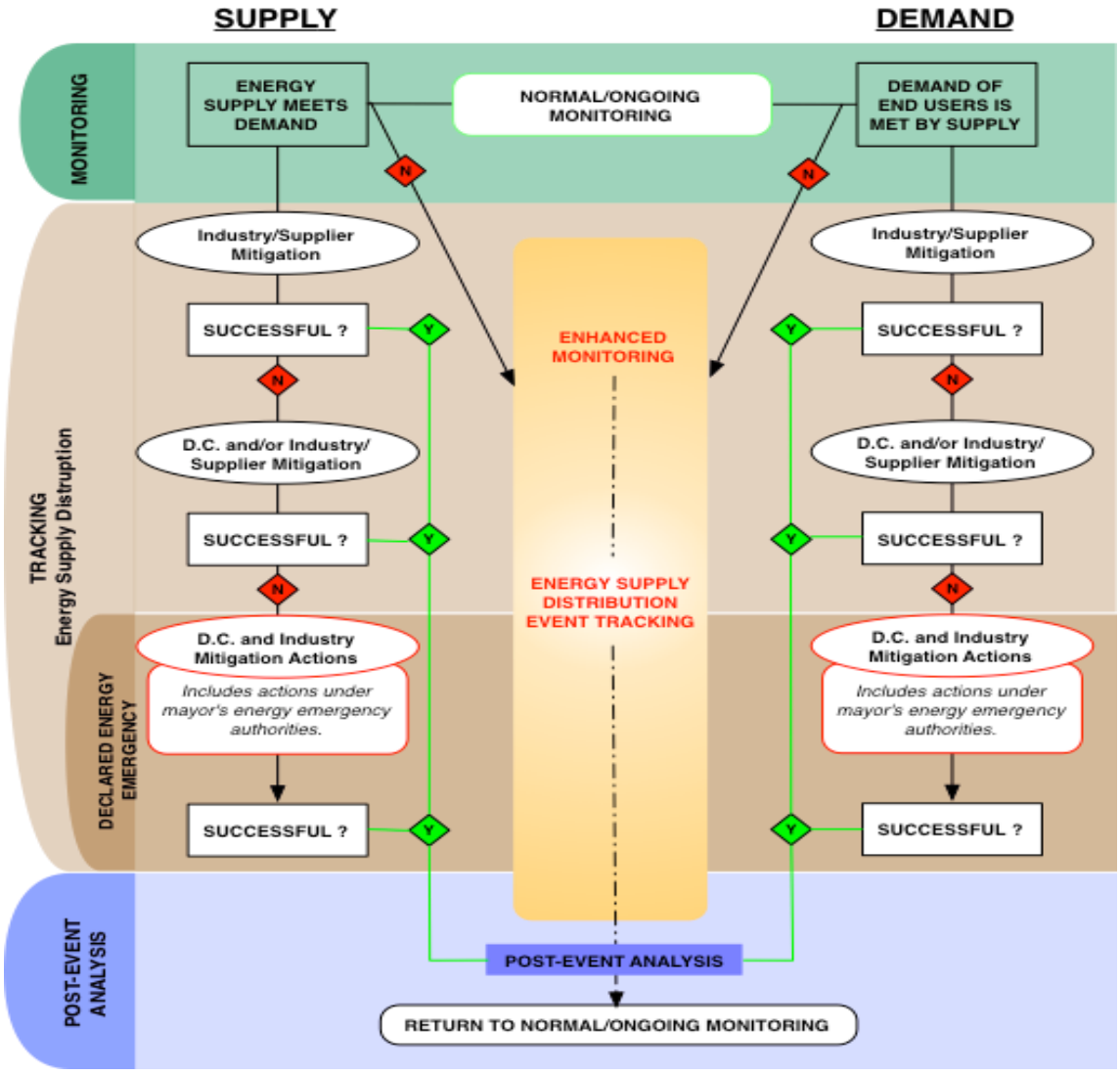


Figure 22 Process to Detect and Correct Potential and Actual Energy Supply Disruptions

A major potential supply disruption may occur to the system delivering energy to the District, causing a delivery disruption. DOEE will facilitate the flow of information that is gathered by such organizations as the MWCOG, other state energy offices, regional supply networks, and federal agencies.

At the regional level, DOEE will communicate with the Maryland Energy Administration (MEA) and the Virginia Department of Mines, Minerals, and Energy (DMME) on the impact of a disaster on distribution networks. These regional partners are charged with monitoring the situation within their states and the jurisdictions surrounding the District. Coordinating with industry partners can provide actionable intelligence on the status of fuel supplies while MEA

and DMME, along with DDOT, can provide information on damage to transportation infrastructure. DOEE will work with these regional partners to establish regular coordination meetings and discuss information sharing on the operational status of fuel terminals within their states, damage to key transportation corridors used to deliver fuel, and assess the availability of reserve fuel supplies that they might be able to share under the EMAC.

In the event of a large-scale emergency that causes the issuance of a federal disaster declaration, DOEE will also serve as the District's point of contact to DOE and coordinate the submission of requests for federal fuel assistance and serve as the liaison with federal fuel suppliers, the U.S. Army Corps of Engineers and the DC National Guard to coordinate the delivery of fuel to DPW fuel stations.

Internal distribution disruptions are disruptions to the distribution system that prevent a sufficient energy supply from being delivered to the end user in the District. An internal distribution disruption includes an equipment malfunction, power lines being down, or weather-related supply disruptions. Such a distribution system impact requires monitoring the interrelatedness of the electric, gas, and petroleum distribution systems. DOEE will facilitate the flow of information during an internal distribution disruption event. In the Washington metropolitan region, the potential for incidents and emergencies that could cause fuel distribution disruptions varies widely, including but not limited to storms, equipment malfunction, or intentional destruction or disruption of energy infrastructure.

4.5 Cybersecurity Disruptions

With the growing ability of hackers to infiltrate computer networks, cybersecurity is increasingly becoming a critical part of a robust energy delivery system. Currently, there are no local regulatory requirements of cybersecurity that apply to energy utilities, but they are encouraged to adopt industry best practices drawing from the expertise at the National Institute of Standards and Technology (NIST). DOEE will continue to work collaboratively with Washington Gas and Pepco to ensure that there are robust cybersecurity standards in place for both energy delivery systems. Ongoing requests for both the electric and gas utilities from the stakeholders in the grid modernization Formal Case is to ensure effective cybersecurity standards in the implementation of data-sharing protocols. This includes asking third parties to share customer data to comply with USDOE's DataGuard standard, which the DCPSC has approved.[66]

With increased deployment of digital smart grid technologies in the District, the need for

[66] DCPSC Formal Case 1130, https://edocket.dcpsc.org/apis/api/Filing/download?attachId=168398&guidFileName=113dcd74-8b6c-4d78-85e3-dc9946263d98.pdf

protecting sensitive information increases. Smart grid deployment may raise security concerns and may increase the vulnerability of infrastructure to cyber attacks. Ensuring that adequate protection and numerous layers of controls are built into smart grid technologies will also help the District ensure a reliable supply of electricity and increase resiliency.

4.5.1 Electric Cybersecurity Measures

Pepco DC is owned by Exelon Corporation. All Exelon-owned utilities follow the same set of cybersecurity measures and protocols. Although details are not public, Pepco has shared the following information about its measures:

- Exelon Corporate and Information Security Services (CISS) utilizes a Security Management System (SMS) to define the methods and instruments management uses to clearly plan, adopt, supervise and improve the tasks and activities aimed at achieving security across the enterprise.
- The CISS SMS is a converged physical and cyber security model that draws from best practice security standards, such as ISO 27001, ISO 27002, NIST Cyber Security Framework, and the DOE Electricity Subsector Cybersecurity Capability Maturity Model.
- CISS categorizes Exelon policies and requirements into separate domains. These domains are access management, business continuity, cyber security, enterprise security (risk) management, intelligence, NERC CIP, personnel security, and physical security.
- Exelon's cyber and information security policies cover topics, including, but not limited to:
  - Access control
  - Business continuity
  - Foreign travel security
  - Security incident response management
  - Information protection
  - Records and information management, retention, and disposition
  - Corporate standard email usage and retention
  - Corporate and information security policy
  - Acceptable use
  - Vulnerability management

To protect customer information, and increase cyber security efforts, all smart grid technology and systems meet the National Institute of Standards and Technology's Advanced Encryption Standards. Pepco ensures that data are protected by computer firewalls, and local area network connections are encrypted to further protect customer information.

4.5.2 Gas Cybersecurity Measures

Washington Gas is owned by Altagas LTD. Similar to Pepco, Washington Gas' cybersecurity measures are not publicly available. After the merger of Washington Gas and Altagas, Altagas was required to satisfy the DC Public Service Commission that cybersecurity measures would be on par with or higher than those implemented by Washington Gas going forward.[67] Washington Gas provided an update to its customers related to the Equifax data breach in 2017, reassuring customers that their data had not been compromised.[68]

4.6 Post-Event Data Analysis

After a disruption event has been resolved, a post-event analysis will be conducted. The analysis will evaluate all events associated with the disruption from the first indication to its resolution, including:

- Duration—length of time of energy supply disruption;
- Response—corrective actions taken;
- Restoration and recovery time;
- Analysis of corrective actions—determining effectiveness;
- Determination of root cause and lessons learned;
- Incorporation of enhancements into the EAP and the ESDTP.

This analysis begins with the first indication of a problem from data monitored prior to the disruption; industry/supplier and District government actions taken and their effectiveness; and the effects of the actions on the District, supply chain participants, end users, and the public.

The purpose of the analysis is to determine:

- Whether additional data or more frequent monitoring would have provided earlier indications of problems;
- Whether the data collected during the event were adequate to determine effective corrective actions;
- Whether the collected data were helpful in managing the event; and
- The relative success of the chosen corrective actions.

Based on the assessment of this information, recommendations to change the ESDTP, and perhaps the EAP itself, will be made.

[67] DCPSC Formal Case 1142, https://edocket.dcpsc.org/apis/api/Filing/download?attachId=108122&guidFileName=988281cc-63ff-44d7-94fc-ed8f2f3af4c5.pdf

[68] https://www.washingtongas.com/media-center/update-on-equifax-data-breach

The following are examples of the types of information and/or questions that should be addressed in the post-event analysis of an energy supply disruption:

- Using the Energy Supply Disruption Tracking Log and any other pertinent information, a detailed chronology of the disruption event will be prepared, which will include key data monitored, alerts issued, and actions taken from the first indication of a problem through return to normal conditions. Specific information will be documented about the duration, response, restoration, and recovery time for energy supply disruption events.
- Analyze the effectiveness of all the corrective actions taken.
- If appropriate, conduct a root cause analysis to factually determine the initiating causes of the disruption. From the root cause analysis, determine what actions are necessary to prevent recurrence and the cost of the actions.
- Characterize the consequences of the disruption in terms of public health and safety; interruption of critical government functions; interruption of customer service; and economic effects for the public, commerce, industry, and state government.
- Did the historical data and thresholds provide proper responses?
- Did the data and monitoring frequency provide adequate warning?
- Were there timely responses to the alerts by the proper organizations (District government, supply chain, media, and public)?
- Was the assessment accurate in defining the extent of the problem?
- Were the assessment and action steps executed in an appropriate timeframe?
- Analyze the effectiveness of all the corrective actions taken.
- Could a faster assessment and action or different action have yielded better results?
- Document the lessons that have been learned from this incident and share them with the appropriate stakeholders.
- Suggest changes to the energy supply system that would avoid the problem or mitigate its effects.
- What changes to the ESDTP and/or the EAP should be made to achieve a better result?

The analysis of an energy supply disruption will be documented in a post-event analysis report for historical reference, as a future training tool, and for the purpose of revising the ESDTP and EAP, as appropriate. Post-event, the Cobra system has the functionality for DOEE to track the operational status and availability of fuel at private gas stations when combined with a hotline to fuel retailers to report their operational status or if they run out of gasoline and diesel.

Below are the detailed information matrices for petroleum, propane, gas, and electricity. In the event the District experiences are widespread outage or fuel shortage, these matrices identify

alternate strategies to determine the level and severity of an emergency event.

Information Details for Petroleum

Information Description	Comments	Frequency	Indication of Stress or Emergency	Current or Proposed	Source	Site/contact specifics
Annual/long-term Information						
Annual Energy Outlook by EIA	Forecasts long-term energy supply perspective	Early release--December, full publication--March	Identifies long-term sources of supply, pricing, and provides baseline	Current	EIA	www.eia.doe.gov
Petroleum Product Dealer Registration						
Monthly, Weekly or Specific Event Information						
EIA Short-term Energy Outlook	Updates supply, storage and pricing information	Monthly	Identifies short-term supply, storage, pricing outlook, and provides baseline	Current	EIA	www.eia.doe.gov
Weather data	Heating and cooling degree day data with comparisons to prior years and projections of long cold snap	Daily	Weather forecast which in past years led to supply/transportation problems	Current	NOAA, DC HSEMA	www.noaa.gov www.hsema.dc.gov
Weekly State Heating Oil and Propane Program (SHOPP) Teleconference	DOEE, EIA, Coast Guard and when supply is tight, industry representatives	Weekly, more frequently in tight supply situations	Statements on supply situation	Current		www.eia.doe.gov
Crude Oil, Gasoline and Heating Oil Futures	Data from NYMEX	Daily (M-F)	Indicates long-term supply problem	Current		www.cmegroup.com/company/nymex.html
Crude Oil, Gasoline and Heating Oil Spot Prices	Data from Wall Street Journal	Daily (M-F)	Indicates long-term supply problem	Current		www.wsj.com/market-data/commodities/cashprices
Retail gasoline and heating oil prices in DC	Based on weekly survey in DC	Weekly	Increase indicates supply problem	Current		
Wholesale gasoline Prices		Daily (M-Sat)	Increase indicates supply problem	Current		
Wholesale heating oil prices		Daily (M-Sat)	Increase indicates supply problem	Current		

Heating Oil Futures	Based on NYMEX Data	Daily (M-F)	Increase indicates longer term supply problem	Current	NYMEX	www.cmegroup.com/company/nymex.html
Gas Inventories	Shows whether supply is adequate for this time of year	Weekly (Thursday)	Decrease below seasonal experience indicates problems	Current	EIA	www.eia.gov
Pipeline Status Bulletin Boards	All pipelines serving DC have them	Daily and current	Identifies supply issues associated with pipeline status	Current	Pipelines	

(CONTINUED)

Information Description	Comments	Frequency	Indication of Stress or Emergency	Current or Proposed	Source	Site/contact specifics
Stocks of crude oil, gasoline and distillate at various points of the distribution system	Comparison	Weekly (W)	Identifies available inventory and comparison with prior week and year data indicates whether situation is normal	Current	EIA	www.eia.gov
Request for driver hour waivers for petroleum tank Trucks	Caused by backups at terminals or difficult driving conditions	As required	Indicates delivery capacity problem	Current	DMV	
Media reports on supply chain interruptions within the U.S. and internationally including information on political instability in countries from which petroleum is imported	Indicates problems with petroleum	As required	Indicates possible problem	Proposed	Automated search services such as Google Alerts, NY Times	
Media reports of customer problems with supply in DC						
Information During Stress Conditions						
Customer complaints, press reports on supply Problems	Information may be through telephone, e-mail or broadcasts	As it happens	Indicates problem with supply or delivery	Current		
Inventory in tanks	Request by DOEE	As indicated	Can show level of problem, geographic variations	Current		
Status of restoration efforts	Information may include number of customers without service, stocks of petroleum products, comments on restoration effort by those involved	As indicated	Shows progress toward resolution of disruption	Proposed		
Media reports of customer problems with supply in DC	Indicates problems have reached customer	As required	Problem is severe and has reached customer	Current		
Customer complaints, press reports on supply Problems	Information may be through telephone, e-mail or broadcasts	As it happens	Indicates problem with supply or delivery	Current		
Inventory in tanks	Request by DOEE	As indicated	Can show level of problem, geographic variations	Current		

Status of restoration efforts	Information may include number of customers without service, stocks of petroleum products, comments on restoration effort by those involved	As indicated	Shows progress toward resolution of disruption	Proposed		

Table 22 Information details for petroleum

Information Details for Propane

Information Description						
Annual/long-term Information						
Pre-Heating Season Meeting with Propane Gas Association	Discussion of Current Supply Situation and Projection for Heating Season	Annual	Expression of concern for supply adequacy	Current	LPG association	
DOE Annual Winter Fuels Outlook Conference	Forecasts heating season supply situation	Annual	Forecast problem, pricing	Proposed	EIA	http://tonto.eia.doe.gov/oog/info/hopu/hopu.asp
Annual Energy Outlook	Projection of long-term outlook for demand and supply of energy--no specific information for propane, but oil and gas information affects propane situation	Annual in March with early release in December	Forecast problem, pricing	Proposed	EIA	http://www.eia.doe.gov/oiaf/aeo/index.html
CSX RR Union Contract Status	Indication of probable strike	Annual, at contract renewals	Failure to reach new contract prior to end of current contract	Proposed	Automated search services such as Google search, NY Times	
International Outlook for countries from whom propane is Imported	Indication of problems, possibility of supply disruption	Annual and when indicated	Threats to curtail supply to marine terminals	Proposed	US Department of State, General News Sources, International Energy Agency	

Market pricing in Europe which exceeds that in the	Indication that propane supplies may be diverted to	Annual and when indicated	Price which historically has resulted in diversion of supplies to Europe	Proposed	EIA	http://www.eia.doe.gov/emeu/international/oilprice.ht

(CONTINUED)

Information Description	Comments	Frequency	Indication of Stress or Emergency	Current or Proposed	Source	Site/contact specifics
U. S. and diverts supply to the European market						
Monthly, Weekly or Specific Event Information						
Weather data	Heating degree day information with comparisons to prior years and projections of long cold snap	Daily	Weather forecast which in past years led to supply/transportation problems	Current	NOAA	
Propane Spot Prices	Comparison to futures prices shows problem when difference increases sharply	Daily (M th F)	Spike in prices	Current	Wall Street Journal	
DC Retail Propane Prices	Current propane price	Weekly Survey (W)	Rapid increase in prices	Current	EIA	http://tonto.eia.doe.gov/oog/info/twip/twip.asp
Propane Inventories	Stocks of propane	Weekly (W)	Stocks significantly below normal	Current	EIA	http://tonto.eia.doe.gov/oog/info/twip/twip.asp http://tonto.eia.doe.gov/oog/info/hopu/hopu.asp
DC Heating Oil and Propane Program Weekly teleconference	DC Energy Officials, EIA, Coast Guard and when supply is tight, industry representatives.	Weekly (Tue)	Statement of supply problem	Current	Mid-Atlantic States, EIA, USCG, VA, MD, sometimes LPG groups	

(CONTINUED)

Information Description	Comments	Frequency	Indication of Stress or Emergency	Current or Proposed	Source	Site/contact specifics
Applications for Driver Hour Waivers in the District	Request to DC DMV by propane association	As they happen	Indicates high demand and problems with supply and/or transport capacity	Proposed	DMV	
Curtailment of gas to interruptible customers	Propane is a back-up to gas for some customers	As it happens	Indicates demand for propane will increase	Proposed	PSC & PJM	
Media reports on supply chain disruptions or events which could result in supply chain disruptions		As it happens		Proposed	Automated search services such as Google search, NY Times	
Customer complaints to DRES and media mention of shortage		As it happens		Current	Phone calls and e-mails to DRES	
Information During Stress Conditions						
Applications for driver hour waivers in other states	Applications in neighboring states indicate supply and transportation stress	As appropriate	Waiver Applications	Proposed	National Propane Gas Association	http://www.npga.org/i4a/sss/index.cfm?pageid=832
Supply Status	Contacts with LPG Association	As appropriate	Allocation status, inventory status	Proposed		
Allocation Status, Inventory Status	Ask during weekly phone call for price information or request through Petroleum Vendors Registration Process	As appropriate	Allocation status, inventory status	Proposed	Weekly phone call survey companies	

Table 23 Information details for propane

Information Details for Gas

Information Description						
Annual/long-term Information						
Design Day Submittal to PSC by LDC's	Shows maximum demand day over 30 year period and approach to meet demand	Biennially	Provides benchmark for daily information on supply	Current	LDCs/PSC	PSC
Emergency Curtailment Plan submittal to PSC by LDC's	Provides sequence of actions in the event of a supply deficiency	Biennially	Defines actions by LDC in event of supply deficiency	Current	LDCs/PSC	PSC
Pre-Heating Season Briefing	Forecasts any anticipated supply problems	Annual--November	Identifies any projected supply problems	Current	Gas companies	
Annual Energy Outlook by EIA	Forecasts long term energy supply perspective	Early release--December, full publication--March	Identifies long-term sources of supply, pricing, and provides baseline	Current	EIA	www.eia.doe.gov
Northeast Gas Association Communications Plan	Identifies who will be informed regarding supply issues--PSC and DOEE are included in the recipients	As appropriate		Current	Regional gas association or other	
Mutual aid agreements	Shows how personnel restore gas service by participating gas companies	As appropriate		Current	LDCs/PSC, Northeast Gas Association as Coordinator	LDCs/PSC
Communication, supply delivery, mutual aid drills	Shows readiness to implement plans	Annual	Drill failure indicates plan deficiency	Current	Regional gas association or other	
Pipeline Safety	Shows pipeline	Biennially	Indicates pipeline deficiencies	Current	PSC Gas	

(CONTINUED)

Information Description	Comments	Frequency	Indication of Stress or Emergency	Current or Proposed	Source	Site/contact specifics
Audit for Transmission and Distribution Pipelines						
Monthly, Weekly or Specific Event Information						
EIA Short-term Energy Outlook	Updates supply, storage and pricing information	Monthly	Identifies short term supply, storage, pricing outlook, provides baseline	Current	EIA	www.eia.doe.gov
Weather data	Heating degree day information with comparisons to prior years and projections of long cold snap	Daily	Weather forecast which in past years led to supply/transportation problems	Current	NOAA, DEMHS	
Gas Futures	Sensitive to integrated perspective of weather and supply prospects	Daily (M -F)	Rapid increase indicates supply problems	Current	NYMEX	
Gas Spot Prices	Sensitive to integrated perspective of weather and supply prospects	Daily (M-F)	Rapid increase indicates supply problems	Current	Wall Street Journal/Platts	
Gas Inventories	Shows whether supply is adequate for this time of year	Weekly (Thursday)	Decrease below seasonal experience indicates problems	Current	EIA	
Pipeline Status Bulletin Boards	All pipelines serving DC area have them	Daily and current	Identifies supply issues associated with pipeline status	Current	Pipelines	Links on www. Northeastgas.org
NGA Gas Supply	Summary sent to	Weekly or daily in	Identifies supply problems and	Current	Regional gas	www.northeastgas

(CONTINUED)

Information Description	Comments	Frequency	Indication of Stress or Emergency	Current or Proposed	Source	Site/contact specifics
Task Force teleconference	PSC, DC DEEA	emergency	approach to resolution		association or other	.org
Notification of Flow control order	Basis for customer curtailment, PSC is notified informally or formally once threshold number of customers is exceeded	As required	Shows gas delivery is being curtailed	Current	LDCs/PSC	LDCs/PSC
Request for Driver hour waivers for LNG tankers	Could be limited to LNG supply or to overall gas supply	As required	Indicates LNG supply capacity problem	Current	DMV	DMV
Gas Inventories	Informal communication from regional authorities and LDC's	As required	Indicates changes in severity, duration of supply deficiency	Current	LDCs	
Pipeline Status Bulletin Boards	Shared with local emergency response officials and PSC	As required	Defines process and expected timing of restoration	Current	LDCs	Personal communication between LDC person in charge and local emergency and PSC officials
NGA Gas Supply Task Force -- Teleconference	Posted on LDC web sites	As required	Indicates status, progress	Current	LDCs	
Media reports on problems in the gas supply chain	Indicates supply problem	As required	Depends on situation	Proposed	Media including automated search services such as Google alerts, NY	

(CONTINUED)

Information Description	Comments	Frequency	Indication of Stress or Emergency	Current or Proposed	Source	Site/contact specifics
					Times	
Customer Complaints to DOEE or PSC and/or 311	Shows problem has reached customer	As required	Indicates severe supply problem	Current	Phone calls and e-mails to DOEE	
Information During Stress Conditions						
Updates of Supply Situation		As required	Indicates changes in severity, and duration of supply deficiency	Proposed	Informal communication from Northeast Gas Association and LDCs	
Restoration Plans	Defined by LDC and reviewed with PSC and local officials	As required	Defines process and expected timing of restoration	Current	Shared with local emergency response officials and PSC	
Numbers of Customers Without Gas	Shows towns with problems and indicates changes	As required	Indicates status and progress	Proposed	Posted on LDC web sites	
Local LNG Storage Inventory	x # of tanks in DC have significant capacity	As required	Indicates time available before major curtailment is needed	Proposed	LDCs	

Table 24 Information details for gas

Information Details for Electricity

Information Description						
Annual/long-term Information						
PEPCO Emergency Plan	Identifies PEPCO actions in event of emergency	Updated every few years		Current	EDCs, PSC	
Annual Energy Outlook by EIA	Forecasts long term energy supply perspective	Early release--December, full publication--March	Identifies long-term sources of supply, pricing, provides baseline	Current	EIA	www.eia.doe.gov
Generation and Transmission Capacity Requirements Forecasts	Several reports published by PJM with near- and long-term needs forecasts	Annual	Indicates new capacity needs	Current	PJM	www.pjm.com
Monthly, Weekly or Specific Event Information						
EIA Short-term Energy Outlook	Updates supply, storage and pricing information	Monthly	Identifies short-term supply, storage, pricing outlook, provides baseline	Current	EIA	www.eia.doe.gov
Weather data	Heating degree day information with comparisons to prior years and projections of long cold snap	Daily	Weather forecast which in past years led to supply/transportation problems	Current	NOAA	
Seven-day forecast	Forecasts weather, demand and capacity available	Daily	Severe weather or probable capacity deficiencies	Current	PJM	www.pjm.com
Monitoring of weather 4 days in advance by mutual aid groups		Current	Severe weather forecasts	Current	EDCs	
Morning Report	Current weather and power system conditions	Daily	Severe weather or probable capacity deficiencies	Current	PJM	www.pjm.com

(CONTINUED)

Information Description	Comments	Frequency	Indication of Stress or Emergency	Current or Proposed	Source	Site/contact specifics
Alerts	Notice of abnormal conditions, operating restrictions	As required	Specific problems identified	Current	PJM	www.pjm.com
Customer calls						
Information During Stress Conditions						
Power Watch and Warning	Watch--turn off all unnecessary electrical equipment during 11 AM to 4 PM peak period, Warning- immediately turn off unnecessary electrical equipment	As required	Warning that a severe delivery problem exists, radio and TV public service announcements	Current	PJM	www.pjm.com
Plans for resolution of generation and transmission outages		As required	Addresses specific problems	Current	PJM	Information provided to DC HSEMA and PSC
Plans for resolution of distribution system outages	Done in coordination with PSC and local emergency management officials	As required	Addresses specific problems	Current	EDCs, PSC	Information provided to DC HSEMA, PSC and local emergency management personnel
Number of customers without power by area of DC	Shows status and progress of service restoration	Daily or more frequent	Shows status and progress of service restoration in text and map formats	Current	EDCs, PSC	

Table 25 Information details for electricity

5 District of Columbia Plan for Energy Resilience

There are two primary roles and responsibilities when considering the District's plan for energy resiliency: the pre-event roles and responsibilities of "overseeing and monitoring," and the resiliency roles and responsibilities of "collaborating on critical infrastructure protection and promoting measures to build resiliency."

5.1 Plan for Resilience: Critical Infrastructure Protection and Promoting Resilience

Promoting resilience is an ongoing activity. It is also a major component of DOEE's Monitoring & Tracking Framework.

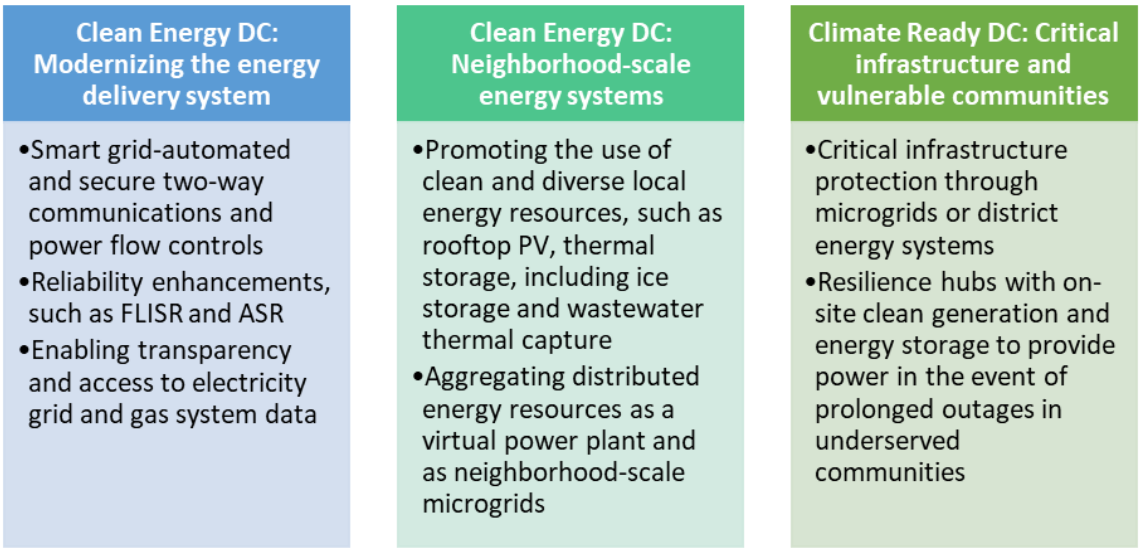


Figure 23 Monitoring & Tracking Framework

Resilience ensures that the District can quickly mitigate and reduce the impacts of an energy disruption or emergency. Resilience is enhanced by (1) identifying critical infrastructure facilities, and (2) developing a plan to protect these facilities from threats and vulnerabilities during an energy emergency.

Diversification of energy sources also enhances resilience, particularly when these resources are distributed energy resources (i.e. customers can own or access them) and locally available, thereby avoiding the need to rely on the centralized energy delivery systems outside of the District. Additionally, grid-scale renewable energy resources, such as wind and solar sited outside the District, have proven to be a resilient source of power during extreme weather events. For example, wind turbines have generated significant amounts of power and have performed well during winter storms. For these reasons, distributed energy resources and

renewable resources can be valuable assets to build resilience.

This section outlines steps that the District has taken to increase resilience and includes ways the District can build upon these efforts.

5.2 Critical Infrastructure Protection Responsibilities

Critical Infrastructure Defined: Section 1016(e) of the USA Patriot Act of 2001 (42 U.S.C. 5195c(e))[69] defines critical infrastructure as "systems and assets, whether physical or virtual, so vital to the US that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters." As part of its emergency management mission, the District of Columbia Homeland Security and Emergency Management Agency HSEMA) leads the District's efforts to protect critical infrastructure from all hazards consistent with federal doctrine. The District categorizes its critical infrastructure based on the US Department of Homeland Security's *National Infrastructure Protection Plan* and its *Infrastructure Taxonomy*, which segment the US economy into 16 distinct infrastructure sectors. These sectors have been determined to provide critical connection, distribution, management, and supply functions and services to states and localities across the country.

HSEMA has determined that 13 of the 16 national infrastructure sectors are present in the District of Columbia.[70] To guide District preparedness, HSEMA has assigned the 13 sectors into tiers, based on the consequence if assets within the sector were disrupted or destroyed. Tier 1 includes Life Safety Sectors, which are essential to protect the public during an emergency and whose disruption would have a debilitating effect on public health and safety. Tier 2 includes Lifeline Sectors, which are those whose disruption or loss of function would have cascading impacts across some or all the District. The remaining sectors are in Tier 3 due to the more limited consequences of their disruption on public health and safety. Table XX shows the sectors and subsectors within these three groups.

Sector	Subsector
TIER 1: LIFE SAFETY SECTORS	
Emergency Services	- Law enforcement - Fire and emergency medical services - Emergency management - Public works
Healthcare and Public Health	- Direct patient care facilities - Laboratories, blood banks, pharmacies - Public health services
TIER 2: LIFELINE SECTORS	
Communications	- Wireline infrastructure - Wireless infrastructure

[69] https://www.law.cornell.edu/uscode/text/42/5195c

[70] Infrastructure sectors that are not represented in the District are Critical Manufacturing, Defense Industrial Base, and Nuclear Facilities.

	- Satellite infrastructure - Cable infrastructure - Broadcasting infrastructure
Energy	- Electricity distribution - Gas distribution - Petroleum distribution
Information Technology	Internet routing, access, and connection services
Transportation	- Aviation - Freight rail - Highway and motor carrier - Maritime transportation - Mass transit and passenger rail - Pipeline systems
Water and Wastewater	- Drinking water systems - Publicly owned wastewater treatment systems
TIER 3: ALL OTHER SECTORS	
Chemical	Chemical storage and distribution
Commercial Facilities	- Lodging - Outdoor event spaces - Public assembly (arenas, stadiums, zoos, museums, convention centers, houses of worship) - Real estate (office and apartment buildings, condominiums, mixed use facilities, self-storage) - Retail centers and districts
Dams	Floodwalls and levees
Financial Services	- Chartered banks and credit unions - Other credit and financing organizations
Food and Agriculture	- Restaurants and institutional food service establishments - Supermarkets, grocery stores, and other food outlets - Registered food manufacturing, processing, and storage facilities
Government Facilities	- Buildings and parks owned or leased by federal and District governments, including general-use office buildings and special-use military installations, embassies, courthouses, national laboratories, and structures that may house critical equipment, systems, networks, and functions - Public and private education facilities (pre-kindergarten through 12th grade schools; institutions of higher education; business and trade schools) - National monuments and icons - Elections infrastructure

Table 26 Critical infrastructure sectors and subsectors in the District of Columbia

HSEMA facilitates and coordinates District CI preparedness through collaboration with the CI

community. This work is supported by a District Critical Infrastructure Working Group, on which DOEE serves as a key member. The Working Group serves as a forum for identifying, guiding, and supporting District infrastructure preparedness initiatives HSEMA performs its role in partnership with multiple federal and District agencies, public and private sector owners/operators, and other jurisdictions in the National Capital Region (NCR). The NCR Critical Infrastructure Protection Working Group is organized with equal representation from Maryland, Virginia, the District of Columbia, and addresses infrastructure security and resilience across regional jurisdictions. In addition, MWCOG, the USDOE, USDHS, and the US Department of Defense (DoD) play a role in examining and protecting critical infrastructure within the District, and within the NCR.

HSEMA is responsible for identifying the District's critical infrastructure, and using that information to support emergency planning, response, and recovery. Information on the location, characteristics, and vulnerabilities of District critical infrastructure is security sensitive. It is maintained within a secure storage environment and made available to authorized District partners on a need-to-know basis.

Protecting critical infrastructure from disruption and enabling service to be restored quickly after an emergency is a priority concern for the nation and the District and integral to energy assurance planning. The Energy sector provides vital energy resources needed by all District businesses, government operations, and residents. Disruptions of any electric or gas assets will have cascading effects across all sectors of the District and NCR, while disruption of petroleum availability would harm the delivery of essential government services and movement of goods and people across the District. Reliance on resources that are generated beyond the boundaries of the District and NCR means there are multiple ways in which such disruptions can occur.

A secure and resilient energy infrastructure is essential to community well-being because disruption or failure of these systems can have cascading impacts across all other sectors. Identifying and assessing critical infrastructure allows the District and neighboring NCR jurisdictions to determine interdependencies between infrastructure sectors; assess vulnerabilities of critical infrastructure to energy disruptions; identify priorities for restoration; and target investments designed to mitigate the effects of such disruptions.

The National Infrastructure Protection Plan[71] categorizes the nation's critical infrastructure (CI) into 16 sectors, including the following:

- Chemical (basic, specialty, and agricultural chemical manufacturing, storage, and distribution; pharmaceuticals; and consumer goods and related facilities)
- Commercial facilities (gaming; lodging; outdoor event venues; public assembly facilities; sports leagues; real estate, specifically office and apartment buildings, condominiums, mixed use facilities, and self-storage facilities)
- Communications (wire line, wireless, satellite, cable, and broadcasting infrastructure)

[71] https://www.dhs.gov/cisa/national-infrastructure-protection-plan

- Critical manufacturing (primary metal, machinery, electrical equipment, appliance, and component, and transportation equipment manufacturing, and all related facilities).
- Dams (dams; levees; navigation locks)
- Defense industrial base (research and development, design, production, delivery, and maintenance of materials needed to meet U.S. military requirements)
- Emergency services (law enforcement; fire and emergency services; emergency management; emergency medical services; public works)
- Energy (all energy production and distribution infrastructure)
- Financial services (chartered banks and credit unions; investment product providers; insurance companies; other credit and financing organizations)
- Food and agriculture (farms; restaurants and institutional food service establishments; supermarkets, grocery stores, and other food outlets; registered food manufacturing, processing, and storage facilities)
- Government facilities (buildings owned or leased by federal, state, local, and tribal governments; embassies; public and private education facilities; national monuments and icons; election systems)
- Healthcare and public health (direct patient facilities; laboratories, blood banks, and pharmacies; public health services; health information technology providers; medical materials providers)
- Information technology (IT products and services; internet routing, access, and connection services)
- Nuclear (reactors, materials, and waste management)
- Transportation systems (aviation; freight rail; highway and motor carriers; maritime transportation; mass transit and passenger rail; pipelines; and postal and shipping).)
- Water and wastewater (public drinking water systems; publicly owned wastewater treatment systems)

The District of Columbia Homeland Security and Emergency Management Agency (HSEMA) leads the District's efforts to protect critical infrastructure from all hazards consistent with federal doctrine. HSEMA facilitates and coordinates District CI preparedness through collaboration with the CI community. This work is supported by a District Critical Infrastructure Working Group, on which DOEE serves as a key member. The Working Group serves as a forum for identifying, guiding, and supporting District infrastructure preparedness initiatives

HSEMA performs its role in partnership with multiple federal and District agencies, public and private sector owner/operators, and other jurisdictions in the National Capital Region (NCR). The NCR Critical Infrastructure Protection Working Group is organized with equal representation from Maryland, Virginia, the District of Columbia, and addresses infrastructure security and resilience across regional jurisdictions. In addition, MWCOG, the USDOE, USDHS, and the DoD play a role in examining and protecting critical infrastructure within the District,

and within the NCR.

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Protecting critical infrastructure from disruption and enabling service to be restored quickly after an emergency is a priority concern for the Nation and the District and integral to energy assurance planning. A secure and resilient energy infrastructure is essential to community well-being because disruption or failure of these systems have cascading impacts across all other sectors. Identifying and assessing critical infrastructure allows the District and neighboring NCR jurisdictions to determine interdependencies between infrastructure sectors; assess vulnerabilities of critical infrastructure to energy disruptions; identify priorities for restoration; and target investments designed to mitigate the effects of such disruptions.

5.3 Proactive Measures to Build Resilience

5.3.1 Sustainable DC

In 2013, the Mayor of the District of Columbia released the Sustainable DC Plan, which was later updated to Sustainable DC 2.0 in 2019, both of which have the vision of making the District "the healthiest, greenest, most livable city for all District residents." Sustainable DC 2.0 has several goals, targets, and actions related to energy. The three targets, all intended to be completed by 2032, are:

- Cut per capita energy use District-wide by 50%
- Increase renewable energy to make up 50% of the District's energy supply
- Have 100% of residents live within walking distance of a facility offering clean back up power to serve critical needs during power outages

In addition, Sustainable DC 2.0 has actions related to improving the reliability and resilience of the transmission and distribution of electricity, as well as removing barriers to modernizing electricity infrastructure to enable neighborhood-scale energy systems and distributed energy resources. Sustainable DC 2.0's energy goals, targets, and actions are bold and innovative; they will reduce the District's reliance on fossil fuels, help diversify the District's energy sources, modernize energy infrastructure, and increase the District's resilience. Combined with advanced technologies (e.g., smart grid components), reducing energy use and increasing the use of renewable sources will allow the District to meet its sustainability and resilience goals. Sustainable DC 2.0 will begin a plan update in Fiscal Year 2023 and will build off the update to Clean Energy DC to refine its energy goals, targets, and actions.

5.3.2 Clean Energy DC

In August 2018, DOEE published Clean Energy DC, the District's comprehensive clean energy and climate action plan. Clean Energy DC provides a framework for reducing energy use at buildings, increasing the deployment of renewable energy, electrifying vehicles, and modernizing the District's energy delivery system to increase resiliency, sustainability, and efficiency.

Clean Energy DC identifies what actions need to be taken between now and 2032 in our buildings, our energy infrastructure, and our transportation system to meet the District's ambitious GHG reduction targets. It lists 57 actions that we can do today, next steps for each, and what we will need to do in the future. The plan aims to reduce emissions by 56% in 2032 compared to the baseline year of 2006 through the implementation of the 57 action items.

Following the adoption of the plan in 2018, the District adopted the landmark Clean Energy Omnibus Amendment Act of 2018 (CEDC Act). The CEDC Act turned the plan's ideas into action, resulting in the following achievements, among others: a first-of-its-kind Building Energy Performance Standard (BEPS); 100% renewable electricity portfolio standard (RPS) by 2032; an increased solar carve out; and new programs and goals for zero-emissions vehicles.

More recently, in August 2022, the Mayor signed the Clean Energy DC Building Code Amendment Act of 2022. The legislation requires the Mayor to issue regulations by 2026 requiring most new and substantially renovated buildings, excluding certain small residential buildings, to meet a net-zero-energy standard. This law represents the realization of one of the major goals of the Clean Energy DC Plan.

The existing electricity distribution grid, like most grids throughout the country, was designed to serve end-use customers from centralized energy generation systems was not optimized to redistribute supply and demand from distributed energy resources (DERs), including customer-owned generation assets. DERs that do not rely on fossil fuels not only enhance the distribution grid's resiliency, but also deliver essential environmental and economic benefits. To fully maximize the values of distributed energy resources, such as fuel cells, solar PVs, or battery storage, the distribution grid must be modernized to handle two-way power flows and redistribute energy throughout the service territory based on fluctuating supply and demand. Such a system will allow for the following:

- A substantial increase in the quantity of clean electricity generated within the District.
- Fully realized economic benefits of new local generation.
- Improved reliability and resilience to both customers and the electric grid
- Cost savings to ratepayers by reducing the need for traditional grid infrastructure, such as substations and feeders, by instead investing in the use of distributed energy and demand-side management (DSM) resources, such as local generation, storage, efficiency, and demand response.

- Development of neighborhood-scale energy systems including microgrids.

Grid modernization efforts will require the development of regulatory frameworks, market structures, and utility models that support a shift toward high levels of DERs and eventually facilitate distributed transactions, e.g., transactions between customer and the distribution system operator or even customer-to-customer transactions.

Clean Energy DC, building upon DOEE's work on grid modernization efforts facilitated by the DC PSC, includes recommended actions to modernize the grid by changing the way ratepayer investments are made and evaluated, and increasing the use of cost-effective distributed energy resources to reduce peak demand and manage load growth in new or congested neighborhoods. Some of this work is already underway through DOEE's participation and leadership in the DC PSC's Formal Case 1130, *Modernizing Energy Delivery System for Increased Sustainability*. Additional research, as well as regulatory and legislative changes, may be required to reduce barriers to DER integration, improve understanding of the District's energy supply and demand, develop cost-effective neighborhood-scale energy systems, and demonstrate the full value of a modernized electricity system.

Clean Energy DC recommends the following actions to modernize the District's energy delivery system:

- Planning and Coordination
  - Define a vision of the future distribution grid and characterize the stages of grid modernization (complete)
  - Adopt a framework for valuing distributed energy resource costs and benefits (underway by DC PSC)
  - Support the collaborative development of an integrated distribution plan
- Analysis of the Electricity System Needs and Capabilities
  - Outline a path to overcome legislative and regulatory barriers to grid modernization
  - Conduct a hosting capacity study of the District's distribution grid (forthcoming in FY 2023)
  - Develop a location-based profile of energy use and GHG emissions (complete)
- Immediate No Regrets Actions
  - Leverage existing advanced metering infrastructure data (underway at DC PSC)
  - Identify near-term projects that should be coordinated with grid modernization activities
- Proof of Concept Projects
  - Pursue pilot projects to key modernization capabilities and technologies. An example is the analysis of a "non-wires alternative" using DERs to a distribution substation and feeders to manage peak demand and meet new load growth in the Mt. Vernon neighborhood. (Pilot Projects underway at DC PSC)

5.3.3 Climate Ready DC

In November 2016, Mayor Bowser adopted the Climate Ready DC plan, which outlines 77 actions the District will take to prepare for the impacts of climate change including more dangerous heat waves, severe weather, and flooding. The potential impacts of climate change to the District's energy infrastructure include disruptions to the distribution grid due to extreme heat or severe weather and damage to energy infrastructure from flooding or other natural disasters. The plan identifies four actions to specifically increase the resilience of energy systems to future climate change:

- Conduct distribution system planning to identify the best strategies for stabilizing the power grid with DERs including energy storage, renewable energy, and micro-grids capable of islanding. Prioritize locations that could provide backup power to critical facilities, or alleviate congestion on the distribution grid.
- Ensure that climate risks are considered in utility rate cases for investments in new and upgraded infrastructure.
- Flood proof and/or elevate electrical infrastructure including, but not limited to, substations, transformers, switch gear, etc. Flood proof and/or elevate gas infrastructure including, but not limited to, pressure regulating stations, odorization equipment, tanks, controls, electric components, etc.
- Conduct site-level studies of extreme heat risk to electrical grid infrastructure including transformers, and overhead transmission and distribution lines. Identify necessary upgrades and mitigation strategies.

5.3.4 Proactive Measures

The District has taken steps to proactively reduce vulnerabilities by:

- Helping to deploy smart grid technologies and increasing cyber security efforts;
- Encouraging the use of renewable energy and clean transportation;
- Diversifying energy sources to reduce the reliance on a limited number of energy sources;
- Promoting the development of microgrids and district energy systems, as well as the creation of community resilience hubs that use onsite renewable energy generation and battery storage;
- Prioritizing the use of DERs, such as rooftop solar photovoltaic systems, battery storage, and demand response, to meet energy demands in the District and to build resiliency at the neighborhood scale; and
- Creating a Vulnerability Assessment and Resilience Audit and Solar Tool for affordable housing properties that will help property owners identify opportunities to improve the resiliency of their properties and protect their residents.

5.3.5 State Energy Program

The State Energy Program (SEP) receives annual formula funds from the Department of Energy to support energy efficiency initiatives, enhance energy security, advance state energy initiatives, and maximize the benefits of decreasing energy waste. DC Fiscal year 2023 programs include implementing the Electric Vehicle Grand Prix and education program, developing a K-12 environment and education program, an electric bicycle pilot program, and supporting the development of the District Energy Conservation Code. Additionally, the District is putting together an application to use the new funding provided by the Infrastructure Investment and Jobs Act over a period of five years. The total funding anticipated by DOEE is $3,022,210.

5.3.6 Improved DC Construction Codes

The District of Columbia adopts an updated suite of Construction Codes on a semi-regular basis based on the updated national model codes published every 3 years by the International Code Council (ICC), American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the NFPA. The model codes are developed by building code officials from across the country, with input by diverse stakeholders in order to incorporate technological and engineering advances and safety best practices. Most recently, the District of Columbia adopted the 2015 edition of the ICC model codes, ASHRAE 90.1-2013, and the 2014 National Electrical Code in May 2020 to comprise the 2017 DC Construction Codes.[72]

A new code development cycle commenced in the District of Columbia in February 2021 to consider adoption of the 2021 edition of the ICC model codes, ASHRAE 90.1-2019 and the 2020 NEC. The Construction Codes Coordinating Board (CCCB) is in the process now of reviewing and approving any local amendment proposals passed up by the respective Technical Advisory Groups (TAGs). The updated DC Construction Codes are expected to be adopted in late 2023.

The CCCB is charged with the authority to review the model codes and make recommendations with respect to model code provisions which need to be deleted, revised or amended based on unique District of Columbia characteristics or policies; critical life/safety, health or general welfare needs; conformity with surrounding jurisdictions; or to correct errors or omissions.

The local DC revisions to the model codes are set forth in Title 12 of the District of Columbia Municipal Regulations (DCMR), referred to as the District of Columbia Construction Codes Supplement. The Supplement together with the model codes comprises the District of Columbia Construction Codes.

[72] The current District of Columbia Building Code can be accessed here: https://codes.iccsafe.org/public/collections/District%20of%20Columbia/2013.

5.4 Renewable Energy Initiatives

In 2017, DOEE launched a major initiative called Solar for All aimed at developing local solar generation capacity while providing energy cost relief to underserved communities. The Solar for All program is a legislative mandate under the Renewable Energy Portfolio Standard Expansion Amendment Act, which was enacted in 2016.

The Act intends to expand the District's solar capacity, to increase the amount of solar generated within the District, and to provide the benefits of locally generated solar energy to low-income households, small businesses, nonprofits, and seniors. Funded by the Renewable Energy Development Fund and administered by DOEE, Solar for All's specific targets are to provide the benefits of solar electricity to 100,000 low-income households (at or below 80% Area Median Income), and to reduce their energy bills by 50% (based on the 2016 residential rate class average) by 2032.

As described in the Solar for All Implementation Plan,[73] DOEE will implement Solar for All in five three-year phases to ensure the program is sufficiently flexible to adapt to market changes and overcome barriers. The initial implementation phase (FY17-FY19) includes development of approximately 7 MW of solar capacity. DOEE's ongoing Solar for All Innovation and Expansion Grants under the initial implementation phase are helping to identify solutions to the core barriers to greater solar deployment in the District.

Distributed solar systems, when paired with battery storage, can bring a greater degree of energy independence and resilience. The proliferation of distributed solar throughout the District, and particularly in underserved communities, raises the possibility that the District may be able to achieve citywide resiliency at the community level by harnessing the advances made in the renewable energy sector. Currently, DOEE is funding projects for other District agencies that will pilot the combined use of rooftop solar systems with onsite battery storage.

5.5 Smart Grid Deployment Initiatives

5.5.1 Pepco Smart Meters

Pepco has installed smart meters for 99% of all customers in the District. Smart meters have the capability to allow two-way communication between customers and Pepco, record hourly energy use information, allow customers to make decisions on their energy usage, and target ways to reduce energy usage. Pepco's smart meters are net-metering capable and can be

[73] https://doee.dc.gov/sites/default/files/dc/sites/ddoe/service_content/attachments/DOEE-%20Report-%20Solar%20for%20All%20Implementation-%20Final%20for%20Transmittal.pdf.

programmed by Pepco to accept energy from renewable generation technologies, such as solar PV arrays. Unfortunately, not all of these functionalities have been fully implemented. While customers can access their data on Pepco's online portal, they are not yet able to share their data with third party providers through a Green Button Connect My Data platform – however, the process for enabling that functionality is already under way at the DC PSC. Additionally, the real-time data access and communications functionalities between the Pepco meter and customer appliances and smart energy management devices have yet to be enabled. The meters are equipped with a Zigbee radio to enable Home Area Network communications. The DC PSC is currently hearing from stakeholders, including DOEE, who wish to see these functionalities fully implemented.

The smart meters are programmed to send a "last gasp" message after a power loss, and notify Pepco when power is restored.

5.5.2 Pepco's Distribution Automation Implementation

Pepco has been pursuing Smart Grid technologies that will allow Pepco to recover faster from outages and minimize the impacts of outages. Such technologies include automatic sectionalizing restoration systems, which automatically identify the fault line, then isolate and restore the line. Additional equipment includes remotely operated switches and remote monitoring systems.

5.5.3 Potential for Demand Response

Demand response provides temporary reductions in consumption to improve the ability of the electrical grid to meet consumer demand. Thus, demand response enhances energy resiliency.

Sophisticated demand response programs are possible in the District because of the availability of smart metering equipment. However, the District has yet to launch smart meter-enabled demand response programs, despite its earlier, and successful, pilot program called Powercents DC. Third party providers could also implement demand response with access to the smart meter data through the Green Button Connect My Data Platform.

5.5.4 Potential Benefits of Additional Smart Grid Deployment for the District

A modernized, smart grid capable of managing two-way power flows and redistributing supply and demand from DERs could help the District create a more reliable electricity supply, lessen the frequency of outages, and allow the District to respond quickly to energy outages. The actual benefits realized by the District will depend on the particular smart grid technologies deployed, and how DER are included in Pepco's forecasting and operations.

As conceptualized, the smart grid may also allow integrated communications between power generators, substations, transmission and distribution lines, customers (including microgrids),

service providers, and grid operators. It could allow grid managers to adjust both supply and demand for electricity, and specific applications could be programmed to automatically control the amount of energy entering the grid. Automatic controls may allow an electric utility to reduce electricity load by turning off equipment via the use of smart meters and smart thermostats. Additional sources of electricity could be turned on as demand increases. These automated controls could make it easier for utilities to manage the intermittent supply of energy from renewable energy sources. Additionally, the use of advanced inverter packaged equipment can allow real-time control of line voltage to manage intermittent generation.

Automated smart grid controls can also be programmed to have self-healing capabilities. For instance, if a power line is knocked down, a signal can be sent directly to the electric utility so that power can be re-routed around the downed line, restoring electricity service to critical infrastructure almost immediately. Field crews could then be quickly dispatched to fix the downed lines. This would help the District avoid cascading power failures and decrease the duration of outages, limiting impacts on residents.

5.6 Energy Storage

Energy storage has traditionally been used to help balance supply and demand for transmission. Grid operators continue to rely on technologies such as pumped hydro and flywheels to balance regional supply and demand. However, more distributed forms of thermal storage and electricity storage are being developed with rapidly declining costs.

Thermal storage, such as extracting heat from sewer pipes and ice storage, is commercially viable and being used at scale at large commercial facilities with significant environmental and financial benefits. In addition, the cost of battery storage has declined significantly, to the point that governments, institutions, and businesses are contemplating the procurement of 100% renewable energy supply backed up by battery storage.[31] Battery storage is now being considered to replace peaker plants, defer or avoid transmission or distribution system upgrades, power microgrids, and manage energy demand in commercial or residential buildings.

DOEE is actively pursuing opportunities to realize the combined use of solar PV systems in the District, developed under the Solar for All program, with battery storage to maximize the resiliency benefits that can be obtained. Currently, DOEE is pursuing such projects with the Department of General Services and the DC Public Library.

5.7 Fuel Cells

Fuel cells convert chemical energy into electricity and can vary greatly in size depending on need. Fuel cells can be as large as a power plant or can be small enough to power personal electronics, such as laptop computers. Fuel cells powered by hydrogen are more efficient and cleaner than burning fossil fuels to create electricity, as hydrogen fuel cells only emit water and waste heat.

Fuel cells can also be powered by gas or biogas (including biodiesel), which can be derived from organic waste. Over the past few years, corporations and municipalities have increasingly used renewable fuel cell systems to meet building energy needs, using the electrical grid as a backup electricity supply.

Fuel cells enhance resiliency by providing efficient, onsite power, thereby reducing the dependence on pipelines and the electrical grid. Fuel cells can function either as backup power or baseload generation. Fuel cell deployments are increasing nationally, with more than 235 MW stationary fuel cells deployed nationally.[32] Fuel cells are also beginning to power vehicles including public buses. DOEE has been encouraging the use of fuel cells, especially sourced by biogas, as the baseload generation for microgrids. DOEE will continue to collaborate with stakeholders to identify and seize opportunities to deploy clean energy fuel cells to increase the District's resiliency.

5.8 Microgrids and District Energy Systems

Creating a microgrid or numerous microgrids within the District would allow sections of the city to operate independently from the distribution grid in the District during an energy emergency. Microgrids can rely on their own power sources (e.g., renewable energy systems), fuel cells, or combined heat and power (CHP) systems, which recycle waste heat to create energy. Similarly, district energy systems can enhance resiliency by efficiently using onsite energy resources for heating and cooling, which represent the most intense uses of energy, for multiple buildings.

In 2017, DOEE completed a preliminary feasibility report on the opportunities to proliferate microgrids and district energy systems in the District. Using the report findings, DOEE began identifying and bringing potential microgrid and district energy opportunities to relevant stakeholders. As a result, several stakeholders are considering the development of a microgrid or the retrofit of a district energy system.

Currently, there are several major developers and institutions, including universities and hospitals, considering a microgrid or retrofitted district energy system to realize multiple benefits: resiliency, reliability, efficiency, energy and operational savings, and reduced pollution and carbon emissions. This includes the St. Elizabeth hospital campus which is reviewing bids for a campus microgrid serving the hospital, 911 call center, and a men's shelter on District Government property.[74] The microgrid is funded in part by a competitive award from FEMA.[75]

District energy is also being used successfully on Capitol Hill in the entire complex of federal

[74] https://dgs.dc.gov/event/dcam-22-cs-rfp-0011-redevelopment-st-elizabeths-east-campus-%E2%80%93-microgrid-project

[75] https://mayor.dc.gov/release/mayor-bowser-announces-new-microgrid-st-elizabeths-east-increase-resiliency-and-reliability

buildings, and in the General Services Administration building. Efforts are currently under way for the GSA to consider how it can maximize the value from its district energy system. DC Water has also installed an anaerobic digester at its Blue Plains wastewater treatment facility, which converts the biogas from the digester to electricity for use at the site. The system generates 13 MW of power for DC Water, saving the utility up to $10 million annually.

To build on this promising technology, DOEE will explore the feasibility of reducing the dependence of both District-owned fuel facilities and private sector retailers on power from the electrical grid. Specifically, DOEE will work with DPW to determine the feasibility of conducting a pilot project that involves installing microgrids or solar panels on top of a fuel pump canopy to generate clean electrical power during "blue sky" days but also deliver needed electricity in the event of a power outage.

In a regional disaster that results in damage to transportation infrastructure and wide-spread power loss for an extended duration, the impact on fuel supplies could be severe because of the dependence on electricity to operate pumps that draw fuel from underground storage tanks. While the District's DPW fuel facilities are retrofitted with emergency generator hookups, fuel at private retailers would be inaccessible as most retailers do not have the ability to connect to an alternate power source. In order to build resiliency against a fuel emergency, placing microgrids on top of critical infrastructure could provide a source of back-up power that is insulated from ongoing energy supply disruptions.

DOEE has found that there are companies with the capabilities and prior experience necessary to design and install solar panels on top of gas station canopies. By working with DPW to potentially pilot this concept at District-owned fuel facilities, DOEE hopes to test the efficacy of such systems in powering fuel pumps and other equipment. If successful, this could become a model that enhances the resiliency of the District and protect against fuel shortages.

5.9 Transportation Fuel Efficiency and Conservation Projects

5.9.1 Bikeshare Programs

The District Department of Transportation (DDOT)'s bikesharing program, in partnership with Arlington County, the City of Alexandria, Montgomery County, Fairfax County, and Prince George's County is called Capital Bikeshare. Over 5,000 bicycles at over 600 stations are available in the DC metro area. As of early 2022, Capital Bikeshare has 338 stations within DC, putting over 80% of the District's population within a quarter mile of a station. The program allows bicycles to be rented for single trips under 30 minutes, or for a day, three days, a month, or a year. The program encourages commuters and tourists to reduce reliance on traditional forms of gasoline-powered transportation. Currently, there are several dockless bikeshare and scooter programs competing with the Capital Bikeshare program in the District.

5.9.2 DDOT's Streetcar and Electric Bus Program

DDOT and the Washington Metropolitan Area Transit Authority (WMATA) have developed a

long-term transportation plan for the District. DDOT began construction of a new streetcar line in Anacostia that travels through Benning Road and H Street and terminates at Union Station. The streetcar began operation in 2016 and has enhanced the existing transportation system in the District. Streetcars will help connect neighborhoods in the District and encourage the use of public transportation, which may help reduce the District's dependency on gasoline-powered automobiles.

In 2018, DDOT added 14 electric buses to the DC Circulator bus fleet. In 2022, the U.S. Department of Transportation announce that DDOT will also receive $9.59 million to purchase an additional 17 electric buses for the DC Circulator fleet from the federal 2022 Low-No Grant Program and Grants for Buses and Bus Facilities Competitive Program Discretionary Grant. In addition, DOEE will provide DDOT with funding from the Volkswagen Beneficiary Mitigation Plan, to purchase additional electric buses by 2027.

The transition to electric public buses will have multiple benefits: health benefits from reduced nitrogen dioxide emissions, climate benefits from reduced carbon emissions, and potential operating and fuel cost savings. However, the issues of charging and the demand on the electric grid need to be carefully considered before a transition to electric vehicles occurs at scale.

5.9.3 Electric Vehicles

The first public electric vehicle charging station in the District was built by ChargePoint, a national EV charging station company based in California, became available on November 16, 2010. The charging station allows for two electric vehicles to be recharged at one time. ChargePoint's mission is to reduce gasoline consumption and pollution and to encourage the production and use of electric vehicles. In the subsequent years, other charging networks have come to the District and provide similar capabilities and amenities as the ChargePoint network. The new hosts include the groups: eVgo, Blink, SemaCharge, OPconnect, GE Wattstation, and Tesla.

Since the initial public charging station has been installed, 237 public Level 2 EV charging stations with 628 charging ports; 8 public DCFC locations with 39 DCFC ports; 46 private charging stations with 138 ports. The infrastructure currently supports an EV ecosystem of 3,500 EVs in the District and 11,000 in the local DMV.

The charging stations collect information on the duration of charging sessions, can alert network administrators of "a disruption in service from vandalism or utility demand response," and can send emails or text messages to drivers on information from their charging session. The networked charging stations can also be remotely accessed for troubleshooting. EV charging stations can also be equipped with utility-grade metering, and can be compatible with Time of Use (TOU) pricing and Demand Response control. Utilities and station owners have the capability to set their own prices or offer free charging services. Smart p hones can also be used to find open charging stations, which use a contactless credit card payment system.

The influx of new EV charging station companies have led to the installation of over 100 different charging locations throughout the District. Each station capacity ranges from Level 1 charging, which provides a full charge in an 8-hour session, to Direct Current Fast Chargers (DCFC), which provides a full charge within half an hour. Most of these stations consist of Level 1 and Level 2 charging and are located within parking lots associated with hotel and retail organizations. The DCFCs are located next to retail and transportation spaces and provide a more depot style of charging, versus a park and charge model.[76]

Of the newly installed stations, over 80% are considered public stations, as anyone can access these stations. The remaining charging stations are considered private and are utilized to charge fleets or are specifically reserved for EV taxicabs. Additionally, there are 18 Tesla charging stations that are accessible to the public but are for Tesla specific vehicles.[77]

5.10 Alternative Fuel Vehicles

The District government currently maintains over 700 alternative fuel and hybrid vehicles in its fleet, which help reduce fuel consumption. These vehicles use biodiesel, E-85, electricity, compressed gas (CNG), and ultra-low sulfur diesel fuels. The District also maintains a DC FleetShare motor pool for employees that helps reduce the total number of vehicles needed.

5.11 Car-Sharing Services

Car-sharing services, such as Zipcar and Free 2 Move, can help the District reduce the number of vehicles on the road and decrease the volume of transportation fuel needed.

5.12 Fuel Supply Disruption Mitigation Strategies

In order to build resiliency against a fuel emergency, installing solar-based resiliency packages on top of gas station retail stores and pump canopies is a primary recommendation. Photovoltaic arrays integrated with battery storage systems and capable of operating in an "island mode" could provide a source of electrical power to operate pumps and payment systems during grid outage events. To facilitate these installations, the retail fueling station market needs targeted outreach and education that explains the opportunity and benefits to business owners, breaks down financing options, and supports projects from initiation to completion.

In addition, District government and first-response partners' portable fuel storage options (stationary tanks with backup pumps, portable tanker trucks, small portable fuel tanks transportable by pickup truck, etc.) should be assessed, and a distribution plan developed, in order to make these resources available in the event of an outage. In a regional disaster that

[76] https://www.afdc.energy.gov/tools
[77] https://www.afdc.energy.gov/tools

results in damage to transportation infrastructure and wide-spread power loss for an extended duration, the impact on fuel supplies could be severe because of the dependence on

electricity to operate pumps that draw fuel from underground storage tanks. While the District's DPW fuel facilities are retrofitted with emergency generator hookups, and would remain operational, fuel at private retailers would be inaccessible as most retailers do not have the ability to connect to an alternate power source. In order to build resiliency against a fuel emergency, placing solar panel plus battery on top of gas station canopies could provide a source of electrical power to operate pumps.

5.13 Framework Supporting Public-Private Partnerships

Energy resiliency will be enhanced if the District continues to build relationships with private-sector partners, including Pepco, PJM, Washington Gas, and other pipeline operators.

Enhancing already-existing partnerships with organizations such as MWCOG, the National Capital Planning Council, the largest energy users, and the largest employers in the District will help the District encourage reductions in energy use and increase the use of distributed energy resources, including locally generated renewable energy. Additionally, DOEE should partner with federal agencies, including the military, the US DOE, GSA, and the Architect of the Capitol, to encourage and enhance resiliency and securing a sustainable energy future.

5.14 Summary

The District and other public and private partners have made major progress toward building resiliency through planning, innovation and important partnerships. The programs and initiatives discussed above will help the District respond to and recover from an energy emergency much more efficiently and quickly.

By their nature, energy emergencies are unexpected events. However, since we understand the basic contours of known emergencies, the District has policies, plans, and procedures in place that can guide responses when an emergency occurs. This EAP, together with the 2015 DRP, provides guidance on how to prepare for and respond to an energy emergency in the District.

APPENDIX A

2017 District Response Plan, Chapter: ESF #12-Energy

Emergency Support Function #12 – Energy

Primary District Agency: Department of Energy and Environment
Support District Agencies: Department of General Services
Department of Public Works
District Department of Transportation

Other Support Agencies: Maryland Energy Administration
and Organizations: Potomac Electric Power Company
Public Service Commission
Virginia Department of Mines, Minerals, and Energy Washington Gas Company

Primary Federal Agency: U.S. Department of Energy
Support Federal Agencies: District of Columbia National Guard
U.S. Department of Defense/U.S. Army Corps of Engineers

Appendix

1 Introduction

1.2 Purpose

Emergency Support Function (ESF) #12 - Energy helps restore District of Columbia (the District) energy systems during and/or following an emergency. The District Department of the Environment (DOEE) is the primary agency responsible for coordinating with other governmental response elements and utilities to restore energy delivery.

1.3 Scope and Applicability

ESF #12 gathers, assesses, and shares information on energy system damage and estimates the impact of energy system outages/shortages within the District. The purpose of this ESF is to facilitate restoration of energy delivery and fuel supplies during and/or following an emergency. Power and fuel are critical to protecting lives and property and maintaining the continuity of the government, business, transportation, emergency services and other critical infrastructure within the District. Also, ESF #12 will provide generator support.

ESF #12 support agencies have a variety of assets and resources available to mitigate energy or hazardous problems. Damage to an energy system in one geographic region may affect energy supplies in other regions that rely on the same delivery systems.

1.4 Incident Management Actions

ESF #12 focuses on those activities that are directly related to an evolving incident or potential incident rather than steady-state preparedness or readiness activities for energy resources.

ESF #12 provides a framework to enable the management of cascading impacts and multiple incidents as well as the prevention of and preparation for subsequent events. Examples of incident management actions from the District perspective include:

- Assessment of the stability of the energy infrastructure
- Coordinating Federal support in the aftermath of an incident involving disruption to the energy infrastructure;
- Enabling immediate recovery activities, as well as addressing long- term consequences in the impacted area.

1.5 Policies

The ESF #12 priorities will be to aid in the restoration of energy delivery and provide generator support. DOEE will assign an ESF Emergency Liaison Officer (ELO) to temporary duty at the

Homeland Security and Emergency Management Agency (HSEMA) Emergency Operations Center (EOC) or other augmentation facility. A DOEE representative will be appointed, as needed, to be a member of the Consequence Management Team (CMT).

2 Situation

2.1 Disaster Condition

An emergency (including a fuel shortage emergency) may sever key energy infrastructure, thereby constraining supply in affected areas and adversely impacting adjacent areas, especially those with supply links to the directly affected areas. Such an incident has the potential to affect transportation, communications and other infrastructure necessary for sustaining public health and safety. Also, it could affect continuity of government as well as critical infrastructure within the District.

2.2 Planning Assumptions

1. There may be widespread and possibly prolonged electric power outages or interruptions.
2. There may be widespread and possibly prolonged disruption to the supply and distribution of gas.
3. Transportation and telecommunication infrastructures may be affected by a disruption in power.
4. Delays in the delivery of petroleum-based products may occur as a result of loss of commercial electric power.

3 Concept of Operations

3.1 General

1. ESF #12 will consolidate utility reports, identify the assessment of fuel and electric power damage, energy supply and demand, and estimate repair such systems, as follows:
    a. Coordinate closely with officials to establish priorities to restore critical customer facilities and coordinate the provision of temporary, alternate or interim sources of emergency fuel and power.
    b. Obtain current information regarding damage to the energy supply and distribution systems and obtain estimates for restoration.
2. ESF #12 will provide timely and credible energy supply assessments and restoration

forecasts in times of disaster in coordination with the U.S. Department of Energy (USDOE).

3. ESF #12 will coordinate with technical experts on energy supply production and delivery to facilitate energy information exchange.
4. ESF #12 will coordinate with other ESFs in order to provide timely and accurate energy impact information and recommend options to mitigate impacts.
5. ESF #12 will provide an ELO to the HSEMA EOC during an emergency.
6. ESF #12 will attain information regarding energy impacts and provide input to situation and other reports through the EOC.
7. ESF #12 will coordinate among federal and mutual aid state officials and energy industries in the region regarding priorities to repair damaged energy systems.

3.2 Organization

DOEE will coordinate all ESF #12 activity. Each support agency may be represented at the HSEMA EOC; ESF #12 will maintain 24-hour contact with those representatives, as necessary, at those locations for the duration of the emergency response period. Support agency representatives will have sufficient knowledge of the capabilities and resources of their agencies, with appropriate authority to commit resources to the response effort.

Upon issuance of a presidential disaster declaration, the ESF #12 team leader is the point of contact (POC) within the District and will represent this ESF in its dealings with the District of Columbia coordination officer (DCCO), who will issue requests for federal assistance to the federal coordinating officer (FCO). The Federal Emergency Management Agency (USDHS/FEMA) will issue a mission assignment to a federal ESF agency; DOEE will coordinate the delivery of assistance for ESF #12 with the appropriate federal partner. The ESF will have an ESF Emergency Liaison Officer present or available for duty at the joint field office (JFO) on a 24-hour basis for the duration of the emergency response period.

3.3 Notification

1. The EOC will notify ESF #12 of the activation of the CMT. ESF #12 will notify support agencies and appropriate officials by telephone, pager, and/or e- mail regarding the nature of the event and any potential ESF # 12 issue.

2. The ESF #12 team leader will attend any CMT meetings and be available, as necessary, for the duration of the initial response period.

3.4 Response Actions

3.5 Initial Actions

a. Use available information to determine the status and assess the energy impacts of the emergency, including public agency and government resources needed to respond.
b. Coordinate with utility representatives to establish priorities to repair damage and communicate regarding restoration of priority facilities.
c. Coordinate with utility representatives to identify government actions that will help obtain needed resources to repair or restore damaged energy systems.
d. Coordinate with and follow the guidance of USDOE to access fuel supplies in the petroleum reserve, in the event of a fuel shortage.
e. Receive and respond to requests for information from neighboring states, local governments, regional bodies, federal agencies and industry.

3.6 Activation

f. Activate disaster response procedures.
g. Dispatch an ESF #12 ELO to the EOC.
h. Provide periodic situation and any other reports to the EOC as directed by HSEMA.

3.7 Continuing Actions

i. Serve as the focal point for receipt of reports on damage to energy supply and distribution systems and requirements for system restoration.
j. Advise and assist industry, District and local authorities on priorities and actions for energy restoration and supply.
k. Locate fuel for transportation, communications and emergency operations. Coordinate with the U.S. Army Corps of Engineers (USACE) and the District of Columbia National Guard (DCNG) for the transportation of fuel.
l. Coordinate the collection and reporting of energy supply information to the public.
m. Recommend actions to conserve petroleum fuel, electric power, and gas, and to ration energy, as necessary.
n. Monitor the fuel supply system in coordination with gas station owners and companies to ensure the District possesses and maintains adequate supplies.

3.8 Public Information/Crisis Communications

o. The Joint Information Center (JIC) structure provides a supporting mechanism to develop, coordinate and deliver messages; it supports the Incident Commander or Unified Command and the associated elements of the ICS. ESF #15, in consultation with ESF #5, will develop a strategic communications plan to prepare and deliver coordinated and sustained messages to the public.
p. All public information and external affairs for ESF #12 will be coordinated with ESF #15.
q. ESF #12 will provide up-to-date information and situational awareness on any

energy emergency to the EOC that may be used in public information and crisis communications.

r. As needed, ESF #12 will send a liaison to the JIC to assist with public information and crisis communications, such as providing technical information relative to energy emergencies.

4 Resource Requirements

ESF #12 will coordinate directly with ESF #5 upon depletion of District resources. During the immediate aftermath of an incident and Presidential declared emergency/disaster under the Stafford Act, the Mayor may request the President to direct the Secretary of Defense to utilize the resources of the DOD for the purpose of performing on public and private lands any emergency work that is made necessary by such incident and that is essential for the preservation of life and property.

All requests for resources will be tracked in the WebEOC system for maximum federal reimbursement after a federal emergency/disaster declaration.

5 Demobilization

Once incident goals and objectives have been achieved and/or a centralized District coordination presence is no longer required, the CMT will direct implementation of the incident demobilization plan. The Planning and Information Section is responsible for the development and implementation of the incident demobilization plan.
Demobilization planning will begin during the response period. Indicators to start demobilization planning include the following:

- No request for additional resources
- End of incident is in sight
- Unassigned resources

Once the incident demobilization plan has been approved, the Information and Planning Branch Chief shall ensure that it is distributed to all activated ESF's. In consultation with the CMT and Incident Commander and Emergency Operations Chief, establishing release priorities of the following:

- Critical resources
- Critical personnel, specialize teams, EOC personnel
- Establishing recall roster in case reactivation is required
- Notifying personnel to be released of the specific times for released
- Establishing demobilization checkout

The Documentation Branch will ensure that all incident documents are submitted prior to demobilization. The EOC Manager will conduct the brief- out to EOC personnel (HSEMA staff and Emergency Liaison Officers) and request a final incident operational update for inclusion in the SITREP. In cases where the EOC is deactivated but there are recovery activities in progress, the responsible ESF agency will continue to provide the HSEMA Disaster Recovery Manager of ongoing activities.

s. Once ESF #12 is no longer needed to support an incident, the ESF will follow the demobilization plan to transfer responsibilities to recover assistance program oversight and monitoring.

t. Following complete demobilization, responsibilities of ESF #12 lead and support agencies shift back to individual agencies' District offices.

6 Responsibilities

6.1 Primary District Agency

District Department of the Environment (DOEE)

As the primary District agency for ESF #12, DOEE will use the framework of its Energy Supply Disruption Tracking plan to complete the following actions:

a. Coordinate information flow.
b. Assist in determining the level of event severity.
c. Assist in identifying measures to be implemented.
d. Monitor energy supply prior, during and after the event.
e. Track energy supply during the event.
f. Conduct follow-ups after the event.

In the event of an energy emergency, DOEE will complete the following actions:

a. Track information during the event.
b. Provide situational awareness of the event.
c. Assist in developing management decisions to respond to the event.

6.2 Support District Agencies

1. **Department of General Services (DGS)** will complete the following actions:

Provide generator support by identifying available generators to be used in response operations, in coordination with HSEMA.

2. **Department of Public Works (DPW)** will complete the followingactions:

   a. Support the restoration of energy delivery and fuel supplies during and/or following an emergency.
   b. Assist in the transport of generators during an emergency.
   c. Provide generator fuel supplies as needed.

3. **District Department of Transportation (DDOT)** will complete the following actions:

   a. Facilitate and coordinate in the restoration of damaged transportation infrastructure within the public right-of-way to reestablish utilities.
   b. Coordinate with PEPCO regarding downed power lines caused by trees.

6.3 Other Support Agencies and Organizations

1. **Maryland Energy Administration (MEA)** will complete thefollowing actions:

   a. Serve as the lead agency for Maryland for ESF #12.
   b. Provide support as requested under the Emergency Management Assistance Compact (EMAC).

2. **Potomac Electric Power Company (PEPCO)** will complete the following actions:

   a. Provide electrical services to the public and businesses of theDistrict.

   b. PEPCO will ensure constant communications with the EOC and provide an ELO to the EOC to ensure effective communications and coordination of emergencies, specifically monitoring the power grid and its impact on the District.

   c. Provide operational/restoration information reports on response activities to the EOC.
   d. Support HSEMA in preparing an impact statement outlining the effects of a long- term power outage on government operations and on the potential threat to the health, welfare, and safety of citizens in the affected areas.

3. **Public Service Commission (PSC)** will complete the following actions:

Provide emergency regulatory action, as appropriate, to facilitate PEPCO, Washington Gas Company and any other suppliers under its mandate in the restoration of services to their customers.

4. **Virginia Department of Mines, Minerals and Energy (DMME)** will complete the following actions:

   a. Serve as the lead agency for Virginia for ESF #12.
   b. Provide support as requested under EMAC.

5. **Washington Gas Company (WGC)** will complete the following actions:

   a. Provide gas to the public and businesses of the District.
   b. Provide an ELO to the EOC to ensure continuous effective communications and coordination of emergencies, specifically monitoring the gas supply and its impact on the District.
   c. Provide operational/restoration information reports on response activities to the EOC.
   d. Support HSEMA in preparing an impact statement outlining the effects of a long- term gas outage on government operations and on the potential threat to the health, welfare, and safety of citizens in the affected areas.

6.4 Primary Federal Agency

1. **U.S. Department of Energy (DOE)** will complete the following actions:

   a. Serve as the primary federal agency for ESF #12.
   b. Provide direct, technical and other support and guidance to the District through its District counterpart.
   c. Support the District in the event of a weapons of mass destruction (WMD) incident. Note: This USDOE support is outlined in Attachment J to the *National Capital Region Weapons of Mass Destruction Incident Contingency Plan*.

      Note: Upon issuance of a presidential declaration of an emergency or major disaster, under the authority of the Robert T. Stafford Disaster Relief Act as Amended, April 1999, federal agencies initially will operate out of the U.S. Department of Homeland Security (USDHS) National Response Coordination Center (NRCC). When the JFO is established near the disaster area, ESF representatives that comprise the Emergency Response Team (ERT) will be in the JFO.

6.5 Support Federal Agencies

1. **DC National Guard (DCNG)** will complete the following actions:

   a. Support the distribution of fuels and other services when requested and coordinated by HSEMA.

2. **Department of Defense/U.S. Army Corps of Engineers (DOD/USACE)** will complete the following actions:

   a. Respond in support of DOE during a federally declared disaster.
   b. Serve as the coordinating federal agency for ESF #3.
   c. Provide electrical generators and other support services as needed to supplement the District's efforts in the temporary restoration of electrical service.

APPENDIX B

Pipeline Owners:

Pipeline Name	Contact
Colonial Pipeline	Cliff Kazmarek
	Direct: (678) 230-2306
	ckazmare@colpipe.com
Kinder Morgan / Plantation Pipeline	Patrick Davis
	Main: (800) 510-5678

National Capital Region Bulk Fuel Terminal Operators:

Terminal No.	Terminal Name	Address	City	ST	Zip
T-52-MD-1550	Buckeye Terminals, LLC - Baltimore	6200 Pennington Avenue	Baltimore	MD	21226
T-52-MD-1551	Kinder Morgan Liquids Terminals LLC	801 East Ordnance Road	Baltimore	MD	21226
T-52-MD-1552	Sunoco Partners Marketing & Terminals LP	2155 Northbridge Avenue	Baltimore	MD	21226
T-52-MD-1554	Petroleum Fuel & Terminal - Baltimore North	5101 Erdman Avenue	Baltimore	MD	21205
T-52-MD-1559	Petroleum Fuel & Terminal - Baltimore South	1622 South Clinton Street	Baltimore	MD	21224
T-52-MD-1560	NuStar Terminals Operations Partnership LP – Balt.	1800 Frankfurst Avenue	Baltimore	MD	21226
T-52-MD-1561	Motiva Enterprises LLC East	2400 Petrolia Avenue	Baltimore	MD	21226
T-52-MD-1562	CITGO - Baltimore	2201 Southport Avenue	Baltimore	MD	21226
T-52-MD-1563	Center Point Terminal - Baltimore West	3100 Vera Street	Baltimore	MD	21226
T-54-VA-1659	Buckeye Terminals, LLC - Fairfax	9601 Colonial Avenue	Fairfax	VA	22031
T-54-VA-1660	TransMontaigne - Fairfax	3790 Pickett Road	Fairfax	VA	22031
T-54-VA-1661	CITGO - Fairfax	9600 Colonial Avenue	Fairfax	VA	22031
T-54-VA-1662	Motiva Enterprises LLC	3800 Pickett Road	Fairfax	VA	22031
T-54-VA-1663	Sunoco Partners Marketing & Terminals LP	10315 Ballsford Road	Manassas	VA	23109
T-54-VA-1671	Kinder Morgan Southeast Terminals LLC	8200 Terminal Road	Newington	VA	22122
T-54-VA-1692	Kinder Morgan Southeast Terminals LLC	8206 Terminal Road	Lorton	VA	22079
T-54-VA-1695	Lincoln Terminal Company	3300 Beaulah Salisbury Drive	Fredericksburg	VA	22402

Glossary

Alternative Fuel Vehicle: A vehicle that runs on a fuel other than "traditional" petroleum fuels (petrol or diesel); Refers to any technology of powering an engine that does not involve solely petroleum (e.g., electric car, hybrid electric vehicles, solar powered). (Internet)

BTU (British Thermal Unit): The amount of heat needed to raise one pound of water at maximum density through one degree Fahrenheit. (Internet)

Comprehensive Energy Plan: The CEP, called Clean Energy DC, provides an energy vision for the District as a national leader, with specific short- and long-term energy goals, strategies, and initiatives for accomplishing these energy goals; provides strategies that align the CEP with the Mayor's Sustainable DC Plan and the Climate Ready DC; and provides a comprehensive set of energy efficiency and renewable energy goals and recommendations that will put the city on a path to reducing energy consumption, increasing local generation and clean power usage, ensuring energy reliability and affordability, and creating green jobs for District residents. (DOEE)

Concept of Operations: A concept of operations is a document describing the characteristics of a proposed system from the viewpoint of an individual who will use that system. It is used to communicate the quantitative and qualitative system characteristics to all stakeholders. (Internet)

Consequence Management: Predominantly an emergency management function and included measures to protect public health and safety, restore essential government services, and provide emergency relief to governments, businesses, and individuals affected by the consequences of terrorism. The requirements of consequence management and crisis management are combined in the National Response Framework (NRF). See also Crisis Management. (2015 DRP)

Critical Infrastructure (CI): 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 safety, or any combination of those matters. (2015 DRP)

Cyber Security: Cyber security is the body of technologies, processes and practices designed to protect networks, computers, programs and data from attack, damage or unauthorized access. In a computing context, the term security implies cyber security. (Internet)

Demand Response Programs: In electricity grids, demand response (DR) is like dynamic demand mechanisms to manage customer consumption of electricity in response to supply conditions, for example, having electricity customers reduce their consumption at critical times or in response to market conditions. (Internet)

Demand Side Programs: Energy demand management, also known as demand side management (DSM), is the modification of consumer demand for energy through various methods such as financial incentives and education. Usually, the goal of demand side management is to encourage the consumption reduction. (Internet)

Demobilization: Stand Down/Demobilization: Once incident goals and objectives have been achieved and/or a centralized District coordination presence is no longer required, the CMT implements the demobilization plan to transfer responsibilities to recovery assistance program oversight and monitoring. Following complete demobilization, responsibilities transition back to normal District agency. (2015 DRP)

Distributed Generation: Distributed generation, also called onsite generation, decentralized generation, generates electricity from many small energy sources connected to the distribution, rather than transmission, system. (Internet)
Emergency: As defined by the Stafford Act, an emergency is "any occasion or instance for which, in the determination of the president, federal assistance is needed to supplement state and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States." (2015 DRP)

Emergency Operations Center (EOC): The physical location at which the coordination of information and resources to support domestic incident management activities normally takes place. An EOC may be a temporary facility or may be in a more central or permanently established facility, perhaps at a higher level of organization within a jurisdiction. EOCs may be organized by major functional disciplines (e.g., fire, law enforcement, and medical services), by jurisdiction (e.g., federal, state, regional, county, city, tribal), or by some combination thereof. (2015 DRP)

Emergency Support Function (ESF): A grouping of government and certain private- sector capabilities into an organizational structure to provide the support, resources, program implementation, and services that are most likely to be needed to save lives, protect property and the environment, restore essential services and critical infrastructure, and help victims and communities return to normal, when feasible, following domestic incidents. The ESFs serve as the primary operational-level mechanism to aid state, local, and tribal governments or to federal departments and agencies conducting missions of primary federal responsibility. (2015 DRP)

Energy Disruptions-- Internal/Distribution: Internal/distribution disruptions are disruptions to the distribution system that prevent a sufficient energy supply from being delivered to the end user in the District. An internal/distribution disruption includes an equipment malfunction, power lines being down, or weather-related supply disruptions. (EAP 2012)

Energy Emergency (Pre-Event): Pre-Event Responsibilities: These include activities such as comprehensive energy planning, maintaining a current energy profile of the District, and planning and participating in emergency planning exercises. (EAP 2012)

Energy Emergency (Event): An emergency (including a fuel shortage emergency) may sever key energy infrastructure, thereby constraining supply in affected areas and adversely impacting adjacent areas, especially those with supply links to the directly affected areas. Such an incident has the potential to affect transportation, communications and other infrastructure necessary for sustaining public health and safety. Also, it could affect continuity of government as well as critical infrastructure within the District. (EAP 2012)

Post-Event Responsibilities: These relate to coordinating the process to develop "lessons learned" and to share those lessons. (EAP 2012)

Energy Profile: Monitoring the energy profile includes keeping track of 1) The drivers of energy supply, demand and prices, which include the trends in energy costs and expenditures: 2) The energy regulatory environment and the extent to which it supports energy assurance; 3) The energy market structure and the extent that it fosters or hinders energy assurance; and 4) the energy market structure comprises the number of suppliers and distributors. (EAP 2012)

Energy Sector- Industrial: An energy-consuming sector that consists of service-providing facilities and equipment of businesses; Federal, State, and local governments; and other private and public organizations, such as religious or social groups. The commercial sector includes institutional living quarters. It also includes sewage treatment facilities. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a wide variety of other equipment.

Note: This sector includes generators that produce electricity and/or thermal output primarily to support the activities of the above- mentioned commercial establishments. (EIA)

Energy Sector-Commercial: An energy-consuming sector that consists of all facilities and equipment used for producing, processing, or assembling goods. Overall energy use in this sector is largely for process heat and cooling and powering machinery, with lesser amounts used for facility heating, air conditioning, and lighting. Fossil fuels are used as raw material inputs to manufactured products. (EIA)

Energy (Electricity) Storage Systems: Electricity storage can be deployed throughout an electric power system—functioning as generation, transmission, distribution, or end-use assets—an advantage when it comes to providing local solutions to a variety of issues. Sometimes placing the right storage technology at a key location can alleviate a supply shortage situation, relieve congestion, defer transmission additions or substation upgrades, or postpone the need for new capacity. (EIA)

Energy Sector-Residential: An energy-consuming sector that consists of living quarters for private households. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a variety of other appliances. The residential sector excludes institutional living quarters. (EIA)

Energy Sector-Transportation: An energy-consuming sector that consists of all vehicles whose primary purpose is transporting people and/or goods from one physical location to another. Included are automobiles; trucks; buses; motorcycles; trains, subways, and other rail vehicles; aircraft; and ships, barges, and other waterborne vehicles. Vehicles whose primary purpose is not transportation (e.g., construction cranes and bulldozers, farming vehicles, and warehouse tractors and forklifts) are classified in the sector of their primary use. (EIA)

Energy Supply Tracking Disruption Plan (ESDTP): An ESDTP is utilized during an energy emergency event to track basic information regarding the duration and severity of the event and the response actions taken. Additionally, the ESDTP reports some measurement of the outcome in relation to the event. The ESDTP provides a process by which energy supply and demand information is monitored and analyzed on a regular basis. (EAP 2012)

Fuel cells: Fuel cells convert chemical energy into electricity. Fuel cells can be as large as a power plant, vehicles, or can be used to provide electricity to smaller devices, like a laptop computer. Fuel cells powered by hydrogen are more efficient, and cleaner than burning fossil fuels to create

electricity. The only emissions from hydrogen fuel cells are water and waste-heat. Fuel cells can also be powered by gas, or biogas (including biodiesel), which can be derived from organic waste. Over the past few years, corporations and municipalities have been installing renewable fuel cell systems to meet building energy needs, using the electric grid as a backup electricity supply, instead of a diesel generator. (EAP 2012)

Incident: An occurrence or event, natural or human caused that requires an emergency response to protect life or property. Incidents can, for example, include major disasters, emergencies, terrorist attacks, terrorist threats, wild land and urban fires, floods, hazardous materials spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, war-related disasters, public health and medical emergencies, and other occurrences requiring an emergency response. (2015 DRP)

kWh (kilowatt hours): The kilowatt hour, or kilowatt-hour, (symbol kW·h, kW h or kWh) is a unit of energy equal to 1000 watt hours. (Internet)

Major disaster: See "Emergency" and "Energy Emergency"

Management decisions: The 2011 DRP identifies responsibility for management decisions in case of an emergency. The DRP places management decisions for an energy emergency in ESF #12—Energy. ESF #12 outlines the concept of operations and the incident life cycle. There are three types of management decisions in which DOEE must participate. Decisions must be made on 1) The nature of an event; 2) Measures to implement; and 3) Types of support needed. (EAP 2012)

Measures: In the event of an energy shortage or disruption, District Government personnel refer to three broad categories of measures that can be implemented— demand reduction measures, supplier/distributor support measures, and user/consumer support measures. (EAP 2012)

Microgrids: A microgrid allows a section of the city to operate independently from the central electricity grid in the District during an energy emergency. Microgrids can rely on their own power sources (e.g., renewable systems), and combined heat and power (CHP) systems. CHP systems recycle waste heat to create energy. (EAP 2012)

MW (megawatts): The megawatt is equal to one million watts.

Operational levels: The 2011 DRP outlines five operation levels to classify the estimated impact of an emergency event on the operations of the District Government. HSEMA has lead Operation Level 1 – Normal. Operation Level 2 – Guarded. Operation Level 3 – Elevated. Operation Level 4 – High Risk. Operation Level 5 – Severe Risk responsibility in making an initial determination of emergency event impact. (DRP)

Renewable energy: Unlike fossil fuels, which are exhaustible, renewable energy sources regenerate and can be sustained indefinitely. The five renewable sources used most often are: 1) Biomass — including: (wood and wood waste, municipal solid waste, landfill gas and biogas, ethanol, and biodiesel; 2) Water (hydropower); 3) Geothermal; 4) Wind; 5) Solar. (EIA)

Resilience: US DOE defines resiliency as “the ability to respond effectively to an energy emergency and to recover quickly from damage.” Resiliency is enhanced with an effective EAP that will help restore energy services quickly following an energy disruption. Identifying critical infrastructure facilities and developing a plan to protect these facilities from threats and vulnerabilities during an energy emergency are key steps towards successfully building this resiliency. (EAP 2012)

Response: Activities that address the short-term, direct effects of an incident. Response includes immediate actions to save lives, protect property, and meet basic human needs. Response also includes the execution of emergency operations plans and of incident mitigation activities designed to limit the loss of life, personal injury, property damage, and other unfavorable outcomes. (2015 DRP)

Situational awareness: Situational awareness is the ability to identify, process, and comprehend the critical elements of what is happening as an event unfolds. From the CMT perspective, this means knowing where emergency needs are greatest; what assets are needed; how to get assets into areas where they are needed; and what the status of assets are as they move on-scene and perform actions. (EAP 2012)

Smart grid: "Smart grid" generally refers to a class of technology people are using to bring utility electricity delivery systems into the 21st century, using computer-based remote control and automation. These systems are made possible by two-way communication technology and computer processing that has been used for decades in other industries. (DOE)

Stand down: Once incident goals and objectives have been achieved, and/or a centralized District coordination presence is no longer required, the CMT implements the demobilization plan. This action will transfer responsibilities to recovery assistance for program oversight and monitoring. Following complete demobilization, responsibilities shift back to individual agencies' District offices. (EAP 2012)

Sustainable DC: The Mayor's Sustainability Vision/Plan is the overarching guide to improving energy efficiency. The Mayor's Vision is for DC to become the most sustainable city in the country, the District has drafted an ambitious, yet achievable, vision that creates the framework to become a healthier, cleaner and greener city. This vision creates a better tomorrow by focusing on social equity, economic competitiveness and environmental quality.

Therm: See "BTU"