Energy Assurance Plan
2018 - 2022

The Department of Energy and Environment

DEPARTMENT
OF ENERGY &
ENVIRONMENT

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Table of Contents

List of Figures

List of Acronyms

API	American Petroleum Institute
BLS	Bureau of Labor Statistics
CIP	Critical Infrastructure Protection
CMT	Consequence Management Team
CUB	DC 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

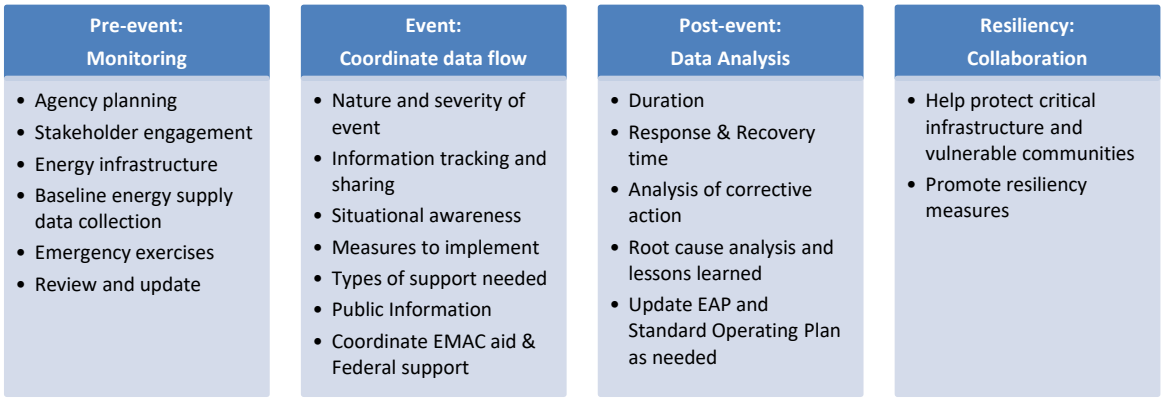
MPD	DC Metropolitan Police Department
MWCOG	Metropolitan Washington Council of Governments
NASEO	National Association of State Energy Officials
NCP	National Contingency Plan
NCR	National Capital Region
NDA	Non-Disclosure Agreement
NRP	National Response Plan
OC/EOM	Office of Communications/Executive Office 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	U.S. Army Corps of Engineers
USCG	United States Coast Guard
WASA	DC Water and Sewer Authority (a.k.a. DC Water)
WMDA	Washington, Maryland, Delaware Service Station and Automotive Repair Association
WebEOC	Web Emergency Operations Center

1 Executive Summary

The Energy Assurance Plan of the District of Columbia 2018-2022 (EAP) updates the District's 2012 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 as described in the 2012 plan. This role has been modified for DOEE recently, as the electric and natural 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.

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

Figure 1. DOEE's Roles as Emergency Support Function #12-Energy



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. **Resiliency Responsibilities:** These relate 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.

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 resiliency of the District's energy systems to reduce vulnerabilities. This section provides the basic guide for what DOEE and other Emergency Support Function (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?

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 the 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)

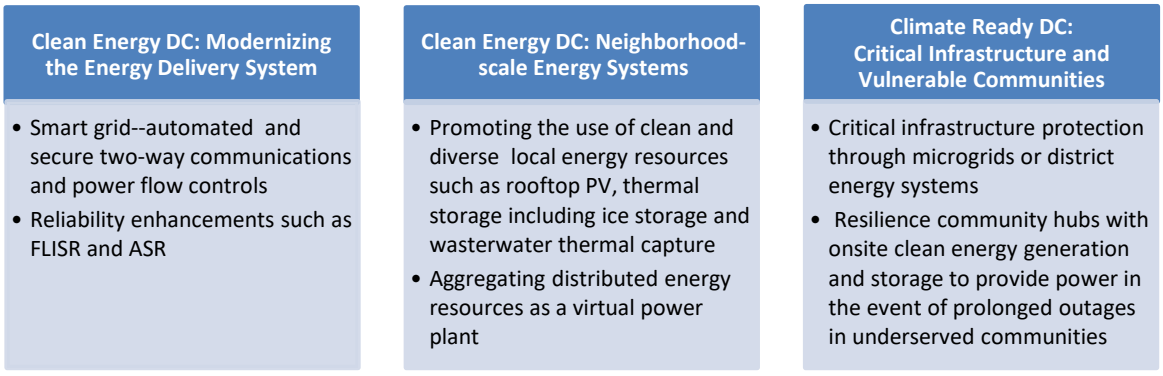
The ESDTP provides a process by which energy supply and demand information is monitored and analyzed regularly.

Section 5: Resiliency

One of the major goals of the Sustainable DC Plan is to promote the resiliency of the energy systems in the District. DOEE's ongoing activities to enhance the resiliency of the District's energy systems include (1) modernizing the District's energy delivery system; (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. The EA is also assisting DOEE's Urban Sustainability Administration's 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).

Figure 2. EA's Role in Promoting Resiliency



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 system 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, in particular 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 2015 DRP. The DRP links the District emergencies to responses by agencies of the District Government and its federal and regional partners.

The 2012 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 situation. Subsequent to the 2012 EAP and the 2015 DRP, 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 in particular, 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 the key component of this update to the District's Energy Assurance Plan.

In addition to this interface role, DOEE is responsible for promoting the resiliency of the District's energy system. Section 5 of this EAP includes a description of the steps the District has taken to increase resiliency.

In the past, DOEE's role in energy emergency planning has been centered on operations. Since the 2005 EAP, DOEE's role has shifted to facilitating and coordinating the flow of information during energy events and emergencies. This update follows the National Association of State Energy Officials' (NASEO) 2009 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 2015 DRP.

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 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 work with the energy providers to ensure that the EAP contains adequate cyber security measures to reduce vulnerability from cyberattacks.
- Develop relationships and maintain regular communication with both internal and external partners who would 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 resiliency 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 an 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.

Figure 3. Energy Sources in the District of Columbia

Type of Energy	Percentage of Total
Electricity	41%
Natural Gas	31%
Gasoline	24%
Fuel oil and Diesel	4%
Total	**100.0%**

Source: Clean Energy DC 2017

Based on 2017 site energy data from DOEE's Clean Energy DC, within the geographical boundaries of the District, electricity comprised 41% of the energy consumed; natural gas, 31%; and petroleum, 24%.

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 a 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 (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.

Petroleum, Diesel, and Fuel Oil

As of 2017, fuel oil, diesel, and gasoline constituted 28% of the District of Colombia's total energy consumption. Petroleum is used in the District for transportation fuel (gasoline and diesel) and heating. The breakdown of uses is 24 % Gasoline and 4% Fuel oil and Diesel.

Gasoline	**Distillate** (Diesel Fuel & Heating Oil)
3.8 million barrels	1 million barrels

Federal data for 2016 reveal that the District's annual petroleum consumption is 3.8 million barrels; 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 Natural Gas Supply Chain

Natural gas is supplied to the District by a single distribution utility, Washington Gas. Natural gas accounted for 31% of total energy consumption in 2017 Natural gas provides heat for 57% of homes in the District.

Figure 4. Natural Gas Consumption in 2015

Sector	Consumption
Residential	13.5 billion cubic feet
Commercial	17.1 billion cubic feet
Vehicle fuel	0.812 billion cubic feet
TOTAL	**31.4 billion cubic feet**

Source: EIA, State Data Systems, District of Columbia

2.2.3 Brief Description of Electricity Supply Chain

The District buys most of its electricity from outside the District, except for a small portion of electricity generated from customer-owned solar photovoltaic systems connected to the distribution grid. 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 comprises 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 more prone to outages than other energy forms. These considerations have necessitated redundant assets including personnel, trucks, and other resources, that are provided by pooling assets over a wide geographic region in order to respond to prolonged outages and disruptions. This asset sharing is coordinated on the basis of meeting a rapidly changing, instantaneous demand. The electric delivery system is regulated and coordinated at the federal, regional, state, and local level.

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, 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 a number of 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

Figure 5. Types of Energy Emergencies

Types of Energy Emergencies	
Supply Disruptions (Shortage)/ External	The District, except for a small amount of solar and co-generation, imports all of its energy. Major potential supply disruptions, or delivery disruptions, may occur to the system delivering energy to the District. 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.

2.3.3 Past Energy Disruptions in the District of Columbia

Since the energy crisis of the 1970s, the District has experienced each type of energy emergency. For the District, weather-related events have been the major sources of disruption of electricity. In 2010, major snowstorms in February and major thunderstorms in July significantly interrupted electricity. While Hurricane Katrina in 2005 and the BP Oil Spill in 2010 had the potential to disrupt the flow of natural gas and petroleum, 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 the reliability challenges of Pepco. 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 resiliency of the electricity grid in the District. More information about this event is presented in Section 5.6.2.

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 emergency response in the nation's capital. HSEMA is responsible for developing and maintaining a comprehensive emergency management plan and establishing emergency management training and exercise programs to sustain a cadre of well-trained emergency personnel to prepare for and respond to an emergency or major disaster.

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

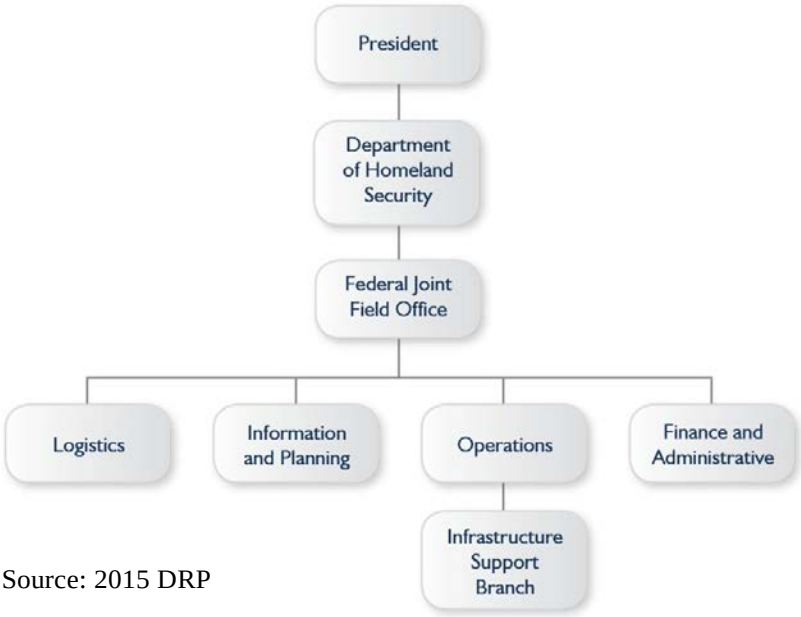
The 2015 District Response Plan designates DOEE as the lead agency for Emergency Support Function (ESF) #12-Energy. As the lead agency, DOEE is expected to coordinate with supporting agencies to monitor and manage the efficient use of energy and fuel supplies, and work with private sector partners to 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.

2.4.1 Legal Authorities, Roles, & Responsibilities

The 2015 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 2015 DRP and incorporates the guidelines identified in the DRP for ESF #12.

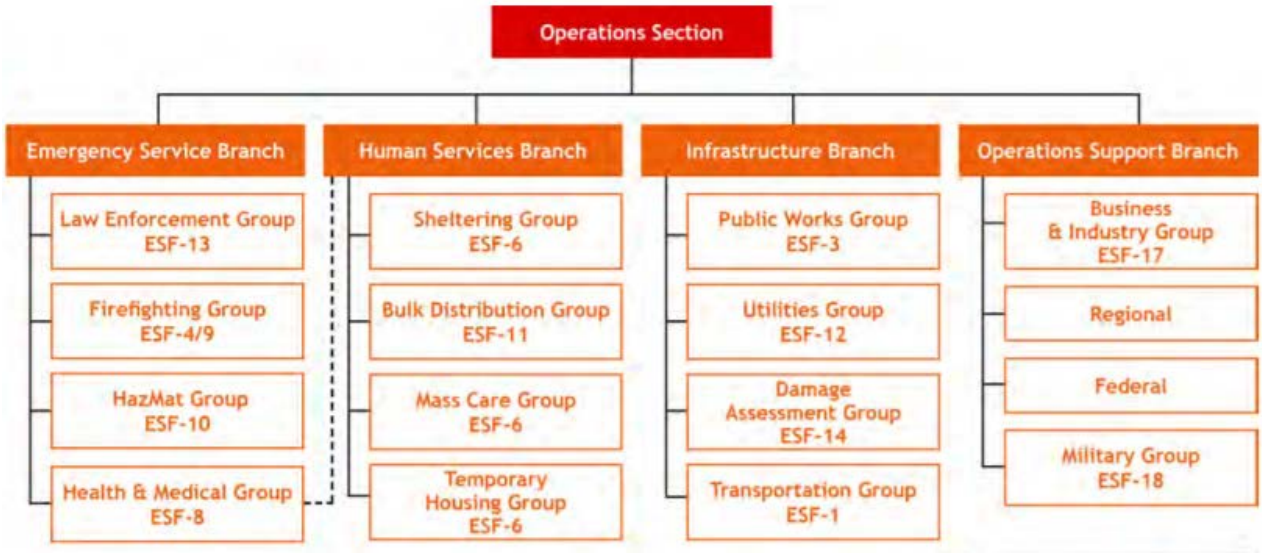
The authorities, roles, and responsibilities flow from the federal level, starting with the President of the United States (See Figure 6 and Figure 7), to the Mayor of the District, to the Agencies in the District (See Figure 8).

Figure 6. Incident Command: Federal



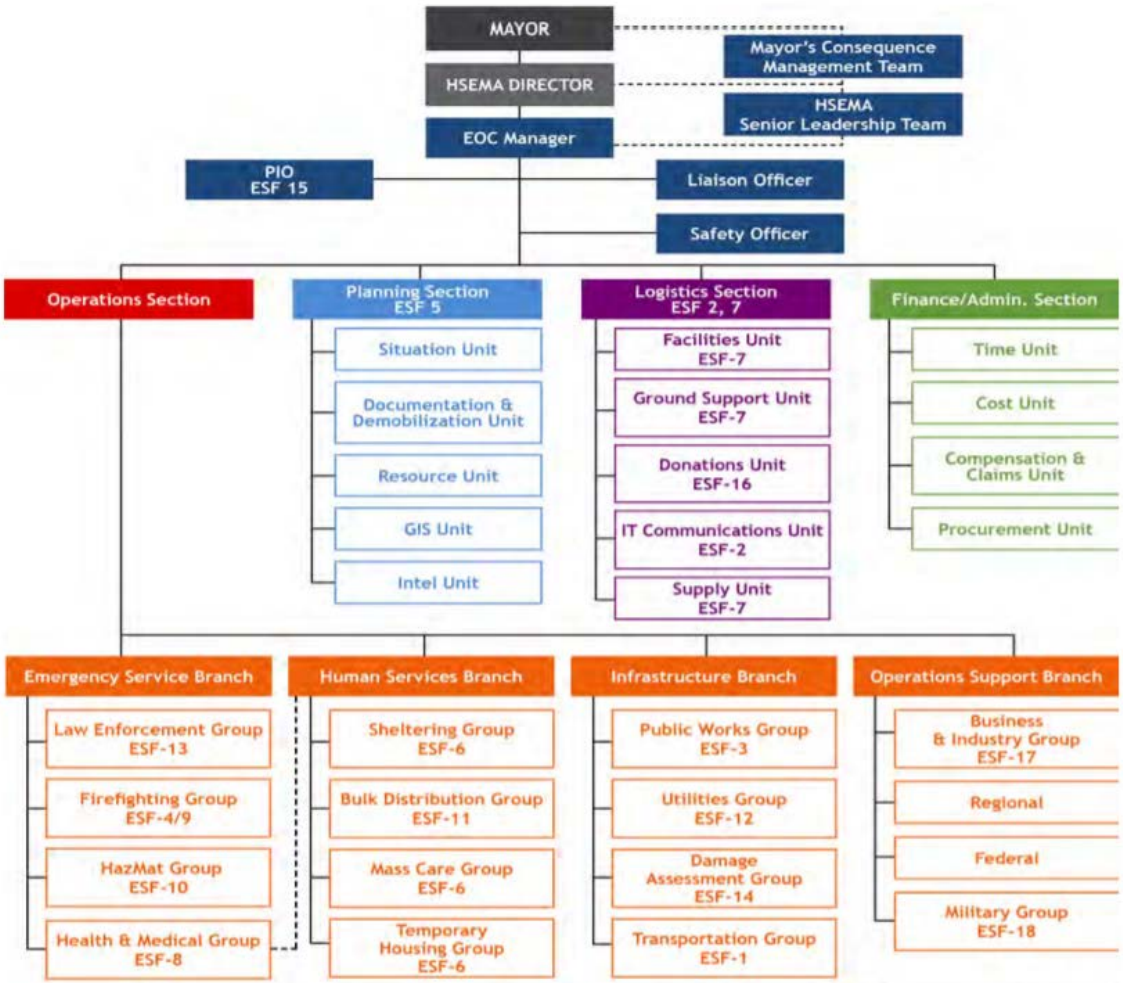
Source: 2015 DRP

Figure 7. Federal Joint Field Command



Source: 2015 DRP

Figure 8. Incident Command: District of Columbia



Source: 2015 DRP

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 District assets, and mitigate the impact of an emergency or disaster.

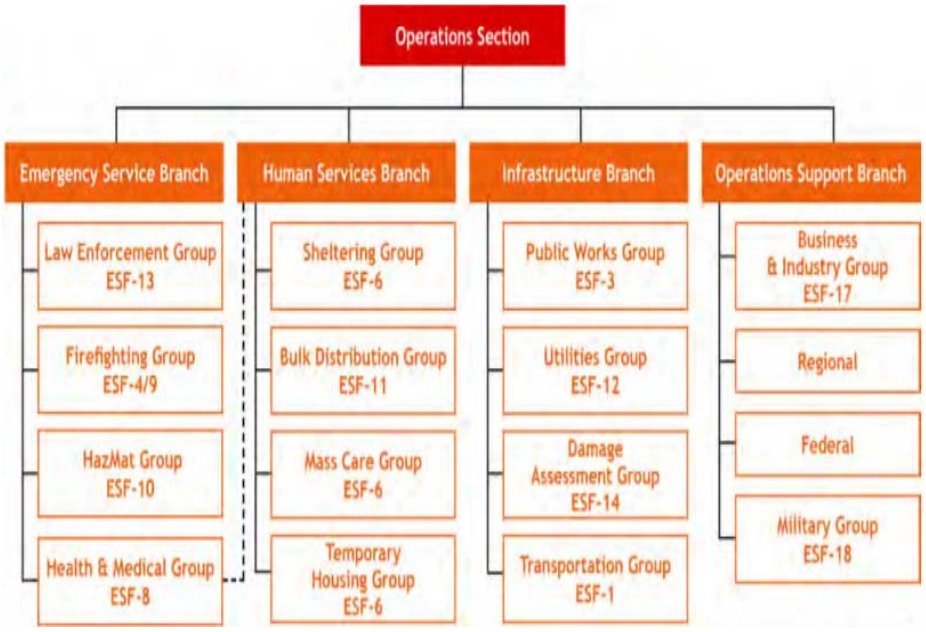
Figure 9. Other Applicable Documents

Title of Applicable Documents and Plan	Date of Plan
District Response Plan (DRP)	January 2015
Energy Assurance Plan (EAP)	December 2018
DPW Fuel Station Emergency Operations Plan	December 2017
Clean Energy DC	August 2018
Climate Ready DC	November 2016

The DRP links District emergencies to responses by agencies of the District Government and

its federal and regional partners. This EAP fits within the DRP's operational concept.

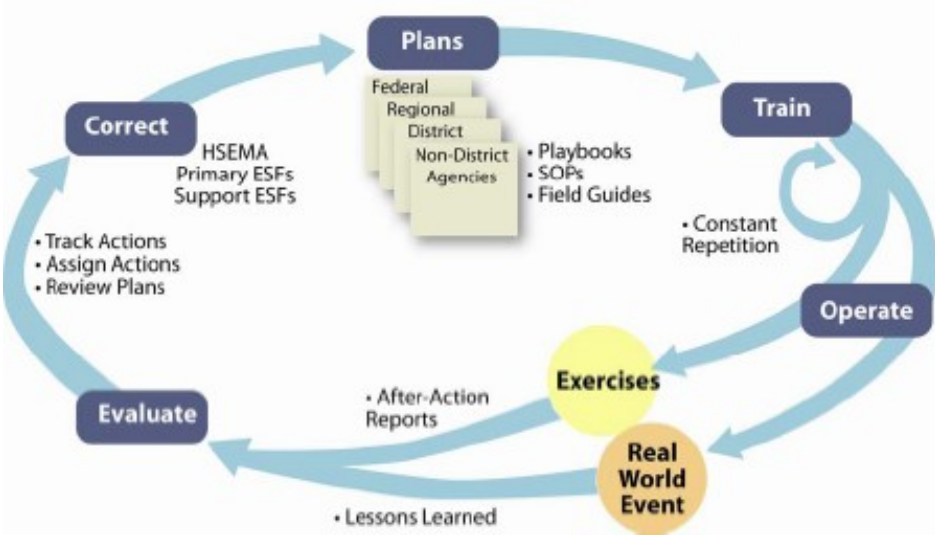
Figure 10. HSEMA Operations Section



Source: 2015 DRP

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 corrected. Likewise, after a real-world event, this EAP will be evaluated and corrected.

Figure 11. DRP Operational Concept



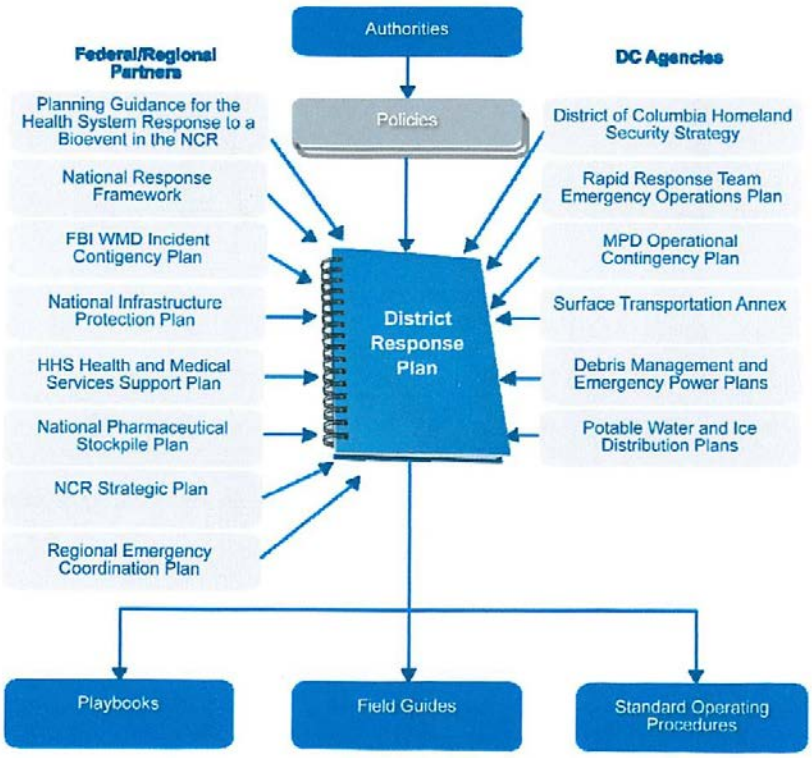
Source: 2015 DRP

While the DRP focuses on the coordination and capabilities of District Government agencies, the plan also recognizes limitations with actions 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 12. Relationships of the DRP to Other Plans



Source: 2015 DRP

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 for providing assistance 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 2015 DRP. The DRP may be used in conjunction with partner state and local plans, federal emergency operational plans developed under statutory authorities, and Memoranda of Understanding (MOU) among various federal agencies.

The DRP may be implemented concurrently with a number of federal and regional emergency operation plans (e.g., the National Contingency Plan (NCP) 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 agency's emergency response roles and responsibilities.

2.4.3 DOEE's Roles as Outlined in the 2015 DRP

The DRP is modeled on the National Response Plan (NRP). The NRP organizes agencies into functional groups called Emergency Support Functions or "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 energy. The 2015 DRP identifies DOEE as the lead for ESF #12. Each lead ESF also provides support to other ESF leads.

Figure 13. DOEE's ESF #12 and Support Functions

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. The 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 system outages/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	Will coordinate with ESF #2 to help facilitate the restoration of energy systems and fuel supplies following an emergency.
#3	Communications	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.

Source: 2015 DRP

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 provides 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 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, the media, and other involved organizations through the Office of Communications, Executive Office of the Mayor (EOM) to ensure accurate, consistent, timely, and reliable information.
#17	Private Sector Coordination	DOEE will assist in ensuring energy needs are met for long-term recovery efforts and advise on environmental impacts of long-term recovery efforts. DOEE will also plan for and provide technical assistance for contaminated debris management and environmental remediation, in coordination with impacted ESF #17 stakeholders.

Source: 2015 DRP

2.4.4 DOEE's Roles & Responsibilities At-A-Glance

The DRP places management decisions for an energy emergency under ESF #12—Energy and describes 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 is expected to provide situational awareness to the Consequence Management Team (CMT) about the impact of an emergency event on energy systems 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. This is a greater role from previous iterations of the DRP when DOEE was a supporting agency primarily focused on sending requested information to lead agencies and to HSEMA.

In the case of an emergency 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. DOEE will use the framework of its Energy Supply Disruption Tracking Plan or "ESDTP."

ESF #12 - Energy gathers, assesses, and shares information on energy system damage (includes fuel, heating oil, natural gas, propone, etc.) and estimates the impact of energy system outages/shortages within the District of Columbia. 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:

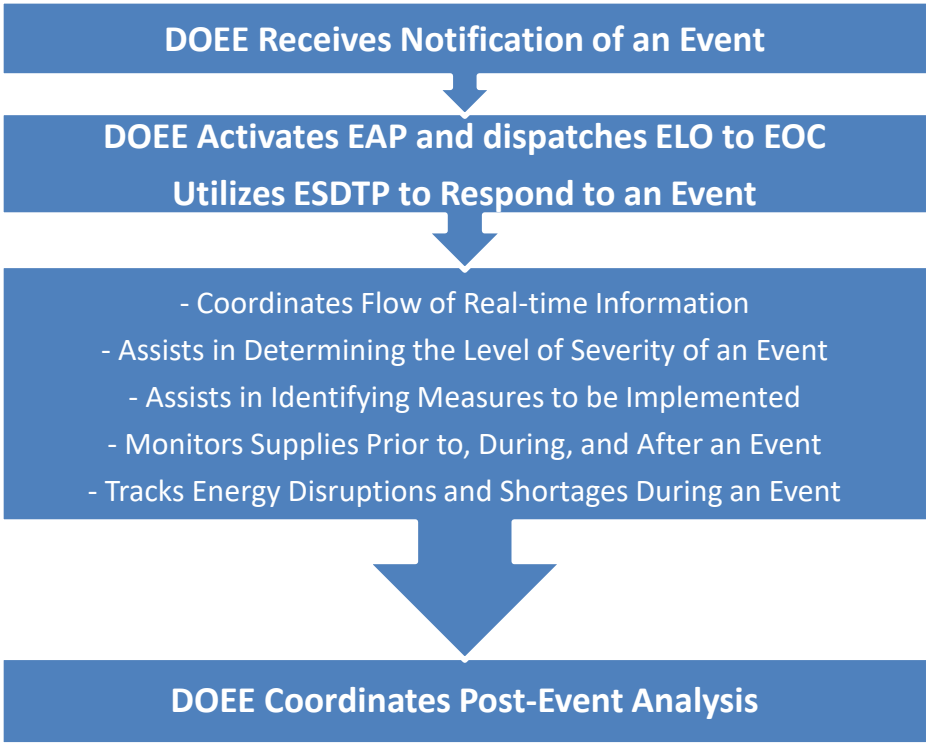
- Coordinate information flow
- Assist in determining the level of event severity
- Assist in identifying measures to be implemented
- Monitor energy supply prior during the event
- Conduct follow-ups after the event

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

- Track information during the event
- Provide situational awareness of the event
- Assist in developing management decisions to respond to the event

The purpose of this ESF 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.

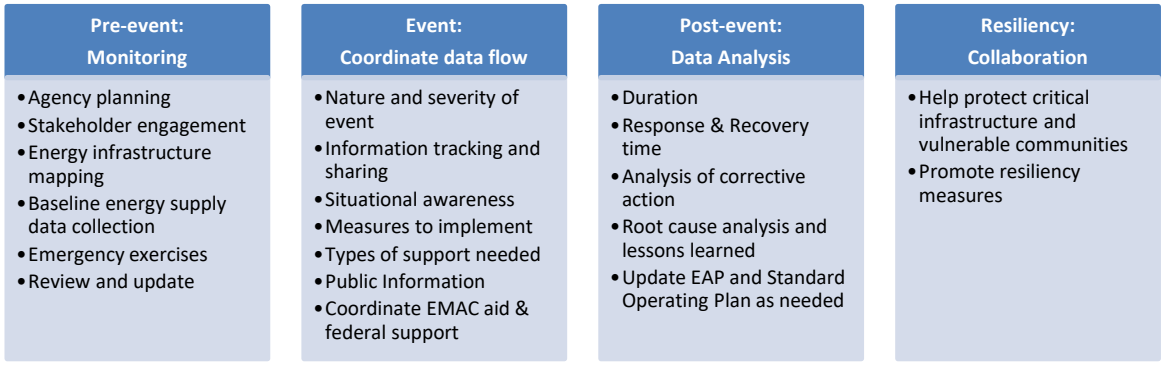
Figure 14. DOEE's Roles & Responsibilities At-A-Glance



DOEE's responsibilities fall into four broad categories:

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 15. DOEE's Roles & Responsibilities



Considering the patterns of energy supply in the District, the first responders to an energy supply disruption will be the energy suppliers and distributors. It is important for the District to have a structure in place 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 resiliency against energy disruptions and supply shortages

Given the above conditions, the role of DOEE in an energy emergency is circumscribed. DOEE will:

1. Coordinate information gathered from external sources. The District will use its tracking and assessing 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. 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.
4. Use the tracking and assessment plan to monitor and share information that the CMT, Mayor, and the public need to know during and after an energy disruption.
5. 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.
6. Use energy programs to promote energy resiliency.
7. Review, exercise, and re-evaluate existing plans, policies, and procedures.

2.5 How Will DOEE Respond to an Energy Emergency?

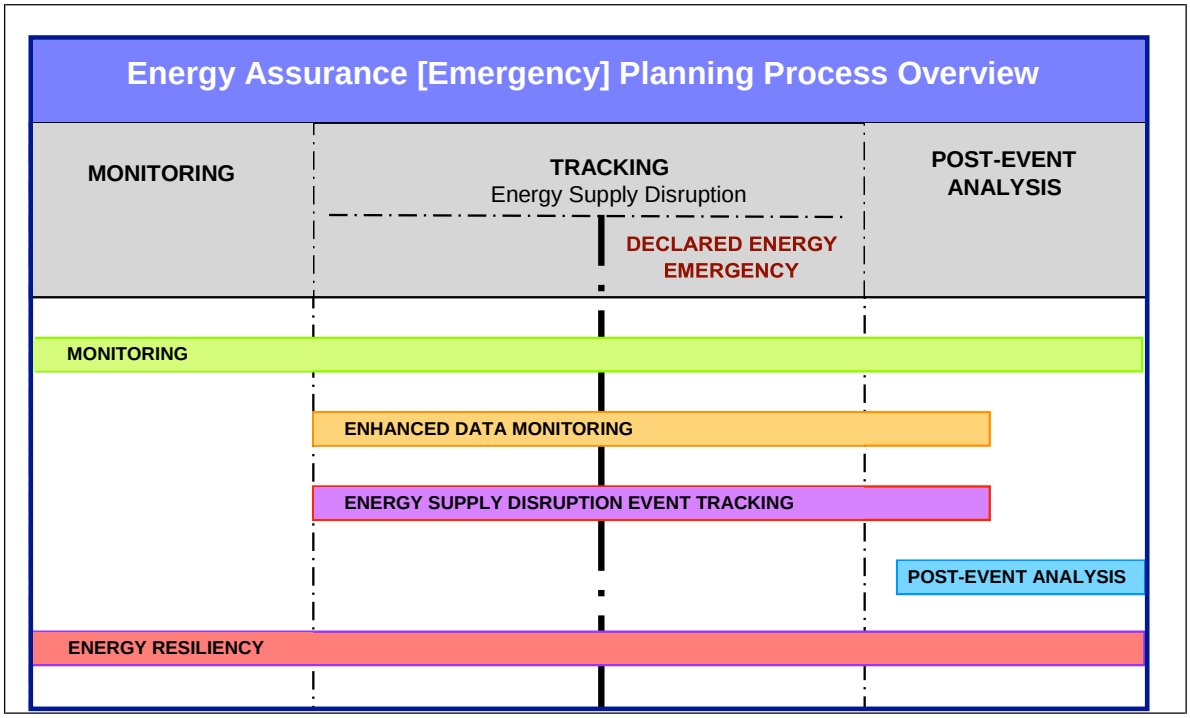
In the event of an energy emergency, DOEE will:

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

2.5.1 Tracking Information during an 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 of evolving conditions during and immediately following an emergency. 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. Figure 16 below shows the overall energy assurance planning process which includes ongoing monitoring of energy supplies and building the resiliency of the District energy infrastructure. In an emergency, this process switches from collecting and tracking real-time data during an event to post-event analysis and developing lessons learned.

Figure 16. Planning Process Overview



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. Previously, DPW had reported such information directly to the emergency operations center at HSEMA, but DOEE's new role as the ESF #12 lead precipitated the need for DPW to share such information with DOEE. Based on preliminary discussions with the supporting agency, all indications are that DPW is prepared to share such information. As such, DOEE will work to establish a mutually agreeable schedule for sharing such information, and if necessary, refine the specific data points that DOEE would need about fuel supplies at DPW facilities.

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 may explore the option of entering into Non-Disclose

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

At a minimum, DOEE will map the locations of public fuel facilities and local fuel retailers. Mapping will reveal which District fuel facilities and private retailers could be impacted by a major flood event. DOEE could conduct a vulnerability assessment to predict the impact of a flood event on these facilities and take measures to ensure that fuel from these stations do not leak into ground water or into the river system. DOEE will also pursue uploading retailer location information into DOEE's incident management tracking system named "Cobra." Pre-event, DOEE will evaluate whether this system could be used to collect baseline data on fuel tank capacity, average fuel supplies, and whether a station has an alternate source of power. 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 for fuel retailers to report their operational status or if they run out of gasoline and diesel.

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 normally contain the information shown in Figure 17.

Figure 17. DOEE's Energy Supply Disruption Tracking Log Example

Time and date of each entry	2:00 PM April 28, 2011 (examples only)
Name of person making the entry	Jane E. Wind (examples only)
Source of information	EIA, Pepco, US DOE, Washington Gas (possible sources as examples)
Type of disruption	Supply Disruptions (Shortage)/External
Start date of disruption	April 26, 2011
Duration to date	April 28, 2011
Estimated Recovery Amount (prior estimate and current estimate)	25,000 gallons and 15,000 gallons
End date of disruption	July 10, 2011
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, 2011
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, 2011

2.5.2 Providing Situational Awareness by Coordinating Information Flows

Situational awareness is the ability to identify, process, and comprehend the critical elements of what is happening as an event unfolds. From the Consequence Management Team 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.

Under the DRP, HSEMA is the lead agency for ESF #5, Emergency Management, which coordinates emergency response planning by analyzing, and processing information through the CMT. DOEE is the lead agency for ESF #12-Energy, which is responsible for collecting and tracking real-time data, coordinating the flow of information, and disseminating information to create situational awareness. In this role, DOEE will serve as the focal point for receiving reports from supporting District agencies on damage to energy supply and distribution systems.

One of the support agencies for ESF #12 is the D.C. 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, as 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 is the D.C. 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 new ESF #12 lead agency, 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 ultimately to 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 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 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.

2.5.2.1 Situational Awareness

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.

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 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.

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 a large number of 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.

During and immediately following the event, DOEE will:

- 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 D.C. to report:
    - The operational status of their gas station (no electricity to operate);
    - Any damage sustained during the emergency event;

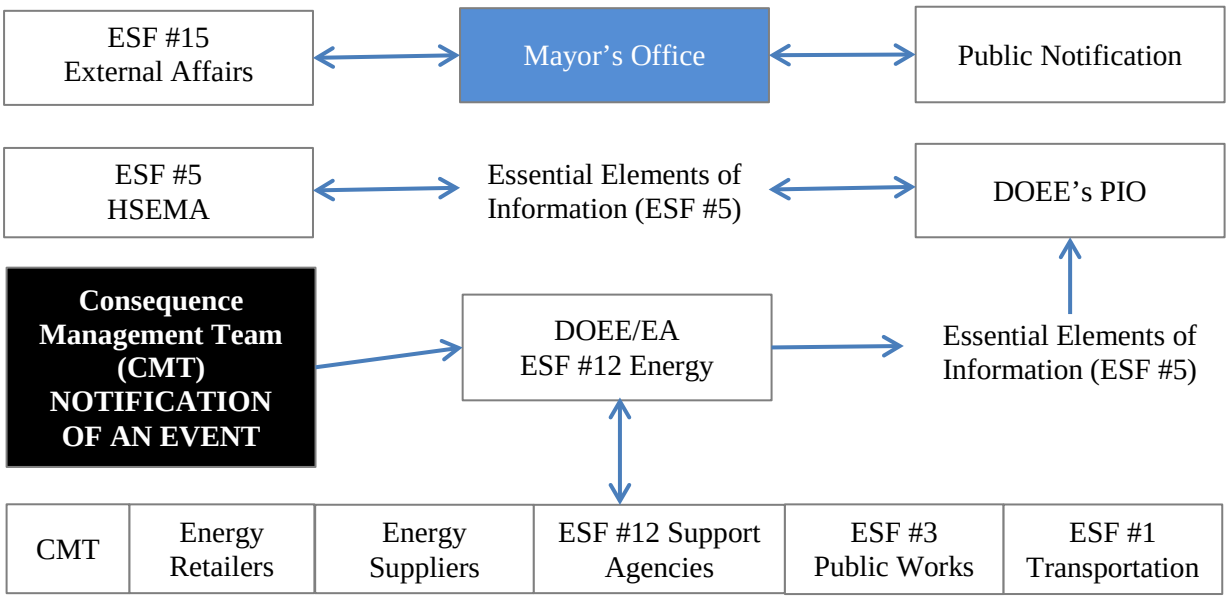
- Estimated available fuel supplies by fuel type (unleaded vs. diesel);
- Any incidents of fuel leaking out of fuel tanks; and
- If the gas station runs out of fuel.

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 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.

Figure 18. Essential Elements of Information Coordinated By ESF #12

1. Status of fuel transportation systems/corridors	11. Historical and demographic information
2. Status of key personnel	12. Status of energy systems
3. Major issues/activities of ESFs	13. Status and analysis of initial assessments (needs assessments and damage assessments, including preliminary damage assessments)
4. Resource shortfalls	
5. Overall priorities for response	
6. Status of upcoming events	
7. Location of the impacted area	14. Status of efforts under federal emergency operations plans
8. Social and economic impacts	
9. Jurisdictional boundaries involved	15. Injuries and medical emergencies
10. Status of ESF activation	16. Logistical problems
Source: 2015 DRP	

Figure 19. DOEE Providing Situational Awareness



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

External partners include a complex set of industry stakeholders who 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.

Figure 20. DOEE Coordinating Flow of Information

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

2.5.2.3 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.

2.5.2.4 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.

2.5.3 Decisions Regarding the Nature of an Event

Figure 21. Management Decisions

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

The 2015 DRP outlines five operation levels to classify the estimated impact of an emergency event on the operations of the District Government. HSEMA has lead responsibility in making an initial determination of emergency event impact. DOEE will work with HSEMA to determine operation levels and the extent to which they have to be modified throughout an incident cycle.

Figure 22. District Response Plan's Operation Levels

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 situation while still ensuring readiness. During the course of normal operations, agencies are engaged in preparedness, training, exercise activities, and maintaining resource activities to ensure continual readiness. Operations 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 would need to take action 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.

Source: 2015 DRP

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.

2.5.4 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.

Figure 23. DOEE's Coordinating Types of 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 & generators) • Supplies (e.g., ice, sandbags)

2.5.5 Voluntary Demand Reduction Measures

The District Government may appeal to the public to implement voluntary demand reduction measures.

Figure 24. Voluntary Measures by fuel type

Electric 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

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

Natural Gas Shortage

Encourage customers to:
- Reduce indoor heated space temperature
- Reduce hot water temperature
- Reduce operating hours

Natural 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

2.5.6 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.

Figure 25. Mandatory Measures

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

Natural 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 natural 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

2.5.7 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.

Figure 26. Supplier/Distributor Support Measures

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

Figure 27. User/Consumer Support Measures

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.

2.6 Follow-up to be Conducted after 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 by the District, supply chain participants, end users, and the public.
- Determination of root cause 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 Resiliency of Energy Systems in the District

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

Resiliency defined: The U.S. Department of Energy (DOE) defines resiliency as "the ability to respond effectively to an energy emergency and to recover quickly from damage."[1]

Developing a plan to increase resiliency 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 resiliency of its energy systems.

Additionally, DOEE will explore placing microgrids or solar panels on top of gas station

[1]https://energy.gov/sites/prod/files/Enabling_States_and_Localities_to_Improve_Energy_Assurance_and_Resiliency_Planning.pdf.

canopies could provide a source of electrical power to operate pumps in order to build resiliency against 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 alternate power source.

DOEE has experience with installing microgrids within the District and has conducted preliminary research on solar companies and available technologies for adding solar panels to the top of gas station canopies. DOEE has found that there are a number of companies with the capabilities and prior experience to manufacturer and install solar panels on top of these canopies. Price quotes were not readily available, but it is a strategy that DOEE will explore further in cooperation with DPW. 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 resiliency of the District and could potentially protect private retailers against fuel disruptions.

DOEE has undertaken additional resiliency efforts through its various strategic plans. Clean Energy DC, the District's comprehensive energy and climate action plan, outlines the roadmap for modernizing the energy delivery system for greater resiliency, efficiency, and sustainability. Climate Ready DC, 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 resiliency planning and program implementation.

Resiliency is enhanced with an effective EAP that will help restore energy services quickly following an energy disruption. Key steps are (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 resiliency capabilities of these facilities and communities.

2.7.1 OnGoing Monitoring

DOEE's ongoing monitoring activities include the following:

1. Comprehensive energy planning.
2. Promoting programs to enhance the resiliency of the District's energy systems.
3. 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.
4. 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.

5. Updating the District's energy profile.
6. Continuing to keep abreast of the activities of the Metropolitan Washington Council of Governments (MWCOG) National Capital Region (NCR) Critical Infrastructure Protection (CIP) Working Group.
7. Keeping abreast of 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.[2]
8. Periodically incorporating additional best practices and lessons learned from energy emergencies into the EAP as needed.
9. Monitoring the progress of Pepco's installation of smart grid technologies and cyber security efforts.
10. Researching the potential for creation of microgrids in the District and review the potential for energy storage solutions.
11. 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.
12. 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.
13. Remaining aware 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 taking leadership on the modernization 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 resiliency audits for vulnerable communities and critical infrastructure.
- Studying opportunities to develop microgrids and retrofit district energy systems.

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

[2] 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/

2.7.3 Protecting Critical Infrastructure

A working group comprised of District agencies, including DOEE, is responsible for maintaining the list of critical facilities and key resources in the District. The group helps ensure that critical infrastructure is protected and that restoration priority for critical facilities is set before an energy emergency occurs. 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 Energy Assurance Plan. In addition, DOEE continues to support the development of microgrids to enhance the resiliency of critical infrastructure.

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:

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

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.

Figure 28. Information Monitored

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

Figure 29. Key Findings

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's demand for electricity continues to be the major driver of energy usage in the District.
2	Energy Supply	In 2015, the District imported over 99% of its energy. Electricity comprised 41.0% of the energy consumed; natural gas, 31.0%, and petroleum 26.0%.[3] With restructuring, both Pepco and Washington Gas are energy distributors in the District. There are many available suppliers in the District for electricity, natural gas, and petroleum.[4]
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 2015, there were 513,002 jobs in the District. The Government sector accounted for 30% of the jobs in 2017. The Leisure & Hospitality Sector accounted for 81,000 jobs or 10% of the total jobs. DC Water and the Washington Metropolitan Area Transit Authority (WMATA) were also large energy users.
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.
6	Demographic	**Income:** In 2016, the District had an annual median family income of $72,935 (in 2016 dollars), while the national median was $59,039. However, recent data shows that the District, in 2016, had an average poverty rate of 18.6%, which is above the national average of 12.7%.[5] Although middle- and upper-income households constitute the largest components of the residential sector, the District has a large number of 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 (2016 estimate) indicates the District population is 681,170[6], and it is expected to grow steadily over the next decade. **Employment:** As of 2015, there were approximately 513,002 jobs.[7]

3.1 Energy Demand in the District

3.1.1 Income and Population

[3] From Clean Energy DC data
[4] https://www.dcpsc.org/getattachment/962d418b-6e50-4066-a5ba-bbb3c6a327c9/2016-Annual-Report.aspx
[5] https://www.census.gov/library/publications/2017/demo/p60-259.html
[6] https://www.bea.gov/regional/bearfacts/pdf.cfm?fips=11000&areatype=STATE&geotype=3
[7] https://www.census.gov/quickfacts/fact/table/DC/BZA110215#viewtop

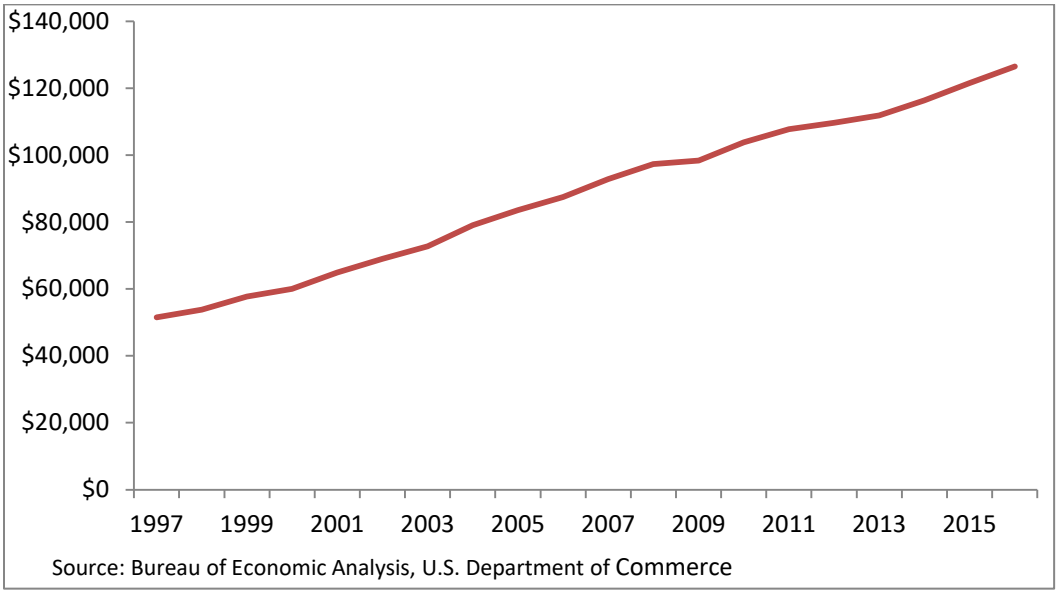
In general, the District is experiencing stable growth in the local economy, homeownership rates, per capita income levels, and expanded office construction. The District population continues to increase, while District-wide energy consumption remained relatively steady.

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 1997-2016. 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. Between 2006 and 2016, the compound annual growth rate for DC GSP was 1.6%.[8]

In 2016, Census data for the District reported an annual median family income of $72,935 (in 2016 dollars). This figure was higher than the national median of $59,039. Still, recent data shows that the District had an average poverty rate of 18.6% in 2016, which is above the national average of 12.7%. 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 30. Gross State Product for the District of Columbia



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 2016 indicates the District population is 681,170.[9] In 2015, the District provided 513,002 jobs.

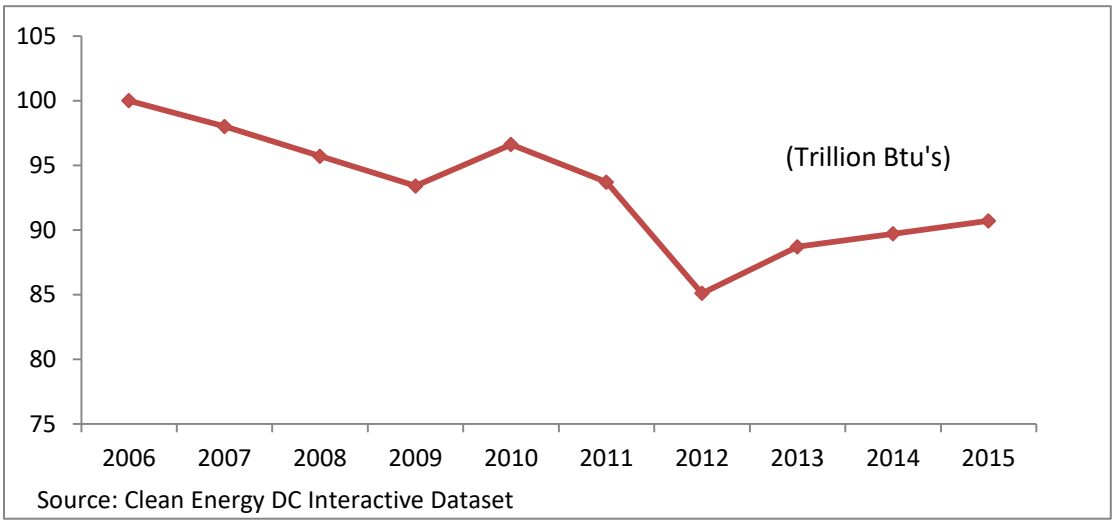
[8] https://www.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=10&isuri=1&7003=200&7035=-1&7004=naics&7005=-1&7006=11000&7036=-1&7001=1200&7002=1&7090=70&7007=-1&7093=levels
[9] http://planning.dc.gov/DC/Planning/DC+Data+and+Maps/DC+Data/Tables/Data+by+Topic/Population/

3.2 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 through the use of coal, natural gas, and petroleum products. In 2015, the electricity grid mix consisted of the use of nuclear, natural 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.[10] However, the District has spent less money for energy per person in the last 5 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.[11] 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.[12]

Figure 31. Energy Consumption in the District of Columbia



3.2.1 Usage by Sector

Residential Sector: Residential energy consumption accounts for approximately 27% of total energy use in the District. Fewer than 2% of District households heat with fuel oil.

Washington+Metropolitan+Statistical+Area+Population+1900+to+2009; http://planning.dc.gov/DC/Planning/About+Planning/News+Room/District+Population+Tops+600,000.

[10] https://www.eia.gov/electricity/data/browser/

[11] https://www.eia.gov/state/seds/archive/seper2015.pdf

[12] https://www.eia.gov/state/seds/archive/seds2015.pdf

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

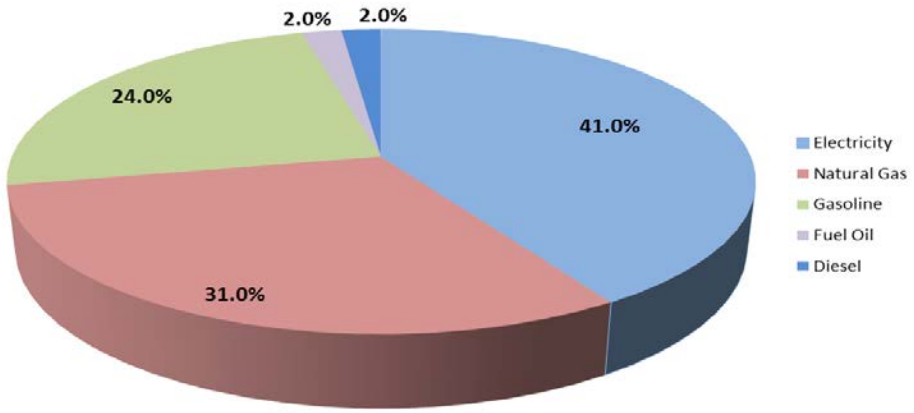
1. Continued increases in residential electricity and natural gas consumption in both single-family and multi-family dwellings will be driven by population increases in the District.
2. Projected increases in the residential population resulting from and causing new single- and multi-family housing to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

Commercial and Industrial Sector: Commercial energy use accounts for approximately 46% of all energy use in the District and an estimated 12-15% of petroleum consumption, which includes a small amount of chemical products manufacturing.

Transportation Sector: Energy consumption in the transportation sector accounts for 27% of energy used annually in the District but accounts for 80% of all petroleum consumption. Annual energy consumption in the transportation sector has decreased modestly since 2006.

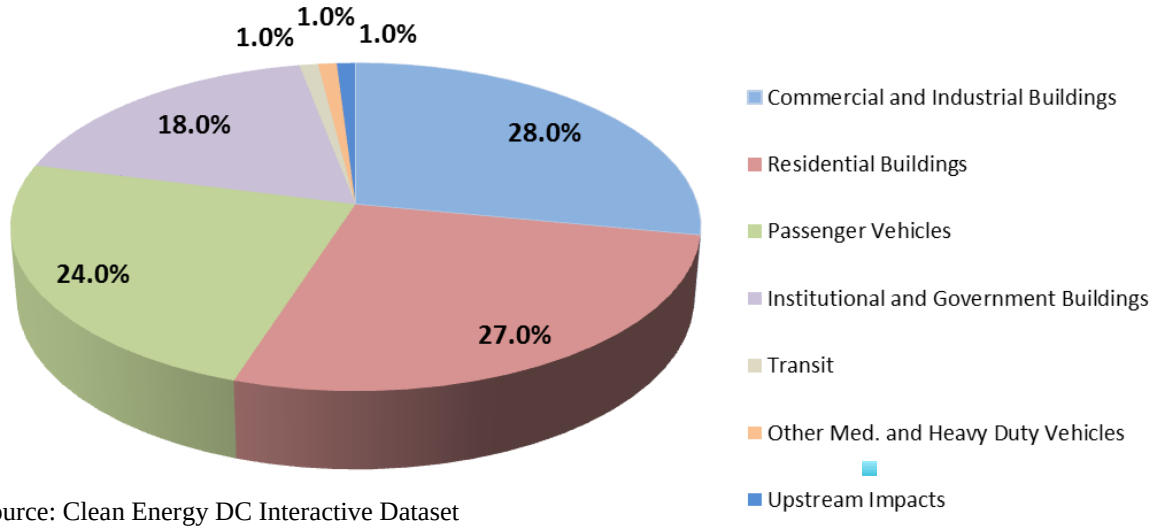
Figure 32 and Figure 33 below and on the following page shows the 2015 energy consumption by sector and by type in the District based on data from the District's comprehensive energy plan, Clean Energy DC.

Figure 32. Energy consumption by fuel source



Source: Clean Energy DC Interactive Dataset

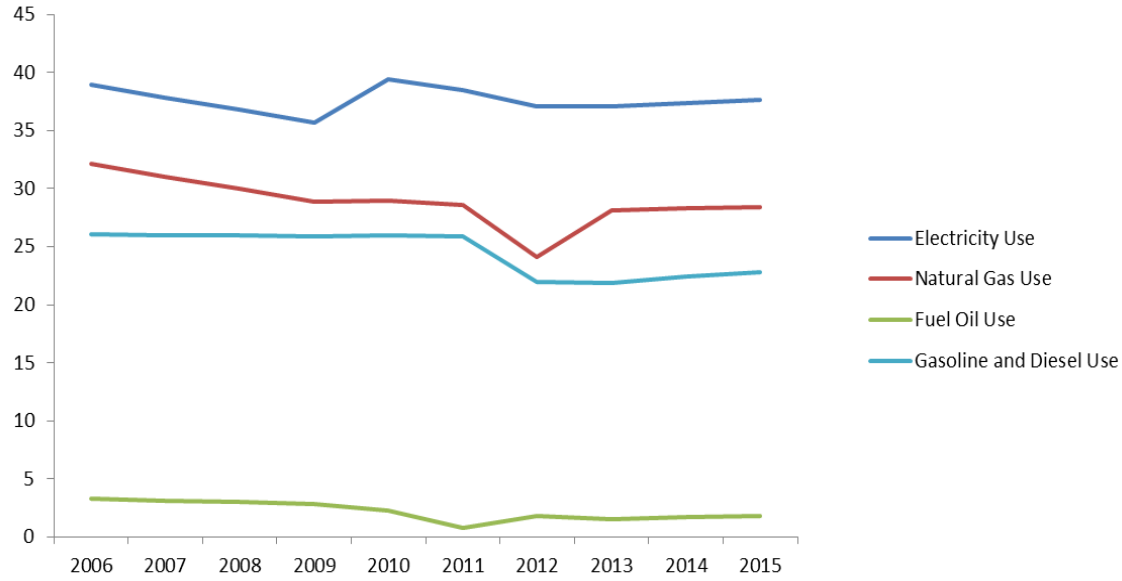
Figure 33. Energy consumption by sector



Source: Clean Energy DC Interactive Dataset

3.2.2 Usage by Source

Figure 34. Consumption trend by fuel source (trillion Btu)



Source: EIA State Energy Data System

Fuel Oil, Diesel, and Gasoline: As of 2016, fuel oil, diesel, and gasoline constituted 28.0% of total energy consumption, which includes an 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

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 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, decreasing by a factor of 2.5. Finally, consumption of gasoline remained relatively steady from 2006 to 2013, with a small uptick in 2015. One is the apparent trend toward greater Metro ridership from locations outside the District. Another is the turnover in the vehicle fleet. The recent rapid increase in gasoline prices has prompted some consumers to condense errands and cut out unnecessary trips. Also, gasoline availability is slightly less convenient as the number of service stations in the District has decreased from 141 in 1987 to 108 in 2009. 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.

Prices that District consumers pay for energy products were second highest in the country at $26.19 per million Btu in 2010, compared to the national average of $18.73 per million Btu in 2008. District consumers paid the 22nd highest energy expenditures per person of $4,033, while the national average was $3,895. This suggests that the District's use of energy is less efficient than the national average.

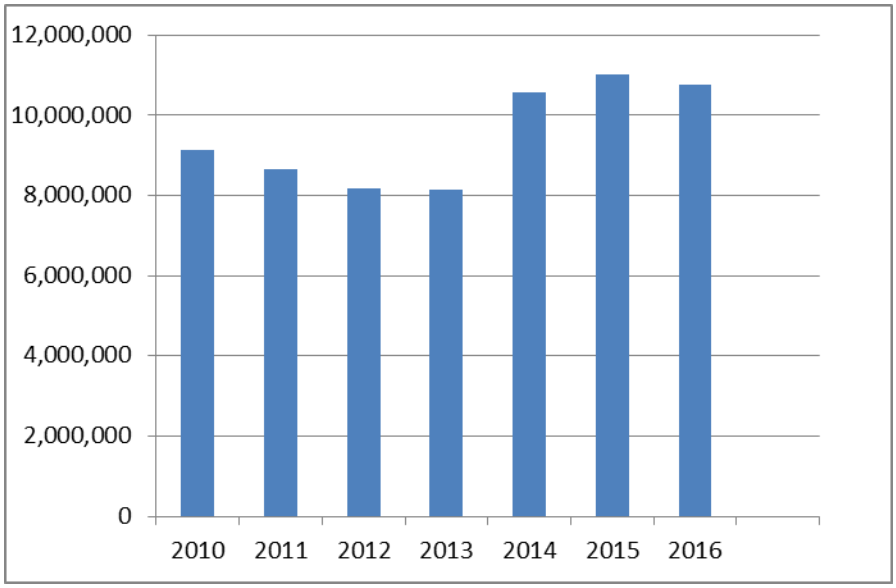
Natural Gas: Between 1980 and 2006, natural gas consumption increased modestly due to growth in the commercial sector. The use of natural gas declined between 2006 and 2012, before increasing slightly between 2013 and 2015. Overall consumption increased between 1980 and 1990 and has remained relatively flat since then. Increases in natural gas use by the commercial sector have been offset by decreases in use by the residential sector. Natural gas accounted for 31% of total energy consumption in the District in 2015, a sizeable increase when compared to 18.5% in 1980.

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 41.0% in 2015. Electricity consumption in the District is shown below.

3.2.3 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. The historical (2006-2015) values of electricity consumption are presented Figure 35 in below.

Figure 35. Electricity Consumption

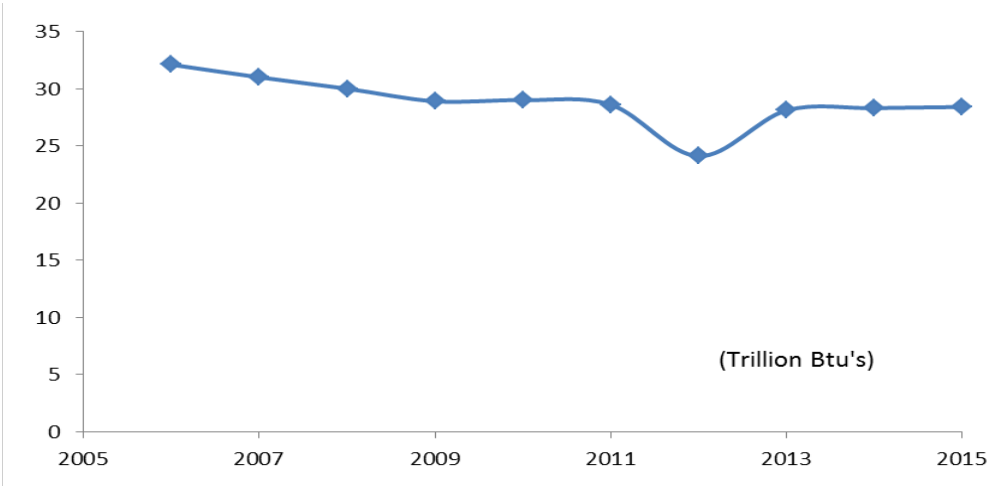


Source: EIA State Energy Data System

3.2.4 Natural Gas Consumption Trends

The weather-normalized consumption of natural gas in the District has fluctuated unevenly in the recent past, but the overall trend is a decline in total natural 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.

Figure 36. District of Columbia Natural Gas Usage



Source: Clean Energy DC Interactive Dataset

3.2.5 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 December 2017, more than 3,100 solar PV systems are in operation in the District, representing 41.63 MW.[13]

3.2.6 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.[14]

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.

3.2.7 Energy Efficiency and Conservation Programs

To the extent that reducing energy consumption reduces the dependence on imported fuels, 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, 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 April 5, 2017, DOEE executed a 5-year contract with the Vermont Energy Investment Corporation to continue serving as the DCSEU.

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

[13] https://www.dcpsc.org/Utility-Information/Electric/Renewables/Renewable-Energy-Portfolio-Standard-Program/Monthly-Update-of-Solar-Generator-Certification.aspx
[14] https://www.dcpsc.org/PSCDC/media/PDFFiles/Electric/electric_sumstats_cons_dmnd.pdf

Columbia authorized PACE in April 2010 with up to $250 million worth of PACE bonds targeting commercial property owners.

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.

3.3 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.

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.[15]

3.4 Energy Supply in the District of Columbia –Natural Gas

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

The District does not have natural gas reserves and therefore does not produce, process, or store natural gas or supplemental supplies. Natural 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 natural gas. Washington Gas is the primary distributor and supplier of natural gas in the District. However, there are 102 approved competitive natural gas suppliers in the District, with about 27 active suppliers. A list of active suppliers can be obtained from the DC PSC's website.[16]

3.5 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, 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.

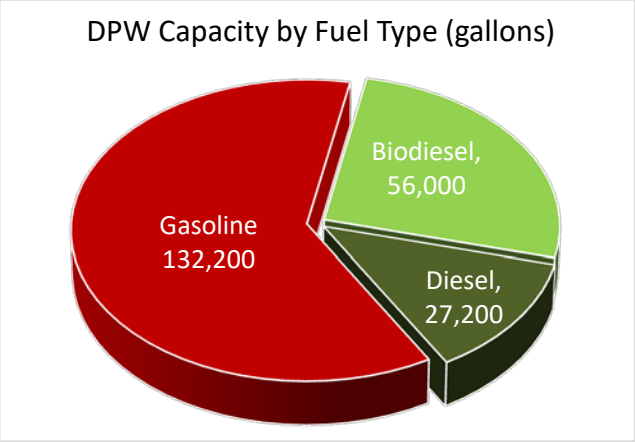
The District can also work with the following organizations to identify potential sources of petroleum products during an energy emergency:

Figure 37. Petroleum Associations

[16] https://www.dcpsc.org/PSCDC/media/PDFFiles/NaturalGas/NaturalGasSuppliers_ApprovedContacts.pdf
https://www.dcpsc.org/PSCDC/media/PDFFiles/NaturalGas/CurrentCommodityGasSuppliers.pdf

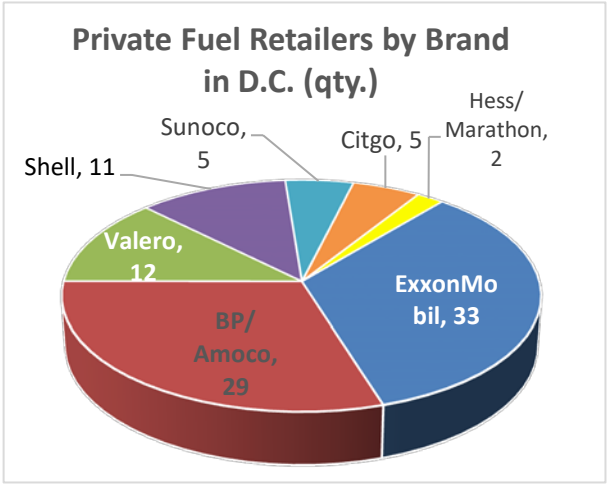
[17] https://www.eia.gov/analysis/transportationfuels/padd1n3/

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 natural gas industries. The Eastern Region of the API, which includes the District of Columbia, represents distributors in the Eastern U.S.



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.

Figure 39. Private Retailers



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 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.

3.6 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.

Figure 40. Energy Price Estimates

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)				

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.

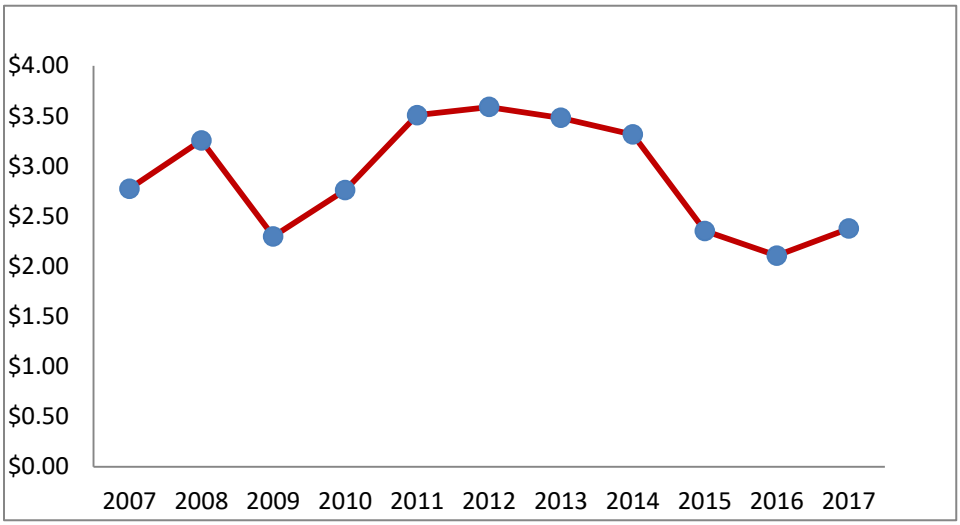
Figure 41. Energy Price Change Percentage

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)				

The average retail price per gallon has increased substantially since 2000. The following graph shows the increase of regular unleaded gasoline in retail price per gallon through November 2017 Prices are projected to increase as supply markets remain tight and demand

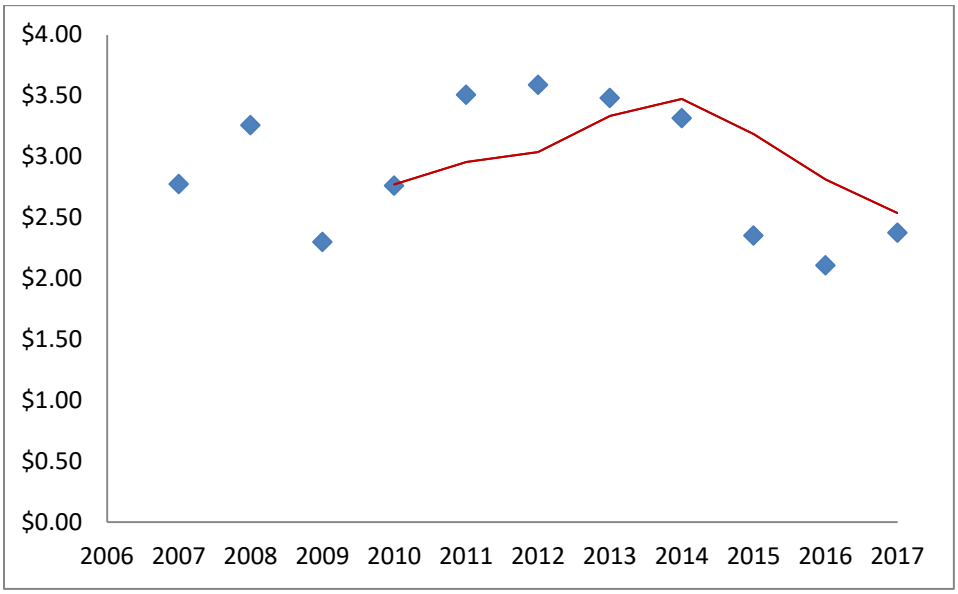
remains constant or continues to increase.

Figure 42. Unleaded gasoline prices in the metropolitan DC region



The price of natural gas for residential, commercial and vehicle use has been at historical lows, ranging from $2 to $3.50, due to the abundant supply of gas from hydraulic fracturing in the United States. It is uncertain how long these low prices can be maintained, but they have lowered the cost of electricity, making natural gas-fired generation much more competitive, and putting significant economic pressures on coal-fired generation, as well as renewable generation. Data from the Energy Information Administration ("EIA") indicates that the average natural gas price for 2014 was about $3.314. The average trained down from roughly $0.94 per therm by 2017. EIA expects natural gas prices, on average, to experience some downward pressure on prices over the forecast period, due to strong growth in natural gas production.

Figure 43. Average annual natural gas prices in the District of Columbia[18]



[18] Bureau of Labor Statistic (BLS) https://www.bls.gov/regions/mid-atlantic/data/averageenergyprices_washingtondc_table.htm

3.7 Largest Energy Users in the District of Columbia

The commercial sector is the largest energy consumption sector in the District. However, energy providers typically do not provide public information about their largest users for proprietary reasons. The largest energy users generally have building energy managers and engineers who manage energy issues. These managers enhance energy reliability through longstanding relationships with private market energy service companies. DOEE has been collecting the monthly aggregated energy usage data for all non-federal buildings that have 50,000 square feet or more. DOEE will track energy trends for these buildings, which data will be used to make recommendations on meeting energy reduction targets consistent with the overall goal of reducing total energy usage. The largest energy users in the District were estimated by counting the number of employees. In November 2017 there were 738,300 jobs in the D.C.

Figure 44. Total Private & Government Employment, November 2017[19]

Sector	Total		Percentage of Total
Total		**798,200**	**100%**
Total Private Sector		**560,800**	70%
Total Government Sector	**237,400**	196,500 (fed)	30%
		40,900 (local)	

Source: Dept. of Employment Services (DOES)

The Federal Government is the largest employer in the District and the District Government is the second largest. The Government sector accounted for 34% of the jobs. The next largest employment sectors are the Professional and Business Services, providing 171,000 jobs, and the Educational and Health Services, providing 141,800 jobs.

Figure 45. Top 20 Employers in DC

Top 20 Employers in the District of Columbia 2016*

1. Georgetown University	11. Red Coats
2. George Washington University	12. The George Washington Hospital
3. Children's National Medical Center	13. Allied Barton Security Services
4. Washington Hospital Center	14. Howard University Hospital
5. Georgetown University Hospital	15. Sibley Memorial Hospital
6. American University	16. Advisory Board Co
7. Booz Allen & Hamilton Inc.	17. Insperity PEO Services LP
8. The Catholic University Of America	18. Marriott Hotel Services Inc.
9. Fannie Mae	19. Providence Hospital
10. Howard University	20. Monumental Sports

*Ranking by size of workforce

Source: D.C. Department of Employment Services, Office of Labor Market Research & Information.

[19] https://does.dc.gov/sites/default/files/dc/sites/does/page_content/attachments/CESdcNov17.pdf

In terms of consumption by entity, both DC Water and WMATA consume large amounts of energy. In addition, based on square footage, the following private facilities are expected to be large consumers of energy:

- Walter E. Washington Convention Center
- Nationals Park
- Capital One Arena

3.8 Distributed Generation in the District

In February 2009, the DC PSC adopted interconnection regulations. These 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. For all distributed generation—solar, wind, combined heat and power, fuel cells, and any other nontraditional power source—interconnection with the local electric grid provides back-up power and an opportunity to participate in net metering and sell-back contracts with utilities.

As of December 1, 2018, the solar energy systems eligible for the District's RPS solar requirement include 3,981 solar PV and 115 solar thermal systems in the District. In addition, 2,475 solar energy systems outside of the District are eligible. The total reported capacity associated with these systems is about 82.6 MW, of which roughly 58.7 MW is located within the District.

DOEE expects to see a robust increase in the number of distributed generation systems in the near future for several reasons: (1) the increased target (10% of all electricity by 2041) for local solar generation under the Renewable Portfolio Standard Expansion Amendment Act; (2) development of microgrids using CHPs or fuel cells; and (3) anticipated net-zero building codes that will require many new buildings to be equipped with onsite renewable generation.

A large amount of distributed generation, when they are 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. In May 2015, the DC PSC initiated a grid modernization proceeding through Formal Case 1130 to investigate and address these issues.

3.9 Microgrids & Energy Storage

Microgrids and district energy systems are increasingly viewed as 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.

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.

Cybersecurity

With the growing ability of outside hackers to infiltrate computer networks, reliable delivery of energy is now dependent on a robust cyber-secure 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. DOEE will work collaboratively with Washington Gas and Pepco to ensure that there are robust cyber security standards in place.

4 District of Columbia Energy Supply Disruption Tracking Plan

4.1 Purpose of the Tracking Plan

An Energy Supply Disruption Tracking Plan 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 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 necessary framework to implement specific data collection or tracking mechanisms during significant energy disruptions up to, and including, a declared energy emergency.

4.2 DOEE's Roles & Responsibilities

The DOEE has been delegated vital roles in the implementation of energy emergency and contingency response planning. In the 2015 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. The DOEE Energy Administration is the primary unit within DOEE to carry out these responsibilities.

4.3 Energy Consumption and Tracking & Assessing Supply Disruptions

All fuel sources are important for tracking and assessment purposes. Based on data from Clean Energy DC[20], within the geographical boundaries of the District, energy consumption is as follows:

Figure 46. Energy Consumption

District Energy Consumption by Fuel Type, 2015	
Type of Energy	**Percentage of Total**
Electricity	41%
Natural Gas	31%
Petroleum	28%
Total	100.00%
Source: Clean Energy DC	

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

4.3.1 Electricity

In the District, there is one electricity distribution company (Pepco) for which the District PSC regulates and has in place performance requirements.

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

Many of the tracking and assessment activities outlined in the plan will fall within the purview of the PSC and Pepco. DOEE's responsibilities will mainly be an information coordinating and sharing role to ensure that the Mayor, users, and the public have adequate information in case of an electricity supply disruption. Pepco and PSC are support agencies to DOEE under ESF #12.

4.3.2 Natural Gas

Similar to electricity, there is one natural gas distribution company in the District (Washington Gas). Washington Gas, like Pepco, is regulated by the PSC. 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.

4.3.3 Petroleum

Unlike electricity and natural gas, 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. 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.

Lessons learned in the aftermath of Sandy indicate that public officials struggled to gather real-time information about product flows and reserve fuel because they did not have pre-established contacts with industry officials who had the authority to share information on fuel inventories and distribution within the region. Even attempts by the EIA, which has the statutory authority to request such data, were unsuccessful in convincing many terminal operators to provide fuel supply and ownership information due federal anti-trust concerns and a general industry resistance to sharing proprietary information. [21]

It is clear from recent NASEO guidance and industry best practice presentations that engaging directly with private fuel suppliers and distributors on an ongoing basis can pay dividends during an emergency by building trust that shared information will not be revealed to industry competitors. DOEE may also explore the option of entering into Non-Disclose Agreements (NDAs) or Memorandums of Understanding (MOUs) with terminal operators and suppliers to facilitate information sharing. Building relationships with fuel suppliers and transporters, including brand name fuel companies, could provide DOEE access to timely notification of incidents and information about disruption to fuel deliveries, which in turn, can support the District to develop pre-event response options.

4.4 Supply Disruptions versus Distribution Disruptions

[21] https://energypolicy.columbia.edu/research/report/improving-regional-situational-awareness-during-fuel-emergencies-new-york-tri-state-areas-lessons

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. 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 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.

4.4.1 External / Supply Disruptions

The District imports all of its energy with the exception of a small amount of solar and co-generation. Consequently, 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.

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.

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.

4.4.2 Internal / Distribution Disruptions

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. DOEE will facilitate the flow of information during an internal/distribution disruption.

In the Washington metropolitan region, the potential for incidents and emergencies that could cause fuel distribution disruptions varies widely, but one significant threat is the reliance on electrical power. A widespread and enduring power outage impacting the Baltimore and Northern Virginia bulk terminals would prevent them from offloading batches of petroleum from the pipeline into storage tanks, or pumping fuel to a loading rack where tankers can receive the fuel. Likewise, 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 to operate pumps, so an electrical outage would render many gas stations inoperable.

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

The DRP provides specific actions that DOEE must initiate in the event a disaster impacts fuel supplies. In order to effectively carry out its functions, DOEE must have a baseline understanding of the e-supply chain, as all petroleum products are transported into the District. The movement of fuel from refineries to retailers involves a diverse set of owners, operators, and assets that control various segments of the fuel supply system which means that fuel disruptions may occur at any point along the supply chain.

DOEE will primarily coordinate information garnered from external sources. To ensure the timely notification of significant incidents that may impact fuel supplies, DOEE should establish communication channels and working relationships with stakeholders along the supply chain. NASEO guidance recommends that localities identify a point of contact and establish communication with pipeline owners, bulk fuel terminal operators, wholesale marketers, and regional fuel supplier associations. Establishing such relationships will also enable DOEE to provider situational assessment of potential threats to the fuel deliveries.

The District will use the tracking and assessment plan as a framework for working with other supporting organizations to ensure that there is a timely flow of information to the Mayor, energy users, and to the public in the case of an energy supply disruption. DOEE will communicate with pipeline owners and terminal operators to establish a conduit for notifying DOEE of any significant incidents or events that may disrupt fuel supplies and discuss supply capabilities. DOEE will engage with petroleum suppliers, marketers and transport companies to establish a process for gathering data on fuel supplies and deliveries to private retailers in D.C.

DOEE will coordinate with 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. DOEE will also coordinate the assessment of how an

energy supply disruption was managed so that lessons learned can be shared with the Mayor, the supporting agencies, energy users and the public. DOEE will use the ESDTP to monitor and share the type of information the Mayor, energy users, and the public will need to know during and after an energy supply disruption.

4.6 Data for Profiling and Tracking

Section 3 contains the District's energy profile. These data are based on the information compiled by the EIA, DC PSC, building data benchmarking, greenhouse gas inventory, and other District agencies, and tend to have a two-year lag. Energy profile data are used primarily for understanding consumption, price, and expenditure trends in the District.

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. 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:

Figure 47. District fuel data profiling and tracking

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

4.7 Energy Assurance Planning Overview Process

The general approach for the ESDTP includes monitoring, tracking and post-event analysis. Section 2.4.4 describes broadly DOEE's responsibilities under the DRP while Figure 14 depicts an overview of how the ESDTP and the energy assurance planning process work.

The tracking and assessment plan follows the general approach for tracking and assessing, including monitoring, tracking, and post-event analysis. However, immediately following an emergency, 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. Tracking and assessment activities monitor the balance between energy supply and demand and how well energy is being delivered to end users. The monitoring process is designed to identify potential and actual disruptions to the energy supply and disruptions to the energy end users' delivery system.

As stated previously, DOEE will work with DPW to establish a protocol for receiving regular reports on the operational status of fuel facilities, the fuel levels in each at the time of the emergency, and fuel usage ("burn rate") during the response. In the event of an emergency, this process would continue but the reporting intervals would be significantly reduced to a real-time basis depending on the nature of the incident and information needed by District leaders. This information is one of the important data points that will be needed for DOEE to provide situational awareness about the status of the supplies and support the CMT in making informed decisions about response actions. Likewise, DOEE will coordinate with DDOT to receive data on the condition of roadways and highways into the District, as these are the distribution arteries that fuel suppliers would need cleared in order to deliver fuel to the District.

4.8 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 or not the energy supply is adequate to meet the demands of end users and to determine whether the delivery system is functioning normally.

One of the first steps in monitoring fuel supplies and forecasting fuel potential disruptions is getting access to information that is only readily available to suppliers. While some information can be gathered from petroleum associations listed in Figure 47 above, DOEE will initiate the following steps to engage with the local petroleum industry:

- Identify key contacts for the following fuel supply chain stakeholders:
  - The Colonial and Plantation pipeline owners;
  - Bulk fuel terminal operators in the region;
  - Fuel suppliers and distributors that transport fuel supplies to local retailers;
- Organize a fuel summit to better understand the vulnerabilities of the system and the supply capabilities in a fuel emergency, and;

  - Discuss DOEE fuel supply data needs, information that suppliers can legally provide, and establish a protocol for receiving notifications of fuel disruptions;
  - Maintain regular communications and meetings with key fuel supply stakeholders;
- Work with DPW to build redundancy in the fuel supply chain and explore options for expanding fuel supply options.

DOEE may also explore the option of entering into Non-Disclose Agreements (NDA) or Memorandums of Understanding (MOU) with fuel suppliers to facilitate information sharing, since suppliers are often reluctant to provide critical information for fear of violating antitrust laws. 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.

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 natural 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
  - Terrorist attacks (physical or cyber)
- Price
  - Increases in spot prices
  - Strikes involving energy supply or delivery systems
  - International embargoes of energy supplies

Figure 50 - Figure **53** provide DOEE with international, national, regional and District of Columbia data sources that will assist in establishing norms and identifying situations where deviation from acceptable norms is about to occur or has occurred.

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;
- Compile data on whether these retailers have the ability to connect to or have a portable generator;

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, changes in contact information, etc.;
- Reviewing media reports regarding supply source status including refinery shutdowns, international events/problems, etc.;
- 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.

4.9 Tracking

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, and natural gas;
- 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 end of extreme conditions;
- Other appropriate information indicating system stress including: settlement of a rail strike which involves propane shipments from Canada; accidents with marine, pipeline, rail or truck shipping; easing of an international dispute that could lead to an embargo.

The following data sources may be useful in tracking:

- 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 Propane Gas Association (PGA), Mid Atlantic Propane Gas Association (MAPGA), 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.

4.10 Energy Supply Disruption Tracking Log

Tracking a disruption event includes 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.

4.11 Post-Event 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;
- The data were helpful in managing the event; and
- The corrective actions were successful.

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

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:

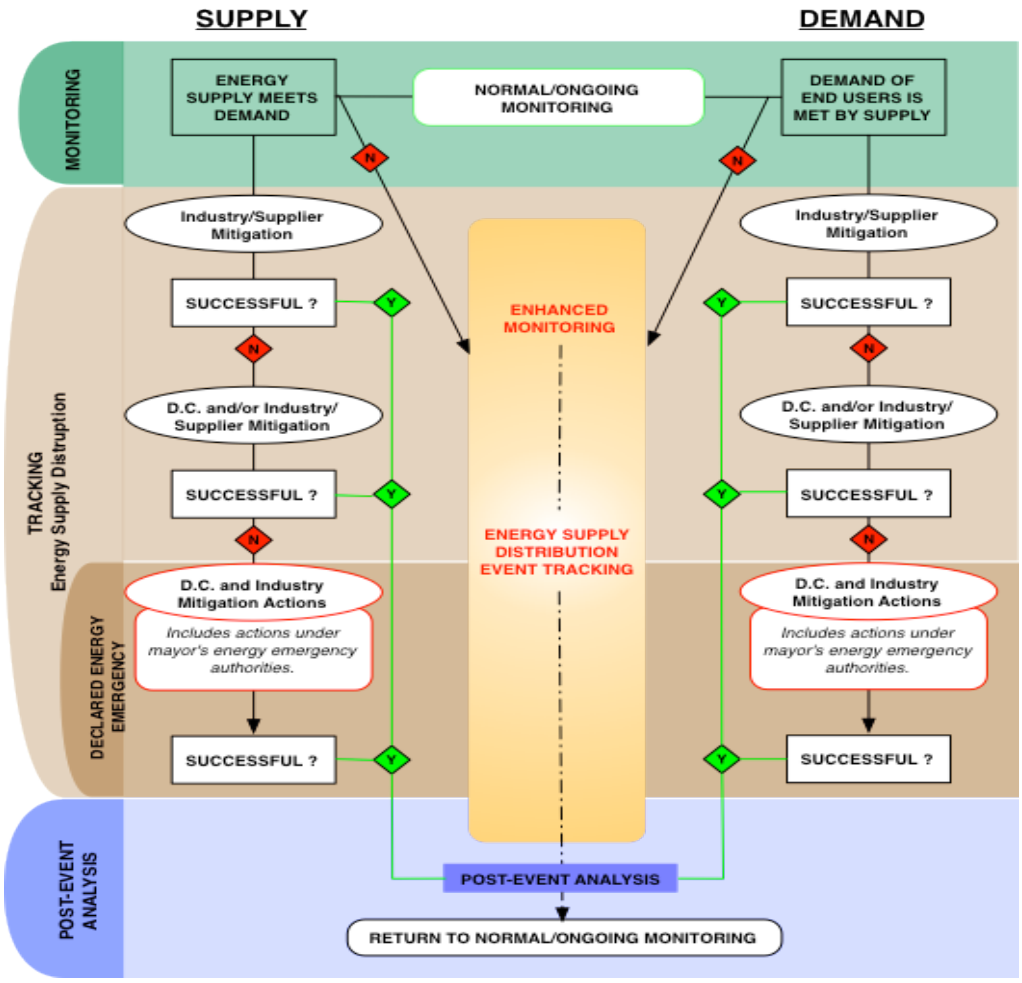
- Using the Energy Supply Disruption Tracking Log and any other pertinent information, prepare a detailed chronology of the disruption event including: key data monitored, alerts issued, and actions taken from the first indication of a problem through return to normal conditions. Specific information will be documented in regard to 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 response?
- 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?
- 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 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.

Figure **48** below 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 energy form, 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 natural gas and, finally, to electricity.

Figure 48. Process to Detect and Correct Potential and Actual Energy Supply Disruptions



4.12 Energy Source Review and Discussion: Petroleum and Propane

4.12.1 Brief Description of Petroleum and Propane Supply Chain (See Appendix B for list of bulk fuel terminal operators)

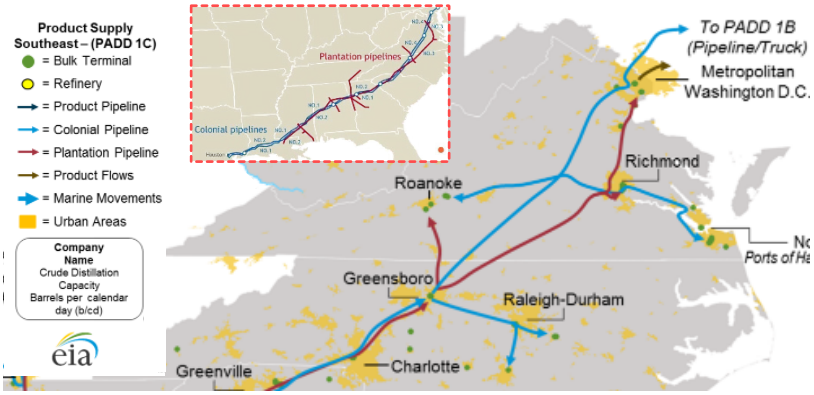
Petroleum

The District of Columbia has no petroleum resources and uses less total petroleum and less petroleum per capita than any U.S. state. The District's only two utility-owned petroleum-fired electricity generating facilities were retired in June 2012. One of them was completely dismantled by 2015. Eighty percent of the petroleum consumed in the District is used by the transportation sector. Fewer than 2% of District households heat with fuel oil.

The District of Columbia 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) pumps petroleum products from Baton Rouge, LA to Greensboro, NC, which shares the same general route as Colonial and has a system capacity of 700,000 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, VA and Baltimore, MD.

Figure 49. Pipeline systems serving DC



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 to transport fuel to private retail gas stations. Similarly, heating oil and propane are picked up by local wholesalers / retailers in smaller trucks and delivered to the tanks of individual customers.

Propane

A 2004 study for the National Propane Gas Association[22] estimated the following uses of propane in the District:

- Residential—48.2%
- Industrial and internal combustion engines—25.1%
- Commercial—21.6%
- Cylinder—5.1%

In the 2004 study, only 2% of homes in the District were estimated to use propane for heat. However, residential heating in the District has progressively transitioned to electricity (i.e. heat pumps) and natural gas since the 2004 study was conducted. A 2016 study by ICF International on the propane market outlook found that between 2010 and 2014, propane's market share loss for residential heating was 11% for the region that includes the District of

[22] *Study of the Propane Industry's Impact on US and State Economics*, Energy and Environmental Analysis, Inc., Nov. 2004

Columbia.[23] Therefore, the current number of homes using propane is likely to be less than 2%.

4.12.2 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 control 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.
- 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).
- 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

[23] https://www.afdc.energy.gov/uploads/publication/2016_propane_market_outlook.pdf

potential or anticipated market conditions (e.g., predicted but yet unrealized political or natural disaster situations).

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.

4.12.3 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 has the ability to 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.

4.12.4 Petroleum and Propane Supply Disruption Post-Event Analysis Report

Section 4.11 Post-Event Analysis of the ESDTP applies to all energy forms and details information to be considered for the analysis and reporting of energy supply disruption events.

4.13 Energy Source Review and Discussion: Natural Gas

4.13.1 Brief Description of Natural Gas Supply Chain

The District of Columbia does not have natural gas reserves or production, and District consumers did not have access to natural gas supplies until 1931. For more than 80 years before that, manufactured gas was locally produced from coal and petroleum. A mixture of natural and manufactured gas was used from 1931 until 1946. After that, manufactured gas was produced during periods of peak gas demand until the mid-1980s.

Natural gas is now supplied to the District by a single natural gas distribution utility that services the city and some surrounding suburbs in Maryland and Virginia. No interstate natural gas pipelines enter the District. The utility's local pipelines bring natural gas into the city from interstate pipelines in Maryland and Virginia. Although the District does not have any natural gas storage facilities within its boundaries, the distribution company that supplies the District owns and operates a storage field in West Virginia.

The District's annual natural gas consumption has been steadily and modestly declining since 2006 from 32 trillion Btu to 28 trillion Btu in 2015. In 2015 31% of all energy consumed came from natural gas for use in buildings and facilities.

4.13.2 Monitoring the Natural Gas Supply Chain

A number of issues can interrupt the supply of natural gas. The following may require monitoring:

- Supply
  - Transportation of supply (including shortage of transportation vehicles) once it reaches distribution
- Demand
  - Curtailment of natural 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 natural gas distribution system;
  - Equipment or pipeline failures in the distribution system; or
  - Tanker accidents.
- 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).
- 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.

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.

4.13.3 Natural Gas 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.

4.13.4 Natural Gas Supply Disruption Post-Event Analysis Report

Section 4.11 Post-Event Analysis of the ESDTP applies to all energy forms and details information to be considered for the analysis and reporting on energy supply disruption events.

4.14 Energy Source Review and Discussion: Electricity

4.14.1 Brief Description of Electricity Supply Chain

The District's annual electric energy consumption has been relatively stable over the past several years. In 2010, the District recorded about 9 million MWh of consumption, which peaked at 11 million MWh in 2015. Since 2015, electricity consumption has declined. Electricity is the most prevalent source of energy in the District, capturing between 40% and 50% of total District-wide energy consumption. Furthermore, the District's goal to become carbon neutral by 2050[24] will make electricity an even more dominant source of energy for

[24] https://doee.dc.gov/release/mayor-bowser-commits-make-washington-dc-carbon-neutral-and-climate-resilient-2050

transportation and buildings.

Increasing electrification and distributed energy resources in the District will need to be addressed through grid modernization efforts to ensure stability and resiliency in the delivery of electricity in the District.

4.14.2 Monitoring the Electricity Supply Chain

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

- Supply
  - Loss of natural gas, coal, nuclear, fuel oil, solar power, or wind power supply
- 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 tornados 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, etc.);
  - 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.

4.14.3 Electric 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.

4.14.4 Electric Supply Disruption Post-Event Analysis Report

Section 4.11 Post-Event Analysis of the ESDTP applies to all energy forms and details information to be considered for the analysis and reporting on energy supply disruption events.

Below are the detailed information matrices for petroleum, propane, natural 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.

Figure 50. 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	Identifies petroleum distributors, location and size of storage tanks	Annual	Used only in a petroleum supply disruption to assess inventories	Current		
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	
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		
Crude Oil, Gasoline and Heating Oil Futures	Data from NYMEX	Daily (M-F)	Indicates long-term supply problem	Current		
Crude Oil, Gasoline and Heating Oil Spot Prices	Data from Wall Street Journal	Daily (M-F)	Indicates long-term supply problem	Current		
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	
Natural 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	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	Indicates problems have reached customer	As required	Problem is severe and has reached customer	Current		
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		

Figure 51. Information Details for Propane

Information Description	Comments	Frequency	Indication of Stress or Emergency	Current or Proposed	Source	Site/contact specifics
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 natural 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	Europe					ml
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 http://tonto.eia.doe.gov/oog/info/hopu/hopu.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 associations	

(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 natural gas to interruptible customers	Propane is a back-up to natural 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 shortages		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	

Figure 52. Information Details for Natural Gas

Information Description	Comments	Frequency	Indication of Stress or Emergency	Current or Proposed	Source	Site/contact specifics
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 by _____?	Forecasts any anticipated supply problems	Annual--November	Identifies any projected supply problems	Current	Gas companies or others?	
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 to restore gas service will be provided 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	Deficiencies versus CFR 192 Transportation of Natural and other Gases by Pipeline; Minimum Federal Safety Unit audits				Pipeline Safety Unit	
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	
Natural Gas Futures	Sensitive to integrated perspective of weather and supply prospects	Daily (M -F)	Rapid increase indicates supply problems	Current	NYMEX	
Natural 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	
Natural 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
Natural 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 natural 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	

Figure 53. Information Details for Electricity

Information Description	Comments	Frequency	Indication of Stress or Emergency	Current or Proposed	Source	Site/contact specifics
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	A number of 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	Defines location of outage	As required	Specific customer outage identified	Current	EDCs, PSC, DRES	
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	

5 District of Columbia Plan for Energy Resiliency

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 Pre-Event: Providing On Going Monitoring

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 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.

5.1.1 What Will DOEE Monitor?

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

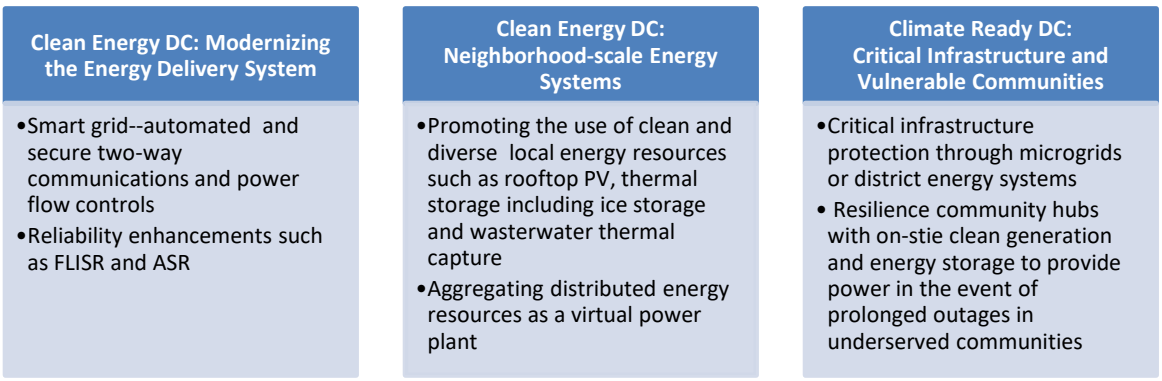
they exist;

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[25];
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[26];
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;
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.

5.2 Plan for Resiliency: Critical Infrastructure Protection and Promoting Resiliency

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

Figure 54. Monitoring & Tracking Framework



Resiliency ensures that the District can quickly mitigate and reduce the impacts of an energy disruption or emergency. Resiliency 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 resiliency, particularly when these resources

[25] https://www.mwcog.org/documents/2013/11/01/national-capital-region-homeland-security-strategic-plan-homeland-security-strategic-plan-uasi/
[26] https://www.mwcog.org/documents/2011/09/30/regional-emergency-coordination-plan-recp-homeland-security-regional-emergency-coordination-plan-recp/

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, renewable energy resources such as wind and solar have proven to be a resilient source of power during extreme weather events. For example, wind turbines have generated much power and have performed well during winter storms. For these reasons, distributed energy resources and renewable resources can be valuable assets to build resiliency.

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

5.3 Critical Infrastructure Protection Responsibilities

Critical Infrastructure Defined: Section 1016(e) of the USA Patriot Act of 2001 (42 U.S.C. 5195c(e)) defines critical infrastructure as "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." Key resources are defined by section 2(9) of the Homeland Security Act of 2002 (6 U.S.C. 101(9) as "publicly or privately controlled resources essential to the minimal operations of the economy and government." The 2013 National Infrastructure Protection Plan27 categorizes the nation's critical infrastructure (CI) into 16 sectors, including:

1. Chemical (basic, specialty, and agricultural chemical manufacturing, storage, and distribution; pharmaceuticals; and consumer goods and related facilities)
2. 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)
3. Communications (wire line, wireless, satellite, cable, and broadcasting infrastructure)
4. Critical manufacturing (primary metal, machinery, electrical equipment, appliance, and component, and transportation equipment manufacturing, and all related facilities).
5. Dams (dams; levees; navigation locks)
6. Defense industrial base (research and development, design, production, delivery, and maintenance of materials needed to meet U.S. military requirements)
7. Emergency services (law enforcement; fire and emergency services; emergency management; emergency medical services; public works)
8. Energy (all energy production and distribution infrastructure)
9. Financial services (chartered banks and credit unions; investment product providers; insurance companies; other credit and financing organizations)
10. Food and agriculture (farms; restaurants and institutional food service establishments; supermarkets, grocery stores, and other food outlets; registered food manufacturing, processing, and storage facilities)
11. Government facilities (buildings owned or leased by federal, state, local, and tribal

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

governments; embassies; public and private education facilities; national monuments and icons; election systems)

12. Healthcare and public health (direct patient facilities; laboratories, blood banks, and pharmacies; public health services; health information technology providers; medical materials providers)
13. Information technology (IT products and services; internet routing, access, and connection services)
14. Nuclear (reactors, materials, and waste management)
15. Transportation systems (aviation; freight rail; highway and motor carriers; maritime transportation; mass transit and passenger rail; pipelines; and postal and shipping).)
16. 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 U.S. Department of Defense (USDoD) 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. 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.

5.4 Proactive Measures to Build Resiliency

5.4.1 Sustainable DC

In February 2013, the Mayor of the District of Columbia released Sustainable DC—the District's plan to make DC the most sustainable city in the nation "with the ultimate goal of making DC more socially equitable, environmentally responsible and economically competitive." Energy is one of the dimensions that Sustainable DC addresses. Specifically, the Mayor's goal is to cut energy use by 50% and increase the use of renewable energy 50% by 2032.

In addition, Sustainable DC proposed the modernization of the energy system in the District as an action item and promoted the development of neighborhood-scale energy systems. These actions and goals are bold and innovative – they will reduce the District's reliance on fossil fuels, help diversify the District's energy sources, modernize the energy infrastructure, and increase the Districts' resiliency. Combined with new technologies (e.g., smart grid components), reducing energy use and diversifying its energy sources will allow the District to meet its sustainability and resiliency goals. Sustainable DC is in the final stages of an update, titled Sustainable DC 2.0, to reassess the District's sustainability goals, targets, and actions. Using new analysis from Clean Energy DC, it will strengthen the initial plan's approach to securing a sustainable energy future.

5.4.2 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 modernizing the District's energy delivery system to increase resiliency, sustainability, and efficiency.

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.
- 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
  - Adopt a framework for valuing distributed energy resource costs and benefits
  - 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
  - Develop a location-based profile of energy use and GHG emissions
- Immediate No Regrets Actions
  - Leverage existing advanced metering infrastructure data
  - 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.

5.4.3 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 natural 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.

5.4.4 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.

5.4.5 State Energy Program

The State Energy Program (SEP) had received $22 million in ARRA funds for energy efficiency and renewable energy efforts in the District. The funds supplemented base SEP grant, which are federal funds to enhance energy security, advance state energy initiatives, and maximize the benefits of decreasing energy waste. Projects included: developing a K-12 Environment and Education Program, electric vehicle education programs for high

school students, supporting alternative fuel vehicles and infrastructure; improving government building energy efficiency; energy efficiency and conservation public education programs.

5.4.6 Improved DC Building Codes

The District of Columbia adopts the model codes published every 3 years by the International Code Council (ICC) 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. The District of Columbia adopted the 2012 edition of the ICC model codes and the 2011 National Electrical Code in March 2014.[28]

A new code development cycle commenced in the District of Columbia in October 2015 to consider adoption of the 2015 edition of the ICC model codes and the 2014 NEC, consistent with code development practices of neighboring jurisdictions (Maryland and Virginia). These codes have been finalized by the Construction Codes Coordinating Board (CCCB). This entity 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.

In September 2018, the Notice of Proposed Rulemaking for the 2017 District of Columbia Construction Codes was published in the DC Register for public comment by November 2018. The updated DC Construction Codes are expected to be finalized in 2019.

5.5 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.

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

As described in the Solar for All Implementation Plan,[29] 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.

5.6 Smart Grid Deployment Initiatives

5.6.1 Pepco Smart Meters

Pepco has installed smart meters for 99% of all customers in the District, which now has the highest smart meter penetration rate in the country. Smart meters 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. Customers have access to their own data on Pepco's online portal—MyAccount—so they can better monitor their energy usage. The meters send Pepco a "last gasp" message after a power loss, and notify Pepco when power is restored. To keep customers informed, Pepco also maintains outage information on their website.

Pepco's smart meters are net-metering capable and can be programmed by Pepco to accept energy from renewable generation technologies, such as solar PV arrays. Pepco is working with manufacturers who may be able to construct devices permitting retrieval of production data so that this capability can be added to the existing smart meters.

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.

5.6.2 Pepco and Smart Meter Performance during the June 29, 2012 Derecho

On the night of June 29, 2012, very strong thunderstorms with straight-line winds (Derecho) of 60 to 80 miles per hour knocked out power for more than 107,000 Pepco customers in the District; some customers were without power for up to eight days.

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

Smart Meters: Of the active smart meters installed, 84,132 smart meters sent a last gasp signal to Pepco. Pepco notes that this number does not include older meters, and the data collisions resulting from "a high volume of concentrated and simultaneous last gasp messages." The meters were used to resolve 796 outage orders by pinging meters to determine their status. This allowed field crews to focus efforts in other outage areas and to more efficiently dispatch field crews to areas with confirmed outages. In this instance, Pepco was not able to reroute power to working parts of its network due to public and crew safety reasons.

Pepco's application to install the smart meters claimed the following benefits:

- Improved outage reporting;
- Accurate dispatching of repair crews; and
- Enhanced customer service.

Pepco's Performance: Using smart meter data, Pepco was able to replace more utility poles and transformers than it did after Hurricane Irene in 2011.

Post-Event Discussions: An oft-discussed solution to decreasing outages in the District has been to bury power lines, which would reduce the number of outages caused by trees taking down power lines. A 2010 study estimated the costs of three strategies to bury power lines, eliminating approximately 65% to 100% of outages and ranging in cost from $1.1 billion to $5.8 billion.[58] The study also reported on the disadvantages of installing power lines underground: construction would affect existing trees in the district and inconvenience street traffic and sidewalks, and underground power lines can have a shorter life- expectancy than overhead lines due to degradation of insulation and potential animal activity. In addition, the cost of construction could be prohibitive, unless it can be combined with already-planned construction or upgrade projects.

5.6.3 Pepco's Undergrounding and Distribution Automation Efforts

Nearly half of the District's electricity distribution wires are already underground. On May 17, 2017, Mayor Muriel Bowser signed amended legislation into law that allows the District Department of Transportation (DDOT) and Pepco to move forward with the District of Columbia Power Line Undergrounding (DC PLUG) to add more underground lines in the District to enhance reliability. DC PLUG is a $500 million initiative jointly funded by Pepco (50%), District ratepayers (37.5%), and DDOT (12.5%). The initiative is expected to span 6 to 8 years, with construction beginning in 2018. DDOT and Pepco submitted their application for approval of the First Biennial Underground Infrastructure Improvement Projects Plan to the DC PSC, which was approved in November 2017.

While the underground lines may enhance reliability, they may not necessarily enhance resiliency. However, 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, deployed on seven feeders in 2016, which automatically identifies the fault line, then isolates and restores the line. Additional equipment includes remotely operated switches and remote monitoring systems. These Smart Grid features should significantly enhance the grid's resiliency.

5.6.4 Pepco's Cybersecurity Measures

Pepco DC and its parent holding company, Pepco Holdings, Inc., merged with Exelon Corporation in 2016. All Exelon-owned utilities follow the same set of cybersecurity measures and protocols. Although details may not be shared with the public due to security reasons, Pepco has shared the following information about its measures:

- Exelon Corporate and Information Security Services (CISS) utilizes a Security Management System 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.
- CISS' Security Management System 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

5.6.5 Pepco Smart Grid Enabled 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 meters. However, the District has yet to launch smart meter-enabled demand response programs, despite its earlier, and successful, pilot program called Powercents DC. The program demonstrated that participants reduced consumption based on price signals. Similar demand response programs have yielded good results and significant energy demand reductions across the country, including in Worcester, Massachusetts where

1,000 customers reduced peak usage by 20%.[30] In the District, Pepco has proposed a critical peak pricing and a critical peak rebate program, which is under review by DC PSC.

5.6.6 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.

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

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.

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

5.7 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

[30] https://www.utilitydive.com/news/national-grid-demand-response-pilot-nets-participants-20-energy-savings/407145/

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. In addition, the developer at the former Walter Reed Army Hospital Campus is in the process of developing a highly innovative, community-owned microgrid that will provide power to the businesses and residents in the development using CHPs, battery storage, and rooftop solar systems.

District energy is also being used successfully on Capitol Hill in the entire complex of federal 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 or solar panels on top of gas station canopies could provide a source of electrical power to operate pumps.

DOEE has found that there are a number of 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.

5.8 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.

5.9 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 natural 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.

5.10 Transportation Fuel Efficiency and Conservation Projects

5.10.1 Bikeshare Programs

The SmartBike DC program encourages the use of bicycles as transportation and provides an

[31] A recent study indicated that the cost per kWh of a lithium-ion battery may be at $100 in 2019, down from $10,000 in the early 1990s. https://www.pv-magazine.com/2017/07/31/study-finds-that-storage-prices-are-falling-faster-than-pv-and-wind-technologies/ The cost difference between 2016 and 2017 for lithium-ion battery for the use case of substation deferral or avoidance was 50%. https://www.lazard.com/media/450338/lazard-levelized-cost-of-storage-version-30.pdf

[32] https://energy.gov/sites/prod/files/2016/11/f34/fcto_state_of_states_2016.pdf

alternative to using cars. Because of the success of the program, the District is expanding the program. On January 2, 2011, the DDOT began removing the current bike sharing infrastructure and transitioned to the CapitalBikeshare (CaBi) program. Over 4,300 bicycles at over 500 stations are available in the DC metro area. The new 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. There are 31,700 current annual/30 day members. Since launching in late 2010, Capital Bikeshare has provided almost 15 million bike rides across the greater Washington, DC area. Currently, there are several dockless bikeshare programs competing with the Capital Bikeshare program in the District.

5.10.2 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.

With the addition of 14 electric buses to the DC Circulator bus fleet in 2018, DDOT now possesses the largest electric bus fleet on the East Coast. 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.

5.10.3 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.

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 phones 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. The majority 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.[33]

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.[34]

5.11 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 bio-diesel, E-85, electricity, compressed natural 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.

5.12 Car-Sharing Services

Car-sharing services, such as Zipcar and Car2go, can help the District reduce the number of vehicles on the road and decrease the volume of transportation fuel needed. In addition, Car2go's fleet consists of economy-sized, fuel-efficient vehicles, which will further reduce the use of petroleum.

5.13 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 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

[33] https://www.afdc.energy.gov/tools
[34] https://www.afdc.energy.gov/tools

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 to 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.

5.14 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.

5.15 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 situation 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

2015 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: and Organizations:	Maryland Energy Administration
	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

I. Introduction

A. 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.

B. 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.

C. 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.

II. 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).

III. Situation

A. 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.

B. 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 natural 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.

IV. Concept of Operations

A. 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 situation.
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.

B. 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.

C. 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.

D. Response Actions

1. 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.

2. Activation

a. Activate disaster response procedures.

b. Dispatch an ESF #12 ELO to the EOC.

c. Provide periodic situation and any other reports to the EOC as directed by HSEMA.

3. Continuing Actions

a. Serve as the focal point for receipt of reports on damage to energy supply and distribution systems and requirements for system restoration.

b. Advise and assist industry, District and local authorities on priorities and actions for energy restoration and supply.

c. 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.

d. Coordinate the collection and reporting of energy supply information to the public.

e. Recommend actions to conserve petroleum fuel, electric power, and natural gas, and to ration energy, as necessary.

f. Monitor the fuel supply system in coordination with gas station owners and companies to ensure the District possesses and maintains adequate supplies.

4. Public Information/Crisis Communications

a. 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.

b. All public information and external affairs for ESF #12 will be coordinated with ESF #15.

c. 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.

d. 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.

5. 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 subsequent to a federal emergency/disaster declaration.

6. 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.

a. 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.

b. Following complete demobilization, responsibilities of ESF #12 lead and support agencies shift back to individual agencies' District offices.

V. Responsibilities

A. Primary District Agency

1. 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.

B. 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 following actions:

   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.

C. Other Support Agencies and Organizations

1. **Maryland Energy Administration (MEA)** will complete the following 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 the District.

   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 natural 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 natural 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 natural gas outage on government operations and on the potential threat to the health, welfare, and safety of citizens in the affected areas.

D. 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.

E. Support Federal Agencies

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

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 similar to 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 located 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 provide assistance to 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 (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)
Energy Emergency (Post-Event)	Post-Event Responsibilities: These relate to coordinating the process to develop "lessons learned" and to share those lessons. (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 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 Storage Systems	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-Residential	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 fork lifts) are classified in the sector of their primary use. (EIA)
Energy Sector-Transportation	Recent technological advances in battery storage capabilities can allow the District to capture and store renewable energy so that it can be used at any time. Battery storage can be used in conjunction with distributed baseload generators to provide power during an electricity outage, ensuring continuity of operations for a building. (EAP 2012)
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 natural 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 (Kilowatts per Hour)	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 (Mega Watts)	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)
Resiliency	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. (http://sustainable.dc.gov/)
Therm	See "BTU"