



## 5.4.12 Utility Failure

The following sections provide the hazard profile (hazard description, extent, location, previous occurrences and losses, probability of future events, and climate change impacts) and vulnerability assessment for the utility failure hazard for the Erie County Hazard Mitigation Plan (HMP).

### 5.4.12.1 Hazard Profile

#### Description

Power failure is defined as any interruption or loss of electrical service caused by disruption of power transmission from accident, sabotage, natural hazards, or equipment failure (also referred to as a loss of power or power outage). A significant power failure is defined as any incident of a long duration, which would require the involvement of the local and/or state emergency management organizations to coordinate provision of food, water, heating, cooling, and shelter.

Widespread power outages can occur without warning or as a result of a natural disaster. Generally, warning times will be short in the case of technological failure, such as a fire at a sub-station, traffic accident, human error, or terrorist attack. In cases where a power failure is caused by natural hazards, greater warning time is possible. For example, high wind events (such as tornadoes and hurricanes) often cause widespread power failure, and are often forecasted before they affect a community. Additionally, severe winter weather conditions (such as ice storms, blizzards, and snowstorms) often cause power failure. These types of incidents are often preceded with warnings allowing power response crews to stage resources to prepare for power failure.

Power failures can lead to secondary hazards as well, leading to negative impacts on the health and safety of residents.

- During periods of extreme heat or extreme cold, vulnerable populations, such as the elderly and medically frail, can be affected and are susceptible to hypothermia or heat stroke. Additionally, power failure can lead to food spoilage, which can have negative impacts on public health.
- A secondary hazard from power failure is a loss of communications capability by first responders, which may in turn have negative impacts on public safety. Power outages can also lead to instances of civil disturbance, including looting.
- Power interruptions at chemical handling plants are of particular concern because of the potential for a chemical spill during restart (U.S. Environmental Protection Agency [EPA] 2001). Chemical spills can also have significant health and environmental impacts.
- Wastewater and potable water utility interruption may occur as a result of a power failure. These critical utilities are essential to community continuity and recovery and interruption of water service may have cascading economic and environmental impacts.
- Power failure may also lead to an increase in traffic accidents because of the lack of traffic control devices, such as stoplights and railroad crossing advisory signals. Power outages lasting a long duration will force law enforcement officials to man traffic control points to prevent accidents.

#### Location

Power failures in Erie County are usually localized and are frequently the result of a natural hazard event involving high winds or ice storms. Power failure is particularly problematic for homes that are heated with electricity. Widespread power outages during the winter months can directly impact vulnerable populations, such as the elderly and medically frail. According to the 2019 American Community Survey, 29,479 homes



across Erie County are heated with electricity (American Community Survey 2019). This represents 7 percent of the total homes in the county. Gas and oil are transmitted through the county primarily by National Fuel Gas Distribution Company, Tennessee Gas, and Empire Pipeline Company.

Wastewater treatment for most municipalities is provided by municipal or private treatment facilities. There are 16 municipal wastewater treatment facilities and 187 pump stations in the county. Municipal wastewater treatment services are provided by wastewater treatment plants, wastewater treatment facilities, and sewage treatment plants. Private wastewater treatment within Erie County includes septic systems and sand filters. Where municipal sewage treatment is not available, on-site septic systems are used. Soil quality in the county is variable, resulting in many parts of the county being unsuitable for on-site wastewater treatment. Undersized or unmaintained on-site septic systems can be an issue, particularly in the drinking watersheds, where exposure and runoff can impair water quality. These wastewater facilities and pump stations are displayed in Figure 4-20 in Section 4, County Profile.

Erie County is served by a variety of communications systems, including traditional land line and cellular service provided by multiple companies, Verizon Wireless and AT&T, plus Sprint, T-Mobile and others offering 3G, 4G, and 4G LTE services (Erie County 2017). Wireless Broadband internet service is provided by Transwave and two predominant wire line broadband companies Verizon and Charter Spectrum (Erie County 2017). The Erie County Broadband Feasibility Study has outlined the development of a county broadband committee, community collaboration efforts, creation and adoption of a “dig once” policy, target broadband infrastructure projects for economic development zones or Erie County Industrial Development Agency focused sites, and development of an Open Access Network (Erie County 2017). In addition to land line, fiber optic and cellular communications systems, Erie County has an extensive radio communications network that is utilized by emergency services agencies, hospitals, law enforcement, public works, transportation, and other supporting organizations.

The most common sources of potable water within Erie County are municipal and private sources. Private sources of water include drilled wells, driven point wells, and springs. Municipal water supplies (provided by towns and cities) include community water systems, noncommunity water systems, non-transient noncommunity water systems, and water systems regulated as a condition of a “Permit to Operate” issued by the Department of Health. The Erie County Water Authority (ECWA) is responsible for ensuring compliance with treatment, reporting, and water quality standards for all public water systems (ECWA 2019). The New York State Department of Environmental Conservation (NYSDEC) Water Well Information database has begun to document potable water wells as of the year 2000, and currently reports 443 new wells drilled in the county since that date (NYSDEC 2021).

### **Extent**

The extent and severity of a power outage depends on the cause, location, duration, and time of year. It can range from a small, localized event to a countywide power outage. Impacts from an outage can be significant to the county and its residents.

Power failures often result from damage to or electrical hazards within an electric power system. System components include power generation plants, substations, circuits, switches, transformers, power lines, and power poles. Because the varied nature of power outages can range from vehicle accidents to severe weather, utility interruptions can happen at any time.

Power failures lead to the inability to use electric-powered equipment, such as: lighting; heating, ventilation, and air conditioning (HVAC) and necessary equipment; communications equipment (telephones, computers, etc.); fire and security systems; small appliances, such as refrigerators, sterilizers, etc.; and medical equipment. These



types of failures can lead to food spoilage, loss of heating and cooling, basement flooding from sump pump failure, and loss of water from well pump failure.

### **Previous Occurrences and Losses**

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Many sources provided power outage information regarding previous occurrences and losses associated with events that caused outages throughout Erie County. With so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP.

Between 1954 and 2020, FEMA included the State of New York in one power outage-related disaster (DR) or emergency (EM) declaration. Generally, these disasters cover a wide region of the State; therefore, they may have impacted many counties. Erie County was included in this disaster (EM-3186 Power Outage).

For this 2021 plan update, power outage events were summarized from 2015 to 2020. Table 5.4.12-1 includes power outage events that occurred between 2013 and 2020. With documentation for New York and Erie County being so extensive, not all sources have been identified or researched. Therefore, Table 5.4.12-1 may not include all events that have occurred throughout the county.



Table 5.4.12-1. Power Failure Events in Erie County, 2015-2020

Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	Erie County Designated?	Description
January 4, 2015	High Wind	N/A	N/A	Both broadcast media and law enforcement reported incidences. Monetary property damage totaled \$40K across the County. A low pressure tracked from western Lake Erie across far southern Ontario to Quebec and dragged a cold front across the region. Strong winds increased to near 60 mph about 2 to 3 hours after the cold front passage. The strong winds downed trees and wires across western New York. Scattered power outages resulted.
November 12, 2015	High Wind	N/A	N/A	Broadcast media reported power lines down in Erie County with \$75K in property damage reported. A strong cold front crossed the region followed by a period of strong winds to the lower parts of Lakes Erie and Ontario. Wind gusts were measured to 60 mph. The winds downed trees and power lines with scattered power outages reported. Several roads were blocked by fallen trees.
July 25, 2016	Thunderstorm Wind Lightning	N/A	N/A	Law enforcement, County Emergency Manager, and broadcast media reported power lines down in Erie County with \$49,000 in property damage. Storms first developed along a line from the east end of Lake Erie to the west end of Lake Ontario, which shifted south and east through the morning then pushing east of the region during the early afternoon. The thunderstorm winds downed trees and power lines throughout the region. Several thousand power outages were reported.
August 13, 2016	Thunderstorm Wind	N/A	N/A	Local fire departments reported power lines down in Erie County with \$15K in property damage. Thunderstorms developed across the region in a moist unstable air mass. Numerous thunderstorms developed on outflow and lake breeze boundaries. Thunderstorms downed trees and wires throughout the region. Power outages were scattered throughout the region.
September 10, 2016	Thunderstorm Wind	N/A	N/A	Social media, trained spotters, and law enforcement reported power lines down in Erie County with \$50K in property damage. Thunderstorms that accompanied a severe cold front produced damaging wind gusts. The winds downed trees and power lines across the region with scattered power outages reported. Several streets were reported blocked and closed by downed trees and wires.
January 4, 2017	High Wind	N/A	N/A	Broadcast media reported power lines down in Erie County with \$40K in property damage. Deep cold air building across the region brought strong, gusty winds to the eastern end of Lake Erie. Winds gusted to between 50 and 60 mph. A building collapse occurred in in East Pembroke with no one inside. The strong winds downed trees and power lines. Several structures were damaged by falling trees. Power outages were reported by New York State Electric and Gas and National Grid.
April 14, 2018	Ice Storm	N/A	N/A	Law enforcement reported powerlines down in Erie County with \$40K in property damage. Two rounds of mixed winter precipitation moved over the area with warm air aloft overriding a deep layer of cold air at the surface. This resulted in sleet initially that transitioned to freezing rain before temperatures eventually increased above freezing. Several areas saw nearly an inch of sleet combined with around one half of an inch of freezing rain. This resulted in thousands of power outages and substantial tree damage.



Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	Erie County Designated?	Description
October 31 – November 1, 2019	High Wind, Lakeshore Flood	YES DR-4472-NY	Yes	Official NWS Observations and river/stream gauges relayed data. Erie County had a total of \$ 18,300,000 in property damage primarily from lakeshore flooding in downtown Buffalo. A deepening area of consolidated low pressure tracked across the region on Thursday evening, October 31. This system brought recorded breaking Halloween rains, damaging wind gusts, a large Lake Erie seiche. Thousands of power outages occurred across the area, and pervasive wind-related damage closed hundreds of roads and did countless tree damage across a vast swath of the area. Enough damage was done across New York to have a Presidential Disaster Declaration. Heavy rain also brought flooding concerns.

Source: National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) 2020; FEMA 2020  
 FEMA Federal Emergency Management Agency  
 K Thousand (\$)  
 M Million (\$)  
 N/A Not applicable

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### Probability of Future Occurrences

While the probability of future power failure incidents in Erie County is difficult to predict, historical records indicate that significant power failures have occurred as a result of high winds, lightning, winter weather, and technological failures. Data were not readily available on the frequency of smaller power outages across the county; however, it is reasonable to assume that power failure events of shorter duration will continue to occur in the future. In addition, future changes in climate may also impact the frequency and probability of future power failure occurrences.

Section 5.3 provides a ranking of the identified hazards of concern for Erie County. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Committee, the probability of occurrence for utility failures in the county is considered *frequent* (hazard event has a 100 percent probability of occurring and may occur multiple times a year), and the probability for major utility failures is considered *occasional* (hazard has a 10 to 100 percent annual probability of occurring), as presented in Table 5.3-2.

### Climate Change Impacts

Climate change is beginning to affect both people and resources in New York State, and these impacts are projected to continue and become more significant. Impacts related to increasing temperatures and sea level rise are already evident in the state. The Integrated Assessment for Effective Climate Change in New York State (ClimAID) was undertaken to provide decision makers with information on the state’s vulnerability to climate change, and to facilitate development of adaptation strategies informed by both local experience and scientific knowledge (New York State Energy Research and Development Authority [NYSERDA] 2011).

Each region in New York State, as defined by ClimAID, has attributes that will be affected by climate change. Erie County is part of Region 1, Great Lakes Plains. Some characteristics of and issues affecting this region associated with climate change include water temperature related to nuclear powerplant cooling, water availability for hydropower, and high availability of wind power (NYSERDA 2011).

Temperatures are expected to increase throughout the state by 2 °F to 3.4 °F by the 2020s, 4.1 °F to 6.8 °F by the 2050s, and 5.3 °F to 10.1 °F by the 2080s. The lower ends of these ranges assume lower greenhouse gas emissions scenarios, and the higher ends assume higher greenhouse gas emissions scenarios. Annual average precipitation is projected to increase from 1 to 8 percent by the 2020s, and from 3 to 12 percent by the 2050s, and from 4 to 15 percent by the 2080s. By the end of the century, the greatest increases in precipitation are projected to be in the northern parts of the state. Although seasonal projections are less certain than annual results, this additional precipitation will most likely occur during the winter months, with the possibility of slightly reduced precipitation projected for the late summer and early fall. Table 5.4.12-2 lists projected precipitation changes within the Great Lake Plains ClimAID Region (NYSERDA 2014).

**Table 5.4.12-2. Projected Seasonal Precipitation Change in Region 1, 2020-2100 (% change)**

Baseline (1971-2000) 37.0 inches	Low Estimate (10 <sup>th</sup> Percentile)	Middle Range (25 <sup>th</sup> to 75 <sup>th</sup> Percentile)	High Estimate (90 <sup>th</sup> Percentile)
2020s	0%	2 – 7%	8%
2050s	2%	4 – 10%	12%
2080s	1%	4 – 13%	17%
2100	-3%	4 – 19%	24%

Source: NYSERDA 2014, Table 3





Annual temperatures throughout New York State have been rising since the start of the 20<sup>th</sup> century. The state's average temperatures have increased by approximately 0.6 °F since 1970, with winter warming exceeding 1.1 °F per decade. Extreme heat events are likely to increase throughout New York State, and short-duration warm season droughts will become more common.

Climatologists predict an increase in the number and intensity of severe weather events. More storms with higher winds will increase the chance that the power infrastructure will be impacted. Extreme temperatures are predicted to increase as well. During the hot summer months, potential for power overload will escalate as demand for power increases. Additionally, climatologists predict an increase in precipitation, which may lead to more winter weather, thus causing additional power failures.

### 5.4.12.2 Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable within the identified hazard area. For the utility failure hazard, all of Erie County has been identified as the hazard area. Therefore, all assets in the county (population, structures, critical facilities, and lifelines), as described in the County Profile, Section 4, are vulnerable to a utility failure. This section discusses the potential impact of the utility failure hazard on the county.

The entire county is vulnerable to the utility failure hazard. Loss of power can exert serious impacts on the health and welfare of residents, continuity of businesses, and ability of public safety agencies to respond to emergencies. Individuals with medical needs are vulnerable to power failures because medical equipment, such as oxygen concentrators, requires electricity to operate. Elderly residents (persons over 65 years old) are also vulnerable to the effects of power failure, as power failure could expose older residents to extreme heat or extreme cold. According to the 2019 American Community Survey 5-year Population Estimates, 169,007 persons are over 65 years old in the county (American Community Survey 2019). Further, households that rely on electricity to power in-home heating and cooling systems will be exposed to significantly colder or hotter indoor temperatures during a utility failure in the winter and summer months, respectively. Households that use utility gas for home heating will be less vulnerable.

Additionally, during power failure events, water purification systems may not function. Further, populations relying on private wells will not have access to potable water. Many power outages are caused by storm events that can lead to flooding. Without electricity, residents would be unable to pump water from their basements, potentially causing structural and content damage to their homes. Section 5.4.6, Flood, includes a more detailed discussion of the county's vulnerability to the flood hazard.

Data were collected from Erie County and the Planning Partnership. Insufficient data were available to model long-term potential impacts of a utility failure on the county. Over time, additional data will be collected to allow better analysis of this hazard. Available information and a preliminary assessment are provided below.

#### Impacts on Life, Health, and Safety

For the purposes of this HMP, the entire population in Erie County is considered vulnerable to utility failure events. Section 4 of this HMP, County Profile, includes a summary of population statistics for the county. Utility failures pose potential health impacts including injury and death. Other issues pertaining to power outages include food safety from lack of refrigeration and carbon monoxide poisoning from misuse of generators.

Utility failure is particularly problematic for homes that are heated with electricity. Widespread power outages during the winter months can directly impact vulnerable populations, such as the elderly and medically frail. Individuals with medical needs are vulnerable to power failures because medical equipment, such as oxygen concentrators, requires electricity to operate. The elderly population (persons over 65 years old) is also



vulnerable to the effects of power failure, as power failure could expose older residents to extreme heat or extreme cold. There are 169,007 persons over 65 years old in Erie County (American Community Survey 2019).

Furthermore, during power failure events, water purification systems may not function. Populations relying on private wells will not have access to potable water. Additionally, many power outage events are caused by storm events that can lead to flooding. Without electricity, residents would be unable to pump water from their basements, potentially causing structural and content damage to their homes.

Individuals powering their homes with generators are subjected to carbon monoxide poisoning if proper ventilation procedures are not followed. Improperly connected portable generators are capable of “back feeding” power lines, which may cause injury or death to utility workers attempting to restore power and may damage house wiring and/or generators (Community Health Care Association of New York State 2020).

### Impacts on General Building Stock

All building stock in the county is exposed to the utility interruption hazard. Section 4, County Profile, summarizes the building inventory in Erie County. Impacts sustained from utility interruption are likely to be secondary impacts. Should potable water distribution be reduced or not available, then structures could be at increased risk for structural fire since current fire suppression is dependent on accessing water from hydrants.

### Impacts on Critical Facilities

All critical facilities in the county are exposed to the utility interruption hazard. It is essential that critical facilities remain operational during natural hazard events. Backup power is recommended for critical facilities and infrastructure. Loss of power can have serious impacts on the health and welfare of residents, continuity of business, and the ability of public safety agencies to respond to emergencies. Interruption of utility gas or water distribution could also reduce the effectiveness of critical facilities to operate at full capacity.

### Impact on Economy

A prolonged power failure in Erie County may impact the county’s economy. All roadway systems and supporting resources provide services locally, regionally, nationally, and internationally. Disruption in any of these services would mean that many workers, residents, and travelers would not be able to go where needed.

Power interruptions can cause economic impacts stemming from lost income, spoiled food and other goods, costs to the owners/operators of the utility facilities, and costs to government and community service groups. Interruption of utility gas or potable water distribution could also cause significant economic impacts such as additional costs for bringing in water tenders to maintain fire suppression capabilities; opening additional warming centers should electric and utility gas utility be interrupted to residential areas; and distribution of potable water for public consumption. Significant costs could be associated with reimbursing fire departments from other counties within New York to travel, staff, and maintain water tenders within Erie County during the duration of a water outage event.

Potential modeling of economic impacts from utility interruption would be developed by calculating interruption of service costs derived from a standard value per person per day multiplied out by the number of customers served. This would help to provide an estimate of the impact of the interrupted utility service but may not be representative of the complete economic impact of a prolonged utility interruption. For example, FEMA’s benefit-cost analysis (BCA) methodology measures the loss of electrical service on a per-person-per-day-of-lost-service basis for the service area affected. The FEMA BCA Toolkit version 6.0 uses the following standard values to estimate cost of utility usage per person per day (FEMA 2020):

- Electric: \$174.00
- Potable Water: \$114.00





- Wastewater: \$58.00

### Impact on the Environment

At this time, there are no known impacts to the environment caused by utility failures.

### Future Changes that May Impact Vulnerability

Understanding future changes that impact vulnerability in the county can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The county considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development
- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

### Projected Development

Any areas of growth could be potentially impacted by utility failures because the entire county is exposed and vulnerable. However, because of increased standards and codes, new development may be less vulnerable to utility failures compared to the aging building stock in the county. Section 4, County Profile, provides more information about the new development plans for Erie County.

### Projected Changes in Population

According to the U.S. Census, the population for Erie County has decreased approximately less than 1 percent between 2010 and 2019 (U.S. Census Bureau 2021). Estimated population projections provided by the 2017 Cornell Program on Applied Demographics indicates that the county’s total population will increase to approximately 945,891 residents by 2040 (Cornell University 2017). With the projected estimates, more people will reside in the county resulting in a higher reliance on electric power or more will be living/working out of properties that do not meet existing codes and are at risk of experiencing utility failure events. Section 4, County Profile, provides additional discussion on population trends.

### Climate Change

Several implications for climate change are related to the power failure hazard. Providing projections of future climate change for a specific region is challenging. Shorter term projections are more closely tied to existing trends making longer term projections even more challenging. The further out a prediction reaches, the more subject to changing dynamics it becomes.

Climatologists predict an increase in the number and intensity of severe weather events. More storms with higher winds will increase the chance that the power infrastructure will be impacted. Extreme temperatures are predicted to increase as well. During the hot summer months, the potential for power overload will increase as demand for power increases. Additionally, climatologists predict an increase in precipitation, which may lead to more winter weather causing additional power failures and utility interruptions.

### Changes in Vulnerability Since the 2015 HMP

Utility failures are a new hazard of concern for Erie County. Since the 2015 analysis, population statistics have been updated using the 5-Year 2015-2019 American Community Survey Population Estimates (American Community Survey 2019). Overall, this vulnerability assessment uses a more accurate and updated building inventory than that used in the 2015 HMP. This information provides more accurate exposure and potential loss estimates for Erie County.