



5.4.5 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 Cattaraugus County Hazard Mitigation Plan (HMP).

5.4.5.1 Hazard Profile

Description

Power failure is defined as any interruption or loss of electrical service caused by disruption of power transmission caused by 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 tornados 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. Incidents such as these often have plenty of warning time, thus power response crews can 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 has negative impacts on public health.
- Another secondary hazard that can result 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 in turn can 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. Their interruption of service may have cascading economic and environmental impacts. Lack of power can prevent fuel pumps from operating and lead to fuel shortages.
- Power failure may also lead to an increase in traffic accidents. Traffic accidents may increase 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 Cattaraugus County are usually localized and are usually 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 2014 – 2018 American Community Survey, 4,203 homes across Cattaraugus County are heated with electricity (American Community Survey 2018). This represents 13.2 percent of the total homes in the county. Gas and electric power in Cattaraugus County are transmitted and distributed primarily by New York State Electric and Gas.

Wastewater treatment for most municipalities is provided by municipal or private treatment facilities. There are 26 municipal wastewater treatment facilities in the county. Municipal wastewater treatment services are provided by wastewater treatment plants, wastewater treatment facilities, and sewage treatment plants. Private wastewater treatment within Cattaraugus 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 which are 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. During the planning process, the Steering and Planning Committees identified 17 wastewater treatment facilities in Cattaraugus County. Of these 17 facilities, 14 are county owned. Additionally, 139 pump stations were identified, of which 132 are county owned. These facilities and pump stations are displayed in Figure 4-27 in Section 4, County Profile.

Cattaraugus County is served by a variety of communications systems, including traditional land line and cellular service provided by multiple companies, such as Verizon, AT&T, Sprint, and T-Mobile. Wireless Broadband internet service is provided by Southern Tier Wireless, DFT, and Spectrum. Plans to provide the county with fiber-optic Internet by Armstrong Communications are currently in the Engineering and Design phase. In addition to land line, fiber optic and cellular communications systems, Cattaraugus County has an extensive radio communications network that is utilized by emergency services agencies, hospitals, law enforcement, public works, transportation, and other supporting organizations.

Because of the rural nature of the county, the most common sources of potable water within Cattaraugus 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 Cattaraugus County Environmental Health Division is responsible for ensuring compliance with treatment, reporting, and water quality standards for all public water systems. 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 386 within the county new wells drilled since that date.

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. Due to the varied nature of power outage causes ranging 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; communication equipment (telephones, computers, etc.); fire and security systems; small appliances such as refrigerators, sterilizers, etc.; and medical equipment. This



all can lead to food spoilage, loss of heating and cooling, basement flooding due to sump pump failure, and loss of water due to well pump failure.

Previous Occurrences and Losses

Many sources provided power outage information regarding previous occurrences and losses associated with events that caused outages throughout Cattaraugus 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. Cattaraugus County was included in this disaster (EM-3186 Power Outage).

For this 2020 plan update, power outage events were summarized from 2013 to 2020. Table 5.4.5-1 includes power outage events that occurred between 2013 and 2020. With documentation for New York and Cattaraugus County being so extensive, not all sources have been identified or researched. Therefore, Table 5.4.5-1 may not include all events that have occurred throughout the county.



Table 5.4.5-1. Power Failure Events in Cattaraugus County, 2013-2020

Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	Cattaraugus County Designated?	Description
January 20, 2013	High Wind	N/A	N/A	Law enforcement reported trees and wires down in Perrysburg with \$15K in property damages reported.
July 1, 2014	Thunderstorm Wind	N/A	N/A	Law enforcement reported power lines down in Conewango with \$15K in property damages reported. Law Enforcement in New Albion reported trees down with \$15K in property damages reported. Law enforcement in Otto reported power lines down with \$20K in property damages reported.
July 8, 2014	Thunderstorm Wind	N/A	N/A	Law enforcement reported trees and wires down in Leon, Steamburg, Perrysburg, Gowanda, Riceville, Cattaraugus, West Valley, Hinsdale, and Allegany. Law enforcement reported trees down on a house in Dayton. \$10K in damages were reported in Leon, \$15K in Steamburg, \$25K in Dayton, \$15K in Perrysburg, \$15K in Gowanda, \$10K in Riceville, \$15K in Cattaraugus, \$15K in West Valley, \$15K in Hinsdale, and \$15K in Allegany.
August 2, 2014	Thunderstorm Wind	N/A	N/A	Law enforcement reported trees and wires down on Nolan Drive in Allegany; \$15K in property damages were reported in Allegany.
September 2, 2014	Thunderstorm Wind	N/A	N/A	The winds downed trees and power lines in the City of Olean. Damage was reported on Main Street, West Riverside Drive, Garden Avenue and South Barry Street. Law enforcement reported trees and wires down on Nolan Drive in Allegany, trees down on several streets in Olean. Allegany reported \$15K in property damages, \$60K in property damages,
May 18, 2015	Thunderstorm Wind	N/A	N/A	Law enforcement reported trees and wires downed by thunderstorm winds in Randolph with \$15K in property damages. Law enforcement reported trees and wires downed by thunderstorm winds in Little Valley with \$15K in property damages. Law enforcement reported trees and wires downed by thunderstorm winds in Ellicottville with \$15K in property damages.
June 12, 2015	Thunderstorm Wind	N/A	N/A	Law enforcement reports indicated the following: <ul style="list-style-type: none"> Downed trees and wires due to thunderstorm winds in Conewango with \$10K in property damages Trees and wires downed by thunderstorm winds in Cattaraugus with \$10K in property damages Trees and wires downed by thunderstorm winds on Route 242 in Ellicottville with \$15K in property damages Trees and wires downed by thunderstorm winds in Salamanca with \$15K in property damages Trees and wires downed by thunderstorm winds on Maple Avenue in Franklinville with \$10K in property damages



Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	Cattaraugus County Designated?	Description
June 5, 2016	Thunderstorm Wind	N/A	N/A	Thunderstorm winds caused downed trees and wires in Olean and Portville, with approximately \$25K in damages.
June 20, 2016	Thunderstorm Wind	N/A	N/A	Thunderstorm winds caused downed trees and wires, damaging two trailers in Delevan causing \$35K in damages and \$15K in damages in Yorkshire.
September 10, 2016	Thunderstorm Wind	N/A	N/A	Downed trees and power lines fell on a house on John Darling Road in Conewango with \$15K in property damages. Law enforcement reported trees and wires down by thunderstorm winds in Dayton with \$10K in property damages. Trees and wires were downed by thunderstorm winds in Otto with \$10K in property damages. Law enforcement reported trees and wires down by thunderstorm winds in South Vandalia with \$10K in property damages. Law enforcement reported trees and wires down by thunderstorm winds in Franklinville with \$10K in property damages.
September 4, 2017	Thunderstorm Wind	N/A	N/A	Law enforcement reported the following: <ul style="list-style-type: none"> Downed trees and wires by thunderstorm winds along Route 39 in Perrysburg with \$15K in property damages Trees downed by thunderstorm winds in Dayton with \$10K in property damages Trees downed by thunderstorm winds in Gowanda with \$10K in property damages Thunderstorm winds downed trees along Sawmill Run Road in Onoville with \$8K in property damages. Downed by thunderstorm winds in Humphrey with \$6K in property damages reported.
February 24-25, 2019	High Wind	N/A	N/A	Many reports were received of trees and wires down throughout the county causing substantial structural damage to homes and businesses. Thousands were reported without power with \$10K in property damages reported.

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



Probability of Future Occurrences

While the probability of future power failure incidents in Cattaraugus 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.

In Section 5.3, the identified hazards of concern for Cattaraugus County were ranked. 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), though 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. Cattaraugus County is part of Region 3, Southern Tier. Some characteristics of and issues affecting this region associated with climate change include highest agricultural revenue in the State, relatively low rainfall, increased summer drought risk, high-value crops requiring irrigation, and projected improved condition for grapes (NYSERDA 2014).

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 by up to 1 to 8 percent by the 2020s, up to 3 to 12 percent by the 2050s, and up to 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 5.4.5-2 lists projected precipitation changes within the Southern Tier ClimAID Region (NYSERDA 2014).

Table 5.4.5-2. Projected Seasonal Precipitation Change in Region 3, 2020-2100 (% change)

Baseline (1971-2000) 34.0 inches	Low Estimate (10 th Percentile)	Middle Range (25 th to 75 th Percentile)	High Estimate (90 th Percentile)
2020s	-4%	1 - 7%	9%
2050s	2%	4 – 10%	15%
2080s	3%	6 – 14%	16%
2100	-2%	5 – 20%	26%

Source: NYSEDA 2014





Annual temperatures throughout New York State have been rising since the start of the 20th century. State 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 increase as demand for power increases. Additionally, climatologists predict an increase in precipitation, which may lead to more winter weather, thus causing additional power failures.

5.4.5.2 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 Cattaraugus 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.

Overview of Vulnerability

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 2018 American Community Survey 5-year Population Estimates, 14,046 persons are over 65 years old in the county. 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 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. Section 5.4.1, Flood, includes a more detailed discussion of the county's vulnerability to the flood hazard.

Data and Methodology

Data were collected from Cattaraugus 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 Cattaraugus 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 14,046 persons over 65 years old in Cattaraugus County (American Community Survey 2018).

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 works 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 the building stock in the county is exposed to the utility interruption hazard. Section 4, County Profile, summarizes the building inventory in Cattaraugus 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 accessing water supply 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 Cattaraugus 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. There could be significant costs associated with reimbursing fire departments from other counties within New York to travel, staff, and maintain water tenders within Cattaraugus County during the duration of a water outage event.

Potential modeling of economic impacts from utility interruption would be calculating interruption of service costs which is 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 caused by utility failures to the environment.

Cascading Impacts on Other Hazards

At this time, there are no known cascading impacts caused by utility failures to other hazards of concern for Cattaraugus County.

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, due to 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 Cattaraugus County.

Projected Changes in Population

According to the U.S. Census Bureau, the population in Cattaraugus County has decreased by approximately 5.3 percent between 2010 and 2018 (U.S. Census Bureau 2020). Estimated population projections provided by the 2017 Cornell Program on Applied Demographics indicates that the county's population will continue to decrease into 2040, reducing total population to approximately 63,500 persons (Cornell Program on Applied Demographics 2017). While less people will reside in the county, those that remain that rely on electric power or are living/working out of properties that do not meet existing codes 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 thus causing additional power failures and utility interruptions.

Changes in Vulnerability Since the 2014 HMP

Utility failures are a new hazard of concern for Cattaraugus County. Since the 2014 analysis, population statistics have been updated using the 5-Year 2014-2018 American Community Survey Population Estimates (American Community Survey 2018). Overall, this vulnerability assessment uses a more accurate and updated building inventory than that used in the 2014 HMP. This information provides more accurate exposure and potential loss estimates for Cattaraugus County.