5.4.12 Utility Failure

This section presents a hazard profile and vulnerability assessment of the utility failure hazard for the Allegany County Hazard Mitigation Plan (HMP).

5.4.12.1 Hazard Profile

This section provides profile information including description, extent, location, previous occurrences and losses, and probability of future occurrences.

Description

A utility failure, or 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 long duration that would require involvement of 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 or by a 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. In most cases, incidents such as these afford plenty of warning time, allowing power response crews to stage resources in preparation for power failure.

Power failures can cause secondary hazards that affect the health of residents. One potential secondary hazard, chemical accidents, occur after power has been restored in industrial facilities. 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 exert significant health and environmental impacts.

Another secondary hazard that can result from power failure is loss of communication capabilities by first responders, which may in turn negatively affect public safety. Backup systems such as amateur radio operators may be required during a disaster to augment communications capabilities. Power outages can also lead to instances of civil disturbance, such as looting.

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. Interruption of service may result in cascading economic and environmental impacts.

Power failure can significantly affect health of the community. During periods of extreme heat or extreme cold, vulnerable populations such as the elderly and medically frail can suffer during power failures, and are susceptible to hypothermia or heat stroke. Additionally, power failure can lead to food spoilage, which also negatively impacts public health.

Power failure may also lead to an increase in traffic accidents because of lack of functioning traffic control devices such as stoplights and railroad crossing advisory signals. Long-duration power outages will force law enforcement officials to man traffic control points to prevent accidents, which may delay or prevent those officers from responding to other emergency incidents.

Extent

The extent and severity of a power outage depends on the cause, location, duration, and time of year of the incident. An incident 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 outages typically occur because of, or in combination with, other emergency or disaster incidents such as severe weather and flooding, and can exacerbate such emergencies. Severity of an incident will also depend on the electrical distribution system affected.

Power failures lead to 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 and sterilizers; and medical equipment. Interruption of service for any of this equipment can lead to a number of issues including food spoilage, loss of heating and cooling amenities, basement flooding due to sump pump failure, and loss of water due to well pump failure.

Location

Utility failures in Allegany County are usually localized, and are typically the result of a natural hazard event involving high winds or ice storms. Gas and electric power in Allegany County are transmitted and distributed by three companies: Rochester Gas and Electric Corporation (RG&E), New York State Electric and Gas Corporation (NYSEG), and National Grid. Home heating systems in the County are powered by many different sources, with a large majority using utility gas. The second most frequent source of home heating fuel is bottled, tank, or LP gas, as some areas are dependent on residential propane tanks for gas service, followed by electricity. Allegany County contains six electric providers to provide power across the County, three of which are municipal providers. These providers are described in Section 4.

Allegany County's public water supply comes from Lake Habeeb with all other surface drinking water sources being located outside of the County. Approximately 85 percent of the County's residents have access to public water and sewage services. Public water and sewer utility service throughout the County is described in Section 4.

Previous Occurrences and Losses

Between 1954 and 2015, the Federal Emergency Management Agency (FEMA) included New York State in one emergency declaration (EM) (EM-3186 in 2003), which was classified as a power outage. Generally, utility-failure disasters have covered a wide region of the State; therefore, they may have impacted many counties. While not all counties were included in the disaster declaration, Allegany County was included in this declaration (FEMA 2015).

For this HMP, major utility failure events that have impacted Allegany County between 1993 and 2016 are identified in Table 5.4.12-1. Dozens of other instances of severe storms and winter storms were been reported during this time period to have caused scattered power outages. Because information regarding specific details of utility failures in the County is scarce, knowledge of previous occurrences and losses associated with these events is limited. Therefore, Table 5.4.12-1 may not include all events that have occurred in the County. No records of other utility failures (for example, sewer) were found.

Table 5.4.12-1. Major Utility Failure Events in Allegany County, 1993 to 2015

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts
February 22, 1997	High Wind	N/A	N/A	A strong cold front crossed the region during the morning hours. Temperatures dropped 40 to 45 degrees with the passage of the front. The funneling effect of the Great Lakes combined with rapid pressure rises behind the front to produce hazardous winds. Trees, power lines, and poles were downed across the entire area. Hundreds of thousands of customers were left without power. Several cities and towns declared States of Emergency because of the prolonged lack of power.
May 31, 1998	Thunderstorm Wind	N/A	N/A	Numerous trees and wires down as well as power outages. Tens of thousands of customers were without power.
September 7, 1998	Thunderstorm Wind	N/A	N/A	Thunderstorms developed during the overnight along old thunderstorm boundaries. The severe storms produced ¾-inch hail and damaging winds. The strong winds downed trees and power lines.
March 4, 1999	Heavy Snow	N/A	N/A	Deep low pressure moved from West Virginia north across New York to Quebec, Canada. Heavy rain changed to heavy snow as cold air circulated into the region. Snow fell at the rate of two (2) to three (3) inches per hour. Nearly 10,000 customers lost power during the storm.
July 9, 1999	Thunderstorm Wind	N/A	N/A	Severe thunderstorms crossed the counties of extreme western New York producing damaging winds, downpours, and hail. The winds downed trees and power lines, and scattered power outages were reported.
July 31, 1999	Thunderstorm Wind	N/A	N/A	Violent thunderstorms ripped across western New York and the Finger Lakes region during the evening hours. The strong thunderstorms downed trees and power lines and left hundreds of thousands of customers without power. Several roads were blocked by fallen debris. Several of the falling trees caused damage to houses and automobiles.
October 13, 1999	Thunderstorm Wind	N/A	N/A	A strong cold front crossed the area. The thunderstorms that accompanied the front produced damaging winds and large hail. The winds downed trees and power lines. About 10,000 customers lost their power.
August 9, 2000	Thunderstorm Wind	N/A	N/A	Numerous thunderstorms crossed the western southern tier and Genesee valley during the evening hours. The thunderstorm winds downed trees and power lines. Thousands were without electricity.
March 9, 2002	High Wind	N/A	N/A	Low pressure over Wisconsin deepened as it moved across Lake Superior and into northern Ontario. Strong winds accompanied and followed the passage of a cold front. The damaging winds affected the entire region, downing trees and power lines and causing some structural damage. Nearly 100,000 customers completely lost power, with thousands of others experiencing brief power outages.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts
July 28, 2002	Thunderstorm Wind	N/A	N/A	Downburst winds accompanying thunderstorms across the southern tier and parts of the Finger Lakes produced isolated downed trees and power lines. Thunderstorms redeveloped during the afternoon and evening hours. As many as 15,000 customers were without power in the southern tier for several hours.
September 29, 2005	Thunderstorm Wind	N/A	N/A	A strong cold front crossed the region during the early morning hours. The thunderstorms accompanying the front produced damaging winds that downed trees and power lines. At the peak of the storms, over 30,000 customers were without power. Falling trees damaged homes and/or automobiles.
February 17, 2006	High Wind	N/A	N/A	Low pressure deepened as it tracked northeast into southern Ontario. The strong winds associated with the low pressure downed trees and power lines throughout western New York. Damage from falling trees to buildings and automobiles was extensive. Over 150,000 customers were left without power during the peak of the storm.
January 30, 2008	High Wind	N/A	N/A	A powerful cold front crossed western New York and was followed by very strong winds (west to southwest). Trees and power lines were downed by the strong winds. Utility companies reported close to 100,000 customers without power in locations scattered throughout region.
June 26, 2009	Thunderstorm Wind	N/A	N/A	An upper-level disturbance brought a round of thunderstorms to the Finger Lakes region during the early afternoon hours. Hail up to 1.5 inches was reported and the thunderstorms winds downed trees and power lines. Several thousand customers lost power because of the storm. Poor drainage flooding was reported.
May 8, 2010	High Wind	N/A	N/A	Deep low pressure passed over western New York with its trailing cold front rapidly sweeping east across the region. Winds increased within a few hours of the approaching front to gust speeds of 60 to 65 mph. Tens of thousands of customers were left without power.
March 23, 2011	Heavy Snow	N/A	No	Low pressure moved east from Iowa across western Pennsylvania to the mid-Atlantic Coast. The low brought a blanket of seven (7) to nine (9) inches of heavy, wet snow to parts of western New York. The snow resulted in slick roads and numerous motor vehicle accidents. In some locations, the weight of the moisture-laden snow brought down power lines. About 5,000 customers were without power in southern Erie, Cattaraugus, and Allegany Counties.
April 16, 2011	High Wind	N/A	N/A	An area of low pressure moved across the eastern Great Lakes region. The system brought strong winds to the area. Wind gusts were measured up to 67 mph. The strong winds downed trees and power lines. Utilities reported several thousand customers without power during the evening hours.
April 27, 2011	Thunderstorm Wind	N/A	N/A	Showers and thunderstorms accompanied the passage of a cold front across the region. The thunderstorm winds downed trees and power lines. Several hundred customers were without power.

Dates of Event	Event Type	FEMA Declaration Number	County Designated?	Losses / Impacts
January 17, 2012	High Wind	N/A	N/A	Low pressure moved across southern Ontario and pulled a strong cold front across the region during the evening hours. Thunderstorms that accompanied the front produced wind gusts up to around 70 mph. The strong winds downed trees and power lines and poles. Power outages were scattered throughout the region with utilities reporting several thousand customers without power at its worse.
September 8, 2012	Thunderstorm Wind	N/A	N/A	A line of thunderstorms developed along a pre-frontal trough and moved across the entire region from west to east from mid-morning through early afternoon. The thunderstorm winds downed trees and power lines as the fast-moving line swept across the area. Power poles were snapped in some cases and power outages were reported throughout the area. Utilities reported tens of thousands of customers without power.
January 6, 2014	High Wind	N/A	N/A	A sharp cold front crossed the region during the overnight/early morning hours. For a brief period in the wake of the front, winds increased across the region. The winds gusted as high as 60 mph. Downed trees and power lines were reported.
February 16-17, 2016	Power Outage	N/A	N/A	A power outage was reported affecting NYSEG, National Grid, and RG&E customers.

Source: NOAA-NCDC, 2016
Notes:

mph Miles per hour
N/A Not applicable
NYSEG New York State Electric and Gas Corporation
RG&E Rochester Gas and Electric Corporation

Probability of Future Occurrences

While the probability of future utility failure incidents in Allegany County is difficult to predict, historical records indicates that utility failures have occurred as a result of high winds, lightning, and winter weather.

Section 5.3 of this HMP lists the ranking of all identified hazards of concern for Allegany County. Probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Partnership, probability of occurrence of utility failures in the County is considered "frequent" (likely to occur within 25 years).

Climate Change Impacts

Climate change is beginning to affect both people and resources in New York State, and these impacts are projected to continue growing 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. Allegany County is part of Region 3, the Southern Tier. Some of the issues in this region that are affected by climate change include more frequent and intense heat waves, and an increase in frequency of intense precipitation events (NYSERDA 2014).

Temperatures are expected to increase throughout the State by two (2) to 3.4 degrees Fahrenheit (ºF) by the 2020s, 4.1 to 6.8 °F by the 2050s, and 5.3 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 one (1) to eight (8) percent by the 2020s, up to three (3) to 12 percent by the 2050s, and up to four (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 (which could increase power and telephone outages), 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 Southern Tier ClimAID Region (NYSERDA 2014).

Table 5.4.12-2. Projected Seasonal Precipitation Change in Region 3, 2020-2100 (Percent Change)

Baseline (1971-2000) 34.0 inches	Low Estimate (10th Percentile)	Middle Range (25th to 75th Percentile)	High Estimate (90th Percentile)
2020s	-1 percent	+ 1 to + 8 percent	+ 10 percent
2050s	+ 2 percent	+ 3 to + 11 percent	+ 14 percent
2080s	+ 2 percent	+ 6 to + 14 percent	+ 18 percent
2100	- 6 percent	+ 1 to + 18 percent	+ 24 percent

Source: NYSERDA 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.

5.4.12.2 Vulnerability Assessment

To understand risk, a community must evaluate its assets that are exposed or vulnerable within the identified hazard area. For the utility failure hazard, all of Allegany 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 of this HMP), are vulnerable to a utility failure. This section addresses the following factors to evaluate the potential impact of the utility failure hazard on the County:

- Overview of vulnerability
- Data and methodology used for the evaluation
- Impacts on (1) life, health, and safety of residents; (2) general building stock; (3) critical facilities; (4) economy; and (5) future growth and development
- Change of vulnerability as compared to that presented in the 2011 Allegany County HMP
- Further data collections that will assist understanding of this hazard over time

Overview of Vulnerability

The entire County is vulnerable to the utility failure hazard. Loss of power can have 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. The elderly population is also vulnerable to the effects of power failure, as power failure could expose older residents to extreme heat or extreme cold. According to the U.S. Census 2009-2013 American Community Survey, 1,604 housing units or approximately 8.7 percent of housing units in Allegany County rely on electricity to power in-home heating systems. Individuals living in these households will be exposed to significantly colder (in winter months) or hotter (in summer months) indoor temperatures during a utility failure. The 9,796 housing units (or 53.2 percent of the total) that use utility gas for home heating will be less vulnerable.

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 5.4.4 of this HMP (Flood) includes a more detailed discussion of the County's vulnerability to the flood hazard.

Data and Methodology

Data were collected from Allegany 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 Allegany County is considered vulnerable to utility failure events. Section 4 of this HMP 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 vulnerable food safety from lack of refrigeration and carbon monoxide poisoning from misuse of generators.

Individuals with medical needs are vulnerable to power failures, because medical equipment such as oxygen concentrators requires electricity to operate. The elderly population is also vulnerable to the effects of power failure, as power failure could expose older residents to extreme heat or extreme cold. 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.

Impacts on General Building Stock

The entire building stock of Allegany County is exposed and is considered vulnerable to the utility failure hazard. Section 4 of this HMP (County Profile) summarizes the building inventory of the County.

Impacts on Critical Facilities

During a power outage event, the County may undergo losses because of an interruption of critical services. Further, increased costs such as those related to providing shelters, and cooling and heating centers may be incurred. Extended power outages will require officials to shelter victims who require heat and power for activities of daily living. Power interruptions can cause economic impacts stemming from lost income and spoiled food and other goods, costs to the owners or operators of the utility facilities, and costs to government and community service groups. FEMA's benefit-cost analysis (BCA) methodology measures loss of electrical service on a person-per-day-of-lost-service basis for the service area affected. For the electrical utility, the standard value is $131 per person per day (FEMA 2014).

Future Growth and Development

As discussed in Sections 4 and 9 of this HMP, areas targeted for future growth and development have been identified across Allegany County. Any areas of growth could be impacted by the power outage hazard because the entire County is exposed and vulnerable. Specific areas of development are indicated in tabular form and/or on the hazard maps included in the jurisdictional annexes in Volume II, Section 9 of this HMP.

Change of Vulnerability

Overall, the County's vulnerability has not changed since the HMP was developed in 2011, and the entire County will continue to be exposed and vulnerable to the utility failure hazard.

Additional Data and Next Steps

For future plan updates, the County can track data on power outage events and obtain additional information on past and future events, particularly in terms of any injuries, deaths, shelter needs, pipe freeze incidents, and other impacts. These data will help to identify any concerns or trends for which mitigation measures should be developed or refined. In time, quantitative modeling of estimated power outage events may be feasible as data are gathered and improved.