Increasing Power Disruptions Challenge Utilities' Response

They grab the global headlines: hurricanes, typhoons, tornadoes, severe winter storms, and heat waves. While property destruction and loss of life deservingly dominate the headlines, the power outages these events create are part of the story, too. Superstorm Sandy created several headlines around the response of utilities to outages the storm caused.

Several trends are pressuring utilities to better plan for and respond to outages across their customer footprint. This includes the increase in number and intensity of weather events and the dependence on always-available power to supply the devices that drive our continually connected society.

Weather induced power outages increasing

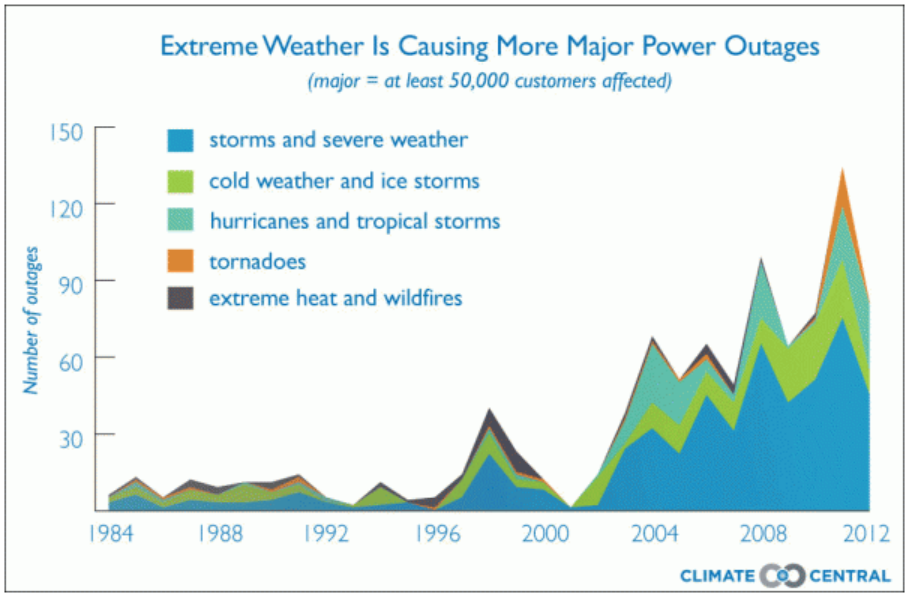
According to research by Climate Central, power outages caused by weather have increased significantly from 1980 – 2012 and their impact is widening:

- Power outages increased tenfold during the study period
- Weather caused 80 percent of the reported outages
- 300 to 500 million people in the US were impacted by power outages during that period

While most of the outages are due to storms, the Climate Central research also showed utilities need to be prepared for other weather related causes such as temperature extremes and fire.

Among weather-related outages:

- 59 percent of the weather-related outages analyzed were caused by storms and severe weather
- Nearly 19 percent by cold weather and ice storms
- 18 percent by hurricanes and tropical storms
- 3 percent by tornadoes
- 2 percent by a combination of extreme heat and wildfires



Credit: climatecentral.org

Researchers examined the intensity of weather events and uncovered interesting correlations to the duration of power outages. A five percent increase in annual average wind speed produced a 56 percent increase in the total amount of time that a utility's customers are without power over the course of a year. Additionally, a 10 percent increase in annual precipitation works out to a 10 percent increase in power outage duration.

Increasing power demand pressures utilities

A perfect storm is brewing for utilities. In parallel with the increase in power outages, is an even greater demand for power. The U.S. Energy Information Administration predicts that by 2040, the worldwide demand for electricity will increase 56 percent.

A recent survey shows that 84 percent of people encounter significant problems if power outages last longer than one day. Sixty-four percent of people report that losing access to electronics is a problem for both short and longer term outages. Losing the ability to heat or cool a house and loss of food is also a serious concern for people when dealing with power outages.

Lead time a critical requirement for efficient power outage response

Meeting these demands requires a multi-faceted approach that turns technology into decision support services that can be delivered on-time or on-demand to quickly mitigate the impact of outages when they occur.

Utilities must leverage rapidly advancing weather and analytics technologies to develop tools that help the preparation phase before an impactful weather event. The biggest challenge is determining what level of response is required, with a long enough lead time to do something proactively about it.

Utility professionals have to consider much more than just storm impact when deciding on the appropriate level of preparation and response. If impactful weather occurs during the week and the impact is small, internal resources may be adequate to cover the storm with some holding of crews over or bringing other shifts in early. However, if the impactful weather occurs over the weekend or around holidays, even if the impact is small, it may be hard to get adequate resources to respond in a timely fashion.

When weather events are significant and widespread, a utility may need mutual assistance from other utilities. Mutual assistance decisions must be made early in storm preparations to ensure their availability. Additionally, once the crews are acquired, they must travel to the location to begin restoring as soon as the weather clears to do so safely.

How technologies, like outage prediction, keep the lights on

Utilities are turning to outage prediction tools to help them meet the requirement for advanced planning. Connecting an outage prediction tool to a weather forecast model that can predict weather conditions out several days provides the utility with the lead time to analyze and adjust to the potential weather scenario. This allows them to plan for the appropriate response level.

Outage prediction tools consider several variables in the models. Wind and precipitation are common factors that directly correlate to outages and are integral to any model. There are secondary factors such as foliage, soil moisture, age of forest, and time since last storm that can greatly enhance the outage model logic. Incorporating historical forecasts further trains and refines the model as observed weather does not always match the forecast. Combing these data points with the utility's outage history provides a comprehensive prediction model for utilities to take action against.

As the demands for uninterrupted power increase, utilities cannot afford to under plan for an event or fail to act soon enough. Regulators have become sensitive to the negative publicity and customer dissatisfaction with utility response after the major storm events of the past few years. They have put increased pressure on utilities to take a hard look at storm preparation and to take action in ways that can improve the process. An outage prediction tool incorporated into the storm preparation phase will help utility managers proactively prepare and respond to outages helping to minimize customer disruption, and maximize the use of restoration resources.

Learn more about how to leverage outage prediction in your operations or contact an IBM representative.

About the author
Brandon Hertell is an Offering Manager for Energy & Utilities in IBM Insight Cloud Services and an American Meteorological Society Certified Consulting Meteorologist. Prior to IBM, Brandon worked for Con Edison, the utility company serving New York City and parts of southern New York. As the company meteorologist he provided weather forecasts and led the development of their weather analytics and outage modeling programs.