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Public Service Commission of Wisconsin
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BEFORE THE
PUBLIC SERVICE COMMISSION OF WISCONSIN

Joint Application of Wisconsin Electric Power Company and Wisconsin Gas LLC for Authority to Adjust Electric, Natural Gas, and Steam Rates	Docket No. 5-UR-110

DIRECT TESTIMONY OF STEVEN A. PECHA

Q. Please state your name, business address and title.

A. My name is Steven A. Pecha. My business address is 333 West Everett Street, Milwaukee, WI 53203. I am employed as the Manager of Electric Distribution Reliability, Planning and Asset Management at Wisconsin Electric Power Company ("Wisconsin Electric").

Q. Please describe your educational background and professional experience.

A. I have been employed by Wisconsin Electric since June 1991. I graduated from the University of Wisconsin-Madison with a Bachelor of Science Degree in Electrical Engineering and Computer Engineering Option in 1991. During my career with Wisconsin Electric, I have provided engineering services in various capacities, but the majority of my career has been in the distribution planning area. From April 1999 to December 2008, I was a Supervising Engineer of Distribution Planning Development and was responsible for network modeling and load analysis tools, distribution planning work procedures, and engineering support to the Electric Distribution Control Center and Electric System Operations. Since January 2009, my principal responsibilities have included the development and implementation of strategic electric distribution system infrastructure projects that support reliability and life-cycle replacements of the distribution system. I am a registered Professional Engineer in the State of Wisconsin.

Q. Have you previously testified before the Public Service Commission of Wisconsin ("Commission")?

A. Yes. I testified before the Commission in Docket 5-CE-139, the Joint Application of Wisconsin Electric Power Company, as an Electric Public Utility, for Authority to Construct a New Distribution Substation and Related Electric Distribution Facilities in the City of Wauwatosa and American Transmission Company, LLC, as an Electric Public Utility, for Authority to Construct Related 138 kV Electric Transmission Facilities in the Cities of Milwaukee and Wauwatosa, all in Milwaukee County, Wisconsin (the Western Milwaukee County Electric Reliability Project).

Q. What is the purpose of your direct testimony in this proceeding?

A. The purpose of my testimony is to explain the company's investment over a ten year period to "harden" or improve the reliability and resiliency of Wisconsin Electric's distribution system against the impact of severe storms (the "Storm Hardening Program"). At a high level, the Storm Hardening Program consists of undergrounding approximately 600-800 miles of overhead distribution lines in various areas of Wisconsin Electric's service territory; adding equipment that allows us to isolate outages; and increasing the automation of our distribution system. Wisconsin Electric is planning to invest $38 million in the Storm Hardening Program in test year 2023, and $700 million over the life of the program. We anticipate the Storm Hardening Program will significantly reduce outages for Wisconsin Electric's customers, and substantially increase the resiliency of Wisconsin Electric's distribution system.

Q. Are you sponsoring any exhibits with your testimony?

A. Yes. I am sponsoring the following exhibits:

- Ex.-WEPCO/WG-Pecha-1 is a map showing Wisconsin Electric's overhead distribution system infrastructure greater than 50 years old;
- Ex.-WEPCO/WG-Pecha-2 is a graph showing Wisconsin Electric's wood pole age distribution;
- Ex.-WEPCO/WG-Pecha-3 is a map depicting the August 10-14, 2021 storm and recovery effort; and
- Ex.-WEPCO/WG-Pecha-4 is a map of Wisconsin Electric's Storm Hardening Program project areas.

Q. Explain why the Storm Hardening Program is needed.

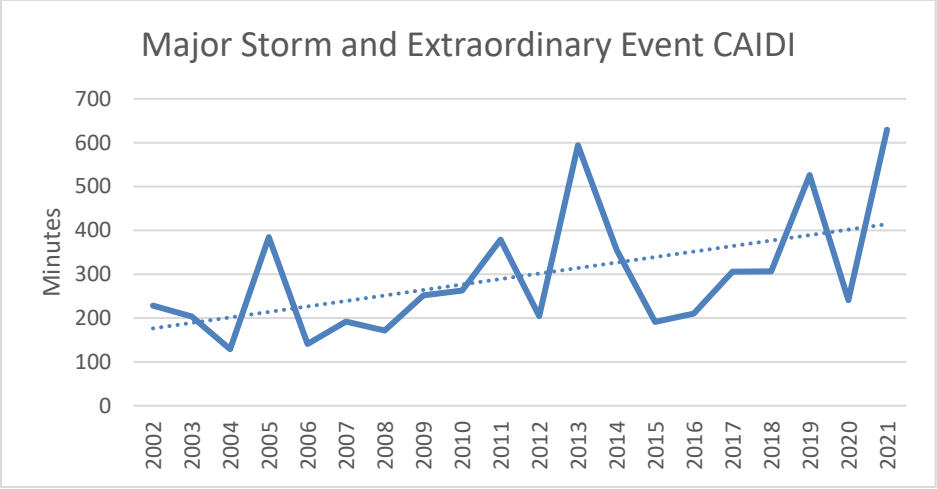
A. As shown in Ex.-WEPCO/WG-Pecha-1, more than one-quarter of Wisconsin Electric's overhead distribution system was constructed over 50 years ago. As a result, an increasing proportion of the company's overhead distribution facilities installed in the 1970s and earlier is approaching the end of its design life. Further, as shown in Ex.-WEPCO/WG-Pecha-2, over 29 percent of Wisconsin Electric's wood poles will be greater than 50 years old by 2027.[1] Because of the age of the overhead components, Wisconsin Electric's distribution system is more susceptible to significant damage during severe weather events, which in turn has resulted in increased restoration times for customers across our service territory. Our investment in the Storm Hardening Program will improve the reliability and resiliency of Wisconsin Electric's distribution system.

[1] The age of wood electric poles is a useful proxy for the age of the majority of overhead system components, including overhead conductors, distribution transformers, switches and protective devices.

Q. What is Wisconsin Electric's current average restoration time following severe weather?

A. Although restoration times for all severe weather are important, the average restoration time following a Major Storm or an Extraordinary Event is particularly indicative of the reliability and resiliency of the electric distribution system. Wisconsin Electric classifies a Major Storm as a weather event with at least 10,000 sustained[2] and unplanned customer interruptions over a widespread geographic area. Extraordinary Events are declared when severe weather conditions result in 100,000 or more unplanned and sustained customer interruptions, or for events of sufficient intensity that a state of emergency is declared at the local, state, or federal level. Both Major Storms and Extraordinary Events have increased over the past ten years.

Below is a chart showing the company's restoration times following Major Storms and Extraordinary Events since 2002. The Customer Average Interruption Duration Index ("CAIDI") represents the average time a customer who experienced an outage during a Major Storm or Extraordinary Event was not receiving electric service.



[2] "Sustained"outage is one that lasts greater than five minutes and covers the period from the hour when several, weather-related outages begin to occur through the last hour that has several, weather related outages

Q. What are the key benefits for Wisconsin Electric's customers of hardening the company's distribution system?

A. The key benefits include:

- Reducing total restoration times due to severe weather by an anticipated 20-25 percent.
- Providing an expected 80 percent or greater reduction in customer minutes of interruption in project areas where distribution lines are converted from overhead to underground and in areas where distribution automation is deployed.
- Reducing line clearance maintenance costs and outages due to tree degradation from the Emerald Ash Borer.

Q. In August 2021, southeast Wisconsin was hit with an Extraordinary Event. How did this storm demonstrate the need for the Storm Hardening Program?

A. On August 10, 2021, severe thunderstorms rolled through Wisconsin Electric's service territory causing widespread damage resulting in 200,000 customer outages, the most significant single event in the company's modern history. During the storm, overhead conductors, wood poles and transformers across a large portion of Wisconsin Electric's service territory were damaged by wind and fallen trees and limbs. Many of the distribution circuits that sustained the most substantial damage took the longest time to restore. Prior to this storm, the facilities on many of the affected circuits had few, if any, identified reliability or other issues. Due to the severity of the damage, it took Wisconsin Electric until Saturday, August 14 to complete all necessary restoration work. Ex.-WEPCO/WG–Pecha-3 provides a map of the storm and recovery effort.

In response to the August 2021 storm, as well as the historic increase in the restoration times from Major Storms and Extraordinary Events, Wisconsin Electric identified opportunities to accelerate its ongoing work to improve the reliability and resiliency of its electric distribution system, and to enhance customer experience. This effort, which remains ongoing, led Wisconsin Electric to create the Storm Hardening Program.

Q. Wisconsin Electric's affiliate, Wisconsin Public Service Corporation ("WPSC"), recently implemented a successful program to improve the resiliency of its distribution system. How will Wisconsin Electric leverage what WPSC learned to design and implement the Storm Hardening Program?

A. In 2013, WPSC began implementing its System Modernization and Reliability Project ("SMRP"), which made significant investments in WPSC's electric distribution system in various locations to improve the reliability of its electric service. Through the SMRP, WPSC invested approximately $220 million over a five-year construction period to underground approximately 200-300 miles of distribution lines. As a result of the SMRP's initial success, WPSC expanded the scope of the project to include an additional 960 miles of underground circuit installation over a four-year construction window for an additional $211 million investment. Since implementing the SMRP, WPSC has seen a reliability improvement of 42 percent, including a 96 percent reduction in electric outage minutes in those areas where overhead lines were replaced with underground circuits. Wisconsin Electric will apply the "lessons learned" during the SMRP in the areas of materials sourcing, construction planning, seasonal construction, and project execution in its Storm Hardening Program.

Q. What prior experience does Wisconsin Electric have with distribution hardening?

A. In 2016, as a result of significant asset renewal and reliability improvement needs in its service territory in the Neenah area, Wisconsin Electric implemented a multi-year program to upgrade existing 4 kV distribution facilities to standard 12 kV operation and rebuild or move roughly 50 miles of overhead power lines underground. This program resulted in a substantial improvement in reliability—a 93 percent reduction in customer minutes of interruption—compared to the five-year period prior to the start of the program.

Q. What are the key elements of Wisconsin Electric's Storm Hardening Program?

A. The key elements of the multi-year plan include:

- Undergrounding: convert approximately 600-800 miles of overhead distribution lines to underground lines in various areas throughout the company's service territory;
- Sectionalizing: install approximately 1500 reclosers (switching devices similar to a circuit breaker) with communication and control technology to enhance fault locating, isolation and service restoration capabilities; and
- Automation: implement distribution automation on 300 distribution circuits, which will allow us to isolate faults and automatically reconfigure the distribution system in order to accelerate restoration times following an outage.

Q. Please describe the undergrounding element of the Storm Hardening Program in more detail.

A. Wisconsin Electric's average annual investment of approximately $55 million over the expected life of the program will target an average of approximately 60-80 miles of

undergrounding per year, resulting in undergrounding approximately 600-800 miles of overhead distribution lines over a ten-year period. This investment builds on Wisconsin Electric's existing 8 kV voltage conversion plans to a standard 24.9 kV distribution system in both urban and suburban areas in southeastern Wisconsin.

Undergrounding overhead distribution lines ultimately improves distribution system resiliency to weather and tree-related outages (including the impacts of fallen trees and limbs from outside the overhead line clearance zone due to tree degradation from the Emerald Ash Borer), and reduces future line clearing costs. The undergrounding investment is approximately $550 million over the ten-year window.

Q. Please describe how Wisconsin Electric's Storm Hardening Program will allow the company to more quickly locate and isolate faults in the distribution system due to outages.

A. In order to improve Wisconsin Electric's ability to locate and isolate faults on the distribution system due to a storm outage, the Storm Hardening Program will triple the number of line recloser devices with remote fault locating, isolating and service restoration capabilities installed each year. This process is referred to as "sectionalizing," because the new line recloser devices allow Wisconsin Electric to remotely isolate and repair specific sections of the distribution system. These devices will help limit the impact of temporary faults on the system from fallen limbs and trees during significant weather events by "reclosing" the circuit and restoring power automatically to customers when the fault clears, and by providing information and allowing the operator to remotely reconfigure the system when a permanent fault occurs to restore as many customers as possible from alternate sources without having to dispatch troubleshooters or line crews

to manually perform switching at multiple locations. Further, the use of sectionalizing will also provide increased remote fault location, isolation and reconfiguration capabilities on the distribution system during non-weather events such as those caused by equipment failure, vegetation contact and other related causes. As part of the Storm Hardening Program, Wisconsin Electric plans to install approximately 150 recloser devices each year of the program for a total of approximately 1,500 recloser devices during the ten-year program.

Q. Please describe in more detail the investment in distribution automation.

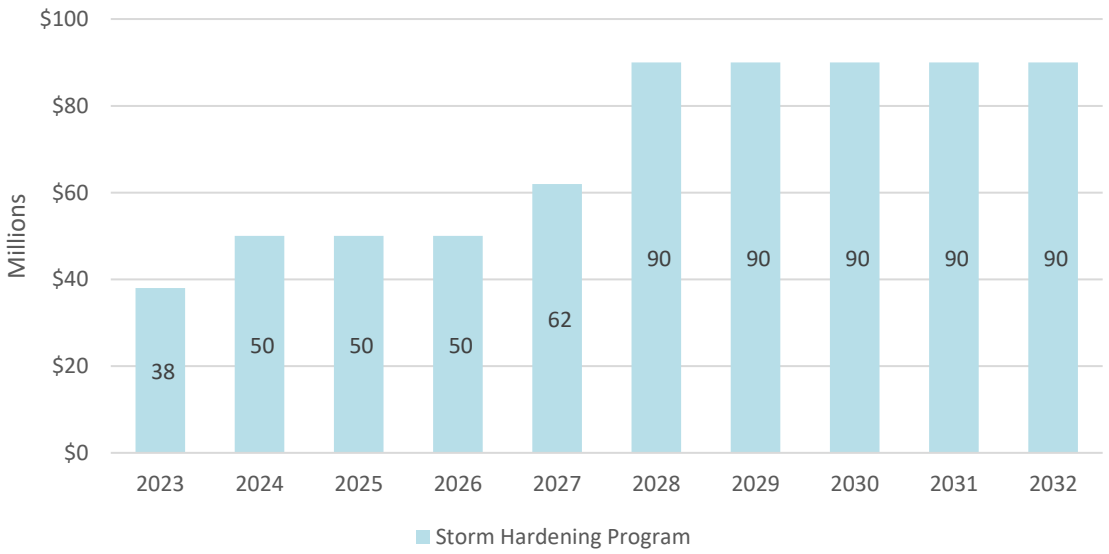
A. To further enhance the capabilities of the new line recloser devices, and the benefits of sectionalization, Wisconsin Electric plans to implement distribution automation on 300 additional distribution circuits. Distribution automation will allow Wisconsin Electric to automatically isolate faults and reconfigure the distribution system to restore service following an outage. Expanding the use of distribution automation will leverage the distribution system's inherent diversity of substations and circuits, especially in urban and suburban areas, and improve resiliency to severe weather events. To prioritize distribution automation work under the Storm Hardening Program, we plan to focus on areas and facilities with the greatest susceptibility to severe weather events—including areas with higher risk factors such as the age and condition of wood poles and conductors. Increasing the use of distribution automation will improve the reliability of the distribution system compared to historical circuit performance. Wisconsin Electric plans to invest approximately $150 million over the ten-year Storm Hardening Program in line recloser devices and associated distribution automation.

Q. Is the Storm Hardening Program limited to particular areas of Wisconsin Electric's service territory?

A. No, the Storm Hardening Program includes undergrounding and distribution automation projects throughout Wisconsin Electric's service territory. Program areas will be located in urban, suburban, and rural communities served from Wisconsin Electric's primary voltage systems. Ex.-WEPCO/WG-Pecha-4 is a map of the program area. The Storm Hardening Program will also improve reliability and resiliency of the distribution system in areas not currently designated for specific projects, because the Storm Hardening Program will increase Wisconsin Electric's ability to quickly restore electric service across its service territory after significant storm events.

Q. What is the cost and schedule for the Storm Hardening Program?

A. The company plans to invest approximately $700 million from 2023 through 2032 as shown in the chart below:



Q. Did Wisconsin Electric consider alternatives to pursuing the Storm Hardening Program?

A. Yes, we considered several alternatives to replacing overhead lines with underground lines, including simply maintaining current system and maintenance practices; continuing system maintenance, but increasing right-of-way maintenance; and replacing aging distribution mains with hardened above-ground poles, lines, and related equipment. Based on our experience operating the distribution system, the age of the current distribution system, and the recent increased frequency of significant storm events, we determined that the Storm Hardening Program would most effectively improve the reliability and resiliency of Wisconsin Electric's distribution system against the impact of severe storms compared to these alternatives.

Q. Does this conclude your direct testimony?

A. Yes.