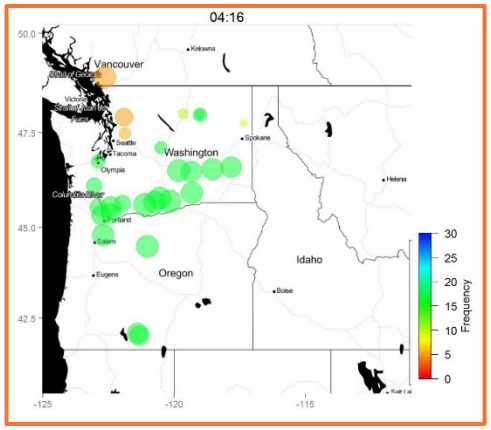
GRID MODERNIZATION LABORATORY CONSORTIUM
U.S. Department of Energy

Mode Meter: Keeping Oscillations in Check

CHALLENGE

The 1996 West Coast blackout cost the United States an estimated $2 billion. The root cause of the outage was small swings, called oscillations, in the nation's alternating current power system. Oscillations are created when various devices on the grid interact with each other. These are usually benign events, but in some cases, the small swings grow into major grid disturbances.

Events like the 1996 blackout reinforced the need for a technology that quickly identifies and reports oscillations before they create instability and cascade into costly power outages.



Mode Meter helped to create this visual display of Northwest grid activity.

SOLUTION

Researchers at Pacific Northwest National Laboratory joined with colleagues at Montana Tech and the University of Wyoming to develop Mode Meter. This software uses data from advanced sensors—called synchrophasors—placed on power lines and other electrical transmission devices to obtain precise, time-synchronized data about power grid operation. More than 1,100 of the sensors are now deployed across the U.S. power system. Mode Meter analyzes the synchrophasor data to determine when power swings are growing unstable and displays the information in an easy-to-read visual tool.

IMPACT

With increasing power oscillations as renewable energy sources connect to the grid, Mode Meter's ability to detect and report grid instabilities enables power operators to act quickly and prevent a blackout—potentially avoiding costly and inconvenient power disruptions. Industry applications developed by the Bonneville Power Administration and Peak Reliability (formerly part of the Western Electricity include key components of Mode Meter, helping to keep electricity flowing.

In November 2014 the U.S. Department of Energy launched the GMLC, a strategic partnership between DOE and the national laboratories to bring together leading experts and resources to collaborate on national grid modernization goals.

This integrated effort builds on prior individual projects at the national laboratories to deliver grid-related advancements, such as **Mode Meter**.

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