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Available Technologies

Regulation Services with Demand Response

SUMMARY

With increased levels of wind and solar power on the electrical grid, utilities are finding it more difficult to predict their power generation capabilities. At the same time, utilities need frequency regulation and load following capacity to counteract the expected minute-to-minute shortages and overages in power generation to meet demand. Historically, these resources have been provided through hydropower and natural-gas powered generators.

Today, researchers at Pacific Northwest National Laboratory have invented a way to use grid frequency information to inform smart loads and devices of how to adjust their operations (i.e. decrease increase demand) to provide various “ancillary” services for utilities, including frequency regulation. These devices measure grid frequency directly from a wall outlet while meeting consumer-set objectives, such as charging an electric vehicle’s battery by a certain time of day or maintaining a water heater’s temperature.

The algorithms used in this regulation tool allow the U.S. electrical grid to maintain its standard frequency of 60 Hertz. The result is less power fluctuations that require the start up or shut down of conventional generators to compensate, thereby increasing emissions and reducing wear and tear on the generators.

ADVANTAGES

- * Reduced generator maintenance costs (due to less wear and tear from start and shut-down operations).
- * Less emissions from generators
- * Provides a range of ancillary services, including frequency regulation, load following, and spinning reserve.

STATE OF DEVELOPMENT & AVAILABILITY

The software has been demonstrated on a hot-water heaters and electric vehicle battery charging systems. [Related Links](#)

» Grid Friendly Appliance Controller

For more information about this complementary technology also developed at PNNL
<http://availabletechnologies.pnl.gov/technology.asp?id=61>

» Smart Charger Controller



This technology, also developed at PNNL, works with this Regulation technology

<http://availabletechnologies.pnl.gov/technology.asp?id=284>

» **Demand Response**

This technology can be linked with the Demand Response technology developed at PNNL

<http://>

» **Water Heater Controller**

The Water Heater Controller technology, also developed at PNNL, works with Regulation tools

<http://>

Technology Portfolio(s)

» Smart Grid Devices

Potential Industry Applications

» Energy & Utilities

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