INNOVATION

Research & Development • Design & Engineering • Forecasting & Analysis
Consultancy • Certification & Standards • Efficiency • Emerging Technologies

PGE's 'SMART' GAS PLANT HELPS BALANCE WIND, SOLAR

Cogeneration effort seeks to mitigate supply issues in renewables variability

The new wind-balancing power plant includes 12 fast-starting Wärtsilä 50SG engines.

Portland General Electric Company recently announced that its Port Westward Unit 2 plant, a 220-megawatt natural gas-fired power plant located near Clatskanie, Ore., went into service on Dec. 30, 2014 and is now available to generate electricity for PGE customers. The new plant is a highly efficient facility designed for maximum flexibility to help meet real-time fluctuations in customer demand and integrate renewable resources.

"With the growing amount of variable renewable power coming online, this type of flexible resource is essential in helping us continue to provide reliable service to our customers in an increasingly complex environment," said Jim Piro, PGE's president and CEO.

The plant is comprised of 12 reciprocating engines supplied by Wärtsilä North America that are designed to be highly efficient, flexible and responsive. The 25,000-horsepower 50SG engines are the first of their size in the country to run entirely on natural gas.

"Port Westward Unit 2's advanced technology and unique configuration allows PGE to ramp up the plant to full load in less than 10 minutes," said Rick Tetzloff, PGE's project manager for Port Westward Unit 2. "This flexibility allows us to adjust quickly when renewable energy — like wind and solar — rise and fall with natural variability. And it also means that on peak demand days, our customers benefit from increased reliability."

Port Westward Unit 2 serves as an important component of the company's diversified portfolio of energy resources, complementing the new 267-megawatt Tucannon River Wind Farm brought online on Dec. 15, 2014.

Fast-reacting capacity is needed to balance sudden fluctuations in the renewable energy supply in real-time. Wärtsilä's power plants have an extensive track record of such operation in Kansas, Colorado and Texas. Smart Power Generation technology helps utilities reach their targets for renewable energy. Agile generation not only supports, but enables more wind and solar power.

The new plant is adjacent to PGE's existing natural gas-fired Port Westward and Beaver plants in Columbia County, Ore. Construction, which began in May 2013, created more than 400 jobs. The plant was completed ahead of schedule and on budget under fixed-price contracts, with final construction costs expected to be approximately $300 million, excluding AFDC.

PGE's latest large-scale wind project went online in Washington State in December. The Tucannon River Wind farm consists of 116 wind turbines with capacity of 267 megawatts. The new wind farm helped PGE meet the 2015 goal for Oregon's Renewable Portfolio Standard, which calls for PGE to supply 15 percent of the electricity used

The Tucannon River Wind Farm went online simultaneously with the new wind-integrating power plant supplied by Wärtsilä.

by its customers from qualified renewable resources by 2015 and 25 percent by 2025.

Completion of Port Westward Unit 2 is a significant milestone in the implementation of PGE's 2009 Integrated Resource Plan. The plan was acknowledged by the Oregon Public Utility Commission in November 2010. Port Westward Unit 2 was PGE's benchmark proposal in a competitive bidding process conducted pursuant to guidelines established by the Oregon Public Utility Commission, using objective scoring criteria intended to identify projects that provide the best balance of cost and risk while meeting PGE customers' needs for reliable, affordable electric power.

— Source: Portland General Electric; Wärtsilä Corporation

DOE SEEKS TO IMPROVE WIND FORECASTING IN COMPLEX TERRAIN

Vaisala research targets grid integration costs, short-term forecast optimization

The Energy Department recently announced $2.5 million for a new project to research the atmospheric processes that generate wind in mountain-valley regions.

This in-depth research, will be conducted by Vaisala, a global environmental and industrial measurement company, from its Seattle, Washington and Boulder, Colorado offices, and will be used to improve the wind industry's weather models for short-term wind forecasts, especially for those issued less than 15 hours in advance. With access to better forecasts, wind energy plant operators and industry professionals can ensure wind turbines operate closer to maximum capacity, leading to lower energy costs for consumers.

The Wind Forecasting Improvement Project 2 (WFIP2) is a DOE initiative targeted at enhancing the reliability of wind forecasting around the world, but specifically in challenging areas. By doing so it seeks to reduce the cost of grid integration and help operators optimize performance through more effective short-term modeling of wind variability.

As part of this project, Vaisala and its partners have been tasked with conducting a comprehensive three-phase study of atmospheric phenomena in complex terrain, with the end goal of enhancing the widely used Weather Research and Forecasting (WRF) model and the National Oceanic and Atmospheric Administration's (NOAA) Rapid Refresh (RAP) and High Resolution Rapid Refresh (HRRR) models.

"Complex terrain creates substantial forecast challenges for wind plants in most regions," said Jack Peterson, Manager of Energy Operations Support at Southern California Edison. "We have seen many situations where the forecasts are dramatically different at neighboring wind farms with only slight elevation changes. Improving the science behind forecasts is an important step and will greatly benefit the industry by removing some of the challenges we face."

Peterson will play a supporting role to the study team steered by Vaisala and comprising of the National Center for Atmospheric Research, the University of Colorado Boulder, Sharply Focused, Lockheed Martin, Texas Tech University, the University of Notre Dame, Iberdrola Renewables, Southern California Edison, Cowlitz County Public Utility District, Eurus Energy, Bonneville Power Administration, and Portland General Electric.

The project will focus on the rugged Columbia River Gorge region between the states of Washington and Oregon — an area specifically selected because it experiences nearly all of the identified atmospheric phenomena known to impact wind energy. The efforts of Vaisala's team will be strengthened through significant collaboration with NOAA and DOE national laboratories.

Following a design and planning phase, the WFIP2 team will deploy extensive measurement equipment for an 18-month period, starting in mid-2015, to first analyze the specific environmental characteristics affecting wind flow patterns, ranging from soil moisture and surface temperatures to the unique topographical features of mountain-valley regions. These observations will then be used to update and improve the computational and atmospheric physics that underpin current forecasting models. Enhanced model predictions produced during the third phase of the project will then be compared with baseline forecasts produced by existing models to evaluate the success of the initiative.

Due to the complexity of terrain in mountain-valley regions and varying degrees of soil moisture and surface temperatures, predicting specific wind conditions presents a major challenge to utility operators looking to optimize the performance of wind turbines in these areas.

This funding will allow Vaisala and its partners to use advanced meteorological equipment to analyze specific environmental characteristics that affect wind flow patterns in the Columbia River Gorge region of Washington and Oregon.

— Source: U.S. Department of Energy; Vaisala