

# Leave it all to us

## Vaisala operates Southern California Edison's wind observation system

Southern California Edison (SCE) awarded Vaisala a three-year contract to provide a turnkey observation system for wind observations, including sensors, collection platforms, maintenance services, as well as operational data acquisition and management services.

The system provides high spatial and temporal resolution wind data for two of their wind generation facilities in Southern California. The data is used to produce more accurate short- and medium-term power output forecasts. Vaisala provides the surface observation and data acquisition system, and the satellite communications systems, communications networking, and the computing infrastructure to allow data management and delivery to the customer.

### Starting off with traditional cup and vane sensors

SCE started off by operating two weather stations at each of its four wind turbine parks. These anemometers were installed

to test the theory of utilizing forecasted wind data to more accurately forecast generation capacities for the wind generation facility. The stations, consisting only of anemometers, were located an average of 30 feet above the ground and utilized the traditional cup and vane sensors. An experimental data collection system was implemented as a part of the pilot system and over the years, these four sites served a useful purpose by providing a reasonable approximation to the wind speed and direction in the vicinity of the wind turbines. However, the four sites were inadequate for the growing power output forecasting requirements of today's electricity generation market.

### Addressing growing requirements

To address the growing requirement, SCE started utilizing the services of an external partner for wind energy forecast modeling. The models use wind speed and direction as inputs to state-of-the-art mesoscale primitive equation models.

These models are more accurate when they have sufficient input data from more accurate sensors. They forecast hourly winds, which in turn are used to forecast hourly power output for a 48-hour period. The models have demonstrated a considerable improvement over the climatological models previously used by SCE. The generation scheduling group utilizes the forecast data to formulate the wind energy resources 24 hours in advance.

In 2004, additional requirements and systems for wind power forecasting developed. One of the systems implemented assists the real-time operations center in one-hour-ahead schedule adjustments in the generation management systems.

The new short-term models, which forecast winds one to eight hours in advance, are required to predict energy power output for the use in the one-hour-ahead market. These short-term forecasts use a combination of the sophisticated mesoscale models and empirically derived statistical information, which incorporate information about the most recent conditions in each wind resource area.

### Vaisala weather stations capturing wind patterns

To reliably achieve the substantial model and generation forecast improvements, 12 weather stations were installed and are operated by Vaisala in order to complete a satisfactory grid to capture wind patterns. At one wind generation facility, seven stations are needed to represent the extremely complex terrain at this pass. Five sensing stations have been placed at a second wind turbine installation. Some of the weather sensors are located approximately 100 feet high, which represents the hub centers of many of the turbines.

*Highly reliable advanced satellite telemetry is used in the remote regions that some wind turbines inhabit.*



The installations have been equipped with Vaisala Ultrasonic Wind Sensors WS425. At two of the seven locations there are two levels of instrumentation, at 33 and 100 feet. At both levels, there are wind and temperature sensors. Additionally, at some sites there is a barometric pressure sensor near the ground. The multi-levels provide invaluable information to evaluate the mesoscale model and how well it is predicting wind shear, temperature and atmospheric stability.

### Benefits from the meteorological data

The meteorological data gathered at these sites is used in the forecast process in several ways:

- To define the statistical relationship between the wind speed and direction and the power output for individual and aggregate wind generation facilities.
- To formulate the statistical relationships between the mesoscale primitive equation model gridded output data and the observed weather conditions (wind speed, etc.) at the generation site in order to remove systematic errors in the meso-scale model forecast data due to small scale effects.
- To provide information about the current weather conditions in the wind parks to the short-term (i.e. hourly update) forecast algorithms.
- To assess and analyze the performance of the short-term and medium-term forecasts to provide a basis for further research to improve the forecasts.

### The turnkey solution and comprehensive services

SCE acquired a complete, integrated automatic weather system including the weather sensing stations, installation, operations, communications, maintenance, and data management package from Vaisala. Vaisala is responsible for the entire work scope including hardware, software, VSAT communications, engineering, field engineering, site implementation, startup commissioning, data acquisition, data storage, data access, and training on a turnkey basis.

Controlled access to the data is provided via Vaisala's Tucson office's Internet connections. The customer is gaining the benefit of the latest meteorological sensing platforms coupled with state-of-the-art communications and systems monitoring. The Tucson facility provides 24/7 monitoring and support for a complete data solution. ■

### Vaisala Services - let us maximize your data availability

Vaisala offers a portfolio of services to ensure that your Vaisala weather observation system keeps working productively, delivering the measurement data you require, over its entire lifecycle.

This lifecycle covers delivery services such as consulting, site surveying, factory acceptance testing, delivery, installation, site acceptance testing and commissioning. It covers the years of active service, supported by our Vaisala HelpDesks, preventive and corrective maintenance, trouble-shooting, and possible further consulting. And it covers system evolution: upgrading according to the needs of your evolving business.

All Vaisala services can be bundled together as you need under the terms of the Vaisala Service Contract. Your Vaisala Service Contract can include a mix of operational support, repairs, software upgrading, preventive maintenance, expedited spare part supply, extended Online Help and Field Engineer Call-out, among many other standard and customized services.

Breaking away from the more conventional service provider role, we can also be your operational partner. If network operation and the work behind ensuring the smooth flow of data is not your core business - you can leave the operations to us. Southern California Edison used Vaisala's turnkey solutions expertise to maximize efficiency. This is what many of our lightning, aviation and traffic weather data customers do. Let us maximize your data availability.

**Further information:**  
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