WEATHER, CLIMATE, AND THE NEW ENERGY ECONOMY

BY MELINDA MARQUIS

Though the relevance of weather to the energy industry's predictions of energy demand (load) has long been recognized, only recently has the crucial role of meteorological information in the industry's predictions of supply (source) been appreciated. As increasing amounts of renewable energy are being brought onto the electric grid, the need for improved weather observations and forecasts across a range of time scales is growing. At this meeting, discussions centered on creative ways to obtain new measurements, improved models, and other information required to support the instantaneous and continuous requirement to balance supply and demand in both traditional and renewable energy.

A town-hall meeting, whose keynote speech was delivered by AMS President Tom Karl, kicked off this First Conference by outlining some of the key meteorological problems hindering greater use of renewable energy and the need for collaboration among private, public, and academic sectors. The conference continued with participants discussing the value and speed of delivery of accurate forecasts of temperature, humidity, precipitation, wind speeds, and cloud cover, which influence energy demand for heating, cooling, and lighting, as well as the timing of certain industrial and manufacturing processes that depend on certain weather conditions.

Participants attempted to bridge the gap between meteorology and the energy industry by discussing the information that those in the two respective fields need from the other. Meteorologists had the opportunity to learn about unique and challenging aspects of the energy trading market. This market's incredible volatility, in which energy prices can change by a factor of as much as 3.8 within one day, as well as its possibility for negative prices, meaning that traders actually sometimes pay for others to take excess electricity to keep demand and supply balanced, leads to the prime importance of accurate weather forecasts. Deviations from the day-ahead forecast can lead to sudden and severe changes in market conditions and prices; millions of dollars are made and lost within a period of an hour, based on weather forecasts.

The paucity of relevant observations for improving forecasts of winds at turbine heights (~100 m) for onshore and offshore wind power, and of clouds (insolation) and aerosols for solar power, led to discussions of how to fill these data gaps. Techniques using remote sensing by ground-based wind profilers, radars, and

FIRST CONFERENCE ON WEATHER, CLIMATE, AND THE NEW ENERGY ECONOMY

WHAT: More than 100 participants, including representatives of academia, business, and government, discussed the nexus of weather and climate with the energy sector
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WHERE: Atlanta, Georgia

AFFILIATION: MARQUIS—NOAA Earth System Research Laboratory
CORRESPONDING AUTHOR: Melinda Marquis, NOAA/ESRL, 325 Broadway, Boulder, CO 80305
E-mail: melinda.marquis@noaa.gov

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lidars, as well as by satellite instruments, promise to deliver valuable observations, in addition to insitu observations from meteorological towers. Assimilating these data into high-resolution, rapid refresh, numerical weather prediction models should lead to improved forecasts of winds and solar radiation that the energy industry can use to make more accurate predictions of power production. Enhanced modeling of the interaction of upwind turbines on downwind turbines—wake effects—was also discussed.

The need for long-term datasets of wind and solar climatologies, as well as improved understanding of the impacts of large-scale climate drivers (such as the El Nino Southern Oscillation) on renewable energy resources, was discussed. Atmospheric scientists can provide information to support decision makers who are investing millions of dollars in siting, developing, and operating wind and solar power plants.

Jon Davis of the Chesapeake Energy Corporation, who was then the chair of the AMS Energy Committee, organized the meeting as part of the 90th AMS Annual Meeting in Atlanta, Georgia. The Third Conference on Weather, Climate, and the New Energy Economy will be held in conjunction with the 92nd AMS Annual Meeting, 22–26 January 2011, in New Orleans, Louisiana.