



# **UWIG/NREL WORKSHOP ON WIND FORECASTING APPLICATIONS TO UTILITY PLANNING AND OPERATIONS**

**February 21-22, 2008**

Saint Paul Hotel  
St. Paul, Minn., MN

## **PROGRAM AGENDA**

### **Workshop Purpose**

- Gain better understanding of wind forecasting with mesoscale models
- Gain better understanding of similarities and differences among mesoscale models and their use in producing wind plant output forecasts
- Explore the production, storage and use of contiguous historical data sets from different models for wind integration studies
- Explore the practical aspects of the use of wind forecasting models to utility wind integration studies and operations planning
- Develop better understanding of next generation integration study requirements
- Develop better understanding of operations planning requirements

The workshop format will consist of a series of panel presentations to provide an introduction and critical insights for the topic at hand, leaving sufficient time at the end of each panel presentation for a panel discussion of the critical issues and questions raised. Workshop participants are encouraged to provide questions for the panelists to Charlie Smith and Brian Parsons at any time before the workshop to enable better preparation by the panelists. Questions from the workshop participants will also be encouraged during the panel discussion periods.

### **Thursday, February 21**

7:30 a.m. – 8:00 a.m.

#### **Registration & Continental Breakfast**

Location: Promenade Foyer

8:00 a.m. – 5:00 p.m.

#### **Workshop**

Location: Promenade South

8:00 a.m. – 8:45 a.m.

#### **Opening Session**

Background and Introduction to Workshop Purpose  
Brian Parsons, National Renewable Energy Laboratory

## Wind Integration Forecasting: Insights and Requirements

Charlie Smith, Utility Wind Integration Group, and Bob Zavadil, EnerNex Corporation

- Integration studies
- Operating forecasts
- Research Needs

8:45 a.m. – 9:45 p.m.

### **Weather, Wind, and Power Data I**

#### Creating the Weather

Chair, Brian Parsons, NREL

Lead panelist, John Zack – AWS Truewind

Panelists, Mark Ahlstrom – WindLogics, Pascal Storck – 3 Tier Environmental Forecast Group, Craig Collier – Garrad Hassan, Ulrich Focken – Energy and Meteo

*What modeling technology is currently in use, how does it perform, what improvements are on the horizon.*

- Physical and statistical models
- Time scales of interest (days, hours, minutes)
- Accuracy
- Grid size
- Time step
- Computer run time
- Monitoring height
- Boundary condition data for driving solution

Discussion

9:45 a.m. – 10:00 a.m.

### **Break**

10:00 a.m. – 11:00 p.m.

### **Weather, Wind, and Power Data II**

#### Putting the Weather Forecast to Work

Chair, Michael Milligan, NREL

Lead Panelist, Mark Ahlstrom – WindLogics

Panelists, Pascal Storck – 3 Tier Environmental Forecast Group, John Zack – AWS Truewind, Craig Collier – Garrad Hassan, Ulrich Focken – Energy and Meteo

*What are the different applications for the weather forecast, what techniques are currently in use to convert the forecast to wind plant output, how do they compare, and what improvements are on the horizon?*

- Converting wind speed to wind plant output for operations forecasting
- Multiple operations forecasting requirements
- Statistical and Artificial Intelligence Methods
- Role of model data and real-time data
- Ensemble techniques

Discussion

11:00 p.m. – 12:00 p.m.

### **Weather, Wind, and Power Data III**

## Now that We Have the Data, What Next?

Chair, Debbie Lew, NREL

Introduction, Michael Milligan, NREL

Lead Panelist, Pascal Storck – 3 Tier Environmental Forecast Group

Panelists, John Zack – AWS Truewind, Mark Ahlstrom – WindLogics, Craig Collier – Garrad Hassan, Ulrich Focken – Energy and Meteo

*What are the evolving needs for wind integration study data, how is it being used, and what are the issues associated with the storage and retrieval of multi-hundred gigabyte size data sets, and the use of data sets produced by different models?*

- Evolution of wind integration studies and associated requirements
- Virtual anemometers
  - How much to store
  - Data collection interval
  - Geographical coverage
- Converting wind speed to wind plant output for planning studies
- Storage and retrieval of regional data sets
- Seams issues using different models
- Model validation and verification
- How many years of data is enough

## Discussion

12:00 p.m. – 1:00 p.m.

### Lunch

Location: Promenade North

1:00 p.m. – 2:50 p.m.

## Integration of Forecast Data into Utility Operations Planning Tools

Forecasting for Operations Planning I

Chair, Bob Zavadil, EnerNex Corporation

*What forecasting products are needed for the different time frames associated with operations planning, what are the similarities and differences between them, what real-time data is required, how can the different forecasting capabilities be used to solve problems for the BA and market operators, how should the forecasts be evaluated, how accurate are they.*

- Different time scales of interest
  - Very short term (0-3 hrs)
  - Short term (3-12 hrs)
  - Intermediate term (12 hr - 4 days)
- Metrics for forecast performance in different time frames and different applications – how to measure value
- Focus on capturing events or error measurement
- Sensitivity of forecast accuracy to forecast area
- Outlook for improvements in forecast accuracy
- Requirements for and role of real-time data

## Overview

Bob Zavadil

- Forecasting applications and time scales

- Utility requirements
- RTO requirements
- Owner requirements

Short Term Forecasting: Methods and Metrics  
Mark Ahlstrom, WindLogics

Panel Discussion with Utilities, ISOs, Consultants

2:50 p.m. – 3:10 p.m.

**Break**

3:10 p.m. – 5:00 p.m.

**Integration of Forecast Data into Utility Operations Planning Tools cont'd**

Forecasting for Operations Planning II  
Chair, Gary Jordan, GE Energy

Intermediate Term Forecasting: Methods and Metrics  
Pascal Storck, 3Tier Environmental Forecast Group

A Benchmarking Proposal:  
John Zack, AWS/Truewind

Panel Discussion with Utilities, ISOs, Consultants

5:00 p.m.

**Adjourn**

6:00 p.m. – 7:30 p.m.

**Reception**

Location: M Street Landing

## **Friday, February 22**

7:30 a.m. – 8:00 a.m.

### **Continental Breakfast**

Location: Promenade Foyer

8:00 a.m. – 12:00 p.m.

### **Workshop**

Location: Promenade South

8:00 a.m. – 10:15 a.m.

### **Integration of Forecast Data into Utility Operations Planning Tools Cont'd**

What's Happening in the Real World?

Chair, Matt Schuerger, Energy Systems Consulting Services

*How are wind plant output forecasts being used in day-to-day utility operations?*

*What is the experience to date? How well do they meet operating needs? What improvements and additional capabilities are needed?*

- Practical implementation experience and questions
- Control room requirements as currently understood
  - Graphic displays
  - Forecasting position on the operating floor?
- Research Projects underway and required

Practical Experience from a Forecasting Trial

AESO – Darren McCrank

Wind Forecasting Applications to System Operation: ANEMOS.plus

UC-Dublin – Mark O'Malley

Integrating 50 GW of Wind Power – Practical Experience from Europe

Energy and Meteo – Ulrich Focken

Developing an Integrated Operational Forecasting System: RDF Project

WindLogics – Josh Stinogel

Wind Power Forecasting Experience in Spain

REE – Gerardo Gonzalez

Wind Forecasting Requirements and Experience at Energinet.dk.

Energinet.dk – Lasse Diness Borup

Discussion

10:15 a.m. – 10:30 a.m.

### **Break**

10:30 a.m. – 11:45 a.m.

### **Integration of Forecast Data into Utility Operations Planning Tools**

Forecasting Requirements and Thoughts from EMS/SCADA Vendors

Chair, Chetty Mamandur, MISO

*What additions and modifications will be required to systems operation and market operation software to handle the additional variability and uncertainty associated with increasing levels of wind generation? What are the EMS vendors' views of the emerging needs of the marketplace? Where do we stand?*

- Forecasting applications and system design considerations
- Adding forecasting products to EMS/SCADA Systems and market operations software
- Outlook for stochastic unit commitment algorithms

#### Wind Forecasting System Requirements for CAISO

CAISO – Jim Blatchford

#### Wind Forecasting System Design Considerations for NYISO

NYISO – Dave Edelson

#### Thoughts from AREVA

AREVA T&D - Avnaesh Jayantilal

#### Thoughts from ABB

ABB - Jorge Naccarino

#### Discussion

11:45 p.m.

#### **Closing Discussion and Action Items**

Led by Charlie Smith, UWIG

12:00 p.m.

#### **Adjourn**