



2019 METEOROLOGY & MARKET DESIGN FOR GRID SERVICES WORKSHOP

June 4-6, 2019

Embassy Suites Denver Downtown
Denver, Colorado

DRAFT PROGRAM AGENDA

Tuesday, June 4, 2019

7:00 a.m. – 8:00 a.m.

Registration & Breakfast

Location: Silverton 3

8:00 a.m. – 12:00 p.m.

Tutorial: Use of Forecasts in System Operations – How are Forecasts Being Used Today

Location: Silverton 1/2

Co-Chairs: **Erik Ela & Aidan Tuohy**, EPRI

10:00 a.m. – 10:30 a.m.

Break

Location: Silverton Foyer

12:00 p.m. – 1:00 p.m.

Lunch

Location: Silverton 3

1:00 p.m. – 2:00 p.m.

Welcome and Overview Session

Location: Silverton 1/2

Introduction

Mark Ahlstrom, NextEra Energy Resources

Local Welcome

Martin Keller, Director, NREL

Keynote Remarks

TBD

Meeting Overview

Charlie Smith, ESIG

2:00 p.m. – 5:00 p.m.

Opening Plenary Session: Common Ground – Forecasting & Market Design for Clean Energy Futures

Location: Silverton 1/2

Chair: **Bethany Frew**, NREL

Linkage between Market Design and Forecasting – Why It Should be Even Tighter
Mark Ahlstrom, NextEra Energy Resources

How Much, How Far, How Certain – Market Proposals and Forecasting Implications
Rob Gramlich, Grid Strategies

Use of Probabilistic Forecasts – Are We Finally Ready to Use Them?
Ben Hobbs, Johns Hopkins University

Grid Services and Future System Values – The Big Picture
Mark O'Malley, NREL

Panel Discussion – What Are Your Major Drivers of Market Redesign Today?

Additional panelists:

Emma Nicholson, Concentric Energy Advisors

Richard Tabors, Tabors/Caramanis/Rudkovich (invited)

TBD

3:30 p.m. – 4:00 p.m.

Break

Location: Silverton Foyer

6:30 p.m. – 8:00 p.m.

Networking Reception

Location: Cripple Creek

Wednesday, June 5, 2019

7:00 a.m. – 8:00 a.m.

Registration & Breakfast

Location: Silverton 3

8:00 a.m. – 10:00 a.m.

Forecasting Session 1: Solar Forecasting 2 Program

Location: Silverton 1/2

Chair: **Tassos Golnas**, DOE

Panel 1

Open Source Evaluation Framework for Solar Forecasting

Justin Sharp, Sharply Focused

Advancing the WRF-Solar Model to Improve Solar Irradiance Forecast in Cloudy Environments

Yangang Liu, Brookhaven National Lab

HAIMOS Ensemble Forecasts for Intra-day and Day-Ahead GHI, DNI and Ramps
Hugo Pedro, UCSD

Development of WRF-Solar v2—Improving Solar Forecasts
Larry Berg, PNNL

Probabilistic Cloud Optimized Day-Ahead Forecasting System based on WRF-Solar
Manajit Sengupta, NREL

Advanced Solar and Load Forecasting Incorporating HD Sky Imaging
Paul Kalb, Brookhaven National Lab

Panel 2

Solar Uncertainty Management and Mitigation for Exceptional Reliability in Grid Operations
Bri-Mathias Hodge, NREL

Probabilistic Forecasts and Operational Tools to Improve Solar Integration
Aidan Tuohy, EPRI

Coordinated Ramping Product and Regulation Reserve Procurements in CAISO and MISO using Multi-Scale Probabilistic Solar Power Forecasts
Venkat Krishnan, NREL

Additional Panelist: **Justin Sharp**, Sharply Focused

8:00 a.m. – 10:00 a.m.

Markets Session 1: Hybrid Resources and Virtual Power Plants – Are They for Real?

Location: Cripple Creek 2

Chair: **Erik Ela**, EPRI

A VPP Case Study
Ulrich Focken, energy & meteo systems, Germany

Behind-the-Meter Resources, Aggregations and Market Participation
Jim Baak, Consultant

Alternative Market Designs for Various Hybrid Resources
Nikita Singhal, EPRI

How Will a Hybrid PV-Battery Plants Bid into a Market?
Gary Dorris, Ascend Analytics

10:00 a.m. – 10:30 a.m.

Break

Location: Silverton Foyer

10:30 a.m. – 12:00 p.m.

Forecasting Session 2: Forecasting for Distributed Energy Applications

Location: Silverton 1/2

Chair: **Bri-Mathias Hodge**, NREL and UC Boulder

Incorporating On-Premise Solar PV Generation into an Operational Load Forecast – Revisited
Frank Monforte, Itron

Forecasting for Congestion in the Distribution Grid
Ulrich Focken, energy & meteo systems, Germany

Load Forecasting with Customer Adoption of DER
Brady Stoll, NREL

Impact of BTM on Load Forecasting in the CAISO
Amir Javanbakht, CAISO

10:30 a.m. – 12:00 p.m.

Markets Session 2: Forecasting and Market Design for Grid Services

Location: Cripple Creek 2

Chair: **Eric Gimon**, Energy Innovation

ERCOT Market Directions – Forecasting Frequency Response and Inertia (or More?)
Nitika Mago, ERCOT

Solar Forecasting for Low Voltage Network Operations in Australia
Nick Engerer, Solcast and Australian National University

Forecast Error, the New Norm: Mitigating Risk in the SPP Market with Probabilistic
Forecasting in Day-ahead Generation Studies
Gunnar Shaffer, SPP

System Services from Renewable Power Plants
Allison Weis, Ascend Analytics

12:00 p.m. - 1:00 p.m.

Lunch

Location: Silverton 3

1:00 p.m. – 2:45 p.m.

Forecasting Session 3: Solar and Wind R&D Forecasting Advances - Part 1

Location: Silverton 1/2

Chair: **Craig Collier**, DNV-GL

Improving Irradiance Forecast Accuracy (CEC project, Clean Energy Research)
Marc Perez, Clean Power Research

Error Correction in the Timing of BPA Wind Power Ramp Events
Andrea Staid, Sandia

Using Wind Plant Production Changes to Improve Neighboring Plant Forecasts
Anamaria Sabau, ConWX

Costs and Consequences of Wind Turbine Wake Effects Arising from Uncoordinated
Wind Energy Development
Julie Lundquist, Colorado State University

1:00 p.m. – 2:45 p.m.

Markets Session 3: Current and Future Market Revenue Streams

Location: Cripple Creek 2

Chair: **Mark O'Malley, NREL**

An Introduction to Grid Services
Paul Denholm, NREL

Value of Ancillary Services – Current Revenues and Future Scenarios
Robin Hytowitz, EPRI

Value of Capacity – Current Revenues and Future Scenarios
Hannes Pfeifenberger, Brattle Group (invited)

Bringing It All Together - Impacts of VER on Wholesale Prices and Market Revenue Now and In the Future
Ryan Wiser, LBNL

2:45 p.m. – 3:15 p.m.

Break

Location: Silverton Foyer

3:15 p.m. – 5:00 p.m.

Forecasting Session 4: Solar and Wind R&D Forecasting Advances - Part 2

Location: Silverton 1/2

Chair: **Jeff Lerner, Vaisala**

Wind Plant Forecast Improvements in Complex Terrain and Extreme Weather Conditions
Mikkel Westenholz, ENFOR

Wind and Solar Forecast Advances and Improved Battery Storage Integration
Tyler McCandless, NCAR

Wind Power Production and Ramp Forecasting Research Update
Ryan Kilpatrick, NRCAN

More Accurate Solar and Wind Guidance from the NOAA HRR Model in 2019-2020
Stan Benjamin, NOAA

3:15 p.m. – 5:00 p.m.

Markets Session 4: Innovation of Services and Markets – Learning from Distribution and Vertically Integrated Utility Experiences

Location: Cripple Creek 2

Chair: **Jessica Lau, NREL**

Incentivizing DERs Through Performance Based Rates
Dan Cross-Call, Rocky Mountain Institute

Distributed Storage and DER Participation in Markets
Jeff Dennis, AEE

DER Blockchain - How it Contributes to Services and Markets
Pete Bronski, Energy Web Foundation

Integration of Distribution System Markets and RTO Markets
Forest Small, Concentric Energy Advisors

Thursday, June 6, 2019

7:00 a.m. – 8:00 a.m.

Breakfast

Location: Silverton 3

8:00 a.m. – 9:45 a.m.

Forecasting Session 5: IEA WIND Task 36 Forecasting Project

Location: Silverton 1/2

Chair: **Caroline Draxl**, NREL

Update on Global Coordination in Forecast Model Improvement and energy forecast metrics in NWP models

Will Shaw, PNNL

Recommended Practices Guidelines for Forecast Solution Selection: Overview and Plans for Phase 2

John Zack, UL-AWS

Jeff Lerner, Vaisala

Data Communication Standards for Wind and Solar Forecasting

Mikkel Westenholz, ENFOR

Panel Discussion on Standardization Needs for VER Forecasting

Chair: **Caroline Draxl**, NREL

Panelists:

Will Shaw, PNNL

John Zack, UL-AWS

Jeff Lerner, Visalia

Mikkel Westenholz, ENFOR

Aidan Tuohy, EPRI

8:00 a.m. – 9:45 a.m.

Markets Session 5: System Operation Under Extreme Weather Events

Location: Cripple Creek 2

Chair: **Josh Novacheck**, NREL

Weather Events in NREL's Wind and Solar Datasets

Justin Sharp, Sharply Focused LLC

Forecasting Power System Relevant Weather Events

Hannah Bloomfield, U of Reading, UK

Weather and Hydro Planning and Operations: Historical and Future Perspectives

Kevin Howard, Western Area Power Administration

MISO Market Operations during Weather Events
Stephen Rose, MISO

9:45 a.m. – 10:15 a.m.

Break

Location: Silverton Foyer

10:15 a.m. – 12:15 p.m.

Closing Plenary Session: Global Perspectives on Forecasting and Market Design for the Future Energy System

Location: Silverton 1/2

Chair: **Aidan Tuohy**, EPRI

Comparison of China and Iberian Peninsula Energy Markets

Liping Jiang, SGERI

Forecasting for an Integrated Energy System

Laurent Dubus, EDF

Forecasting and Market Design for Multi-area Energy Balancing: A European Perspective

Magnus Korpås, NTNU

VG Forecasting and Market Operation Experience

Mike Davidson, AEMO (invited)

Market Design Considerations for a High Renewables Future

Aaron Townsend, ERCOT

12:15 p.m. – 12:30 p.m.

Closing Remarks

Charlie Smith, ESIG