

Utility-scale PV Variability Workshop

October 7, 2009; 8am – 5pm

Cedar Rapids Marriott, Cedar Rapids, Iowa

Goal: To improve understanding of PV plant variability and its impact on utility planning and operations

Participants: PV developers, utilities, DOE, labs, consultants

Agenda:

7:00 a.m. – 8:00 a.m.

Registration & Breakfast

Location: Pre-Con Area

8:00 a.m. – 5:00 p.m.

Workshop

Location: Hickory

8:00 a.m. – 8:30 a.m.

Welcome, Introductions, and Overview

Welcome and introductions (Charlie Smith – UWIG, Dan Ton – DOE, Christy Herig – SEPA)

- Industry relevance; connection to DOE Renewable Energy and Smart Grid Programs, IEA High Penetration workplan.

Meeting motivation and overview (Benjamin Kroposki – NREL)

- Overview of issues in PV variability, integration, interconnection; overview of agenda.

8:30 a.m. – 9:30 a.m.

PV Interconnection Update

PV interconnection standards (Abraham Ellis – Sandia)

- IEEE, NERC and FERC standards for distributed systems and utility-scale system

Generic PV system models for interconnection and planning studies (Abraham Ellis – Sandia)

- Positive-sequence system planning (PSS/E and PSLF) and distribution planning models

9:30 p.m. – 10:30 p.m.

Integration of PV in Utility Operations

Utility operations and variable generation (Michael Milligan – NREL)

- Overview of utility operations; possible impacts of PV variability and uncertainty; mitigation alternatives

Solar resource forecasting (Mark Alhstrom – WindLogics)

- State-of-the-art, challenges and opportunities for improvement; integration into operations

10:30 – 10:45

Break

Location: Pre-Con Area

10:45 p.m. – 12:00 p.m.

PV Integration Studies

Wind and Solar integration studies (Nick Miller – General Electric)

- Solar integration study purpose, methodologies and data requirements; experience with wind integration studies

Development of data sets for PV integration studies (Ray George – NREL)

- Development of distributed generation and centralized system data sets for integration studies

12:00 p.m. – 1:00 p.m.

Lunch

Location: Oak

1:00 p.m. – 2:30 p.m.

Solar Resource Variability – What do we know?

Modeling the solar resource at higher resolution (Michael Brower – AWS Truewind)

- Mesoscale solar resource modeling methodologies, challenges and opportunities for higher time and space resolution

Short-term variability of the solar resource over wide geographical area (Andrew Mills – LBNL)

- Analysis of ARM data in the Southern Great Plains region; existing solar radiation database

Comparison of PV, CSP, wind variability (Yih-Huei Wan – NREL)

- Analysis of actual system output data to characterize PV variability and effect of geographic diversity, as compared to CSP and wind.

2:30 p.m. – 2:40 p.m.

Break

Location: Pre-Con Area

2:40 p.m. – 4:00 p.m.

Modeling PV Plant Output Variability

Short-term PV output variability in large PV systems (Carl Lenox – SunPower)

- Observed short-term output variability within a single large PV plant

Quantifying PV power output variability (Tom Hoff – Clean Power Research)

- Theory of solar resource variability and impact of geographical dispersion

Characterization of short-term PV variability for large PV systems (Joshua Stein – Sandia)

- Effect of plant size, tracking system and other factors on output characteristics of large and distributed PV systems; static, stochastic and dynamic models for short-term PV output behavior

4:00 p.m. – 4:30 p.m.

Data Collection Needs

Discussion of data collection effort and analysis needs by PV Variability Ad Hoc Group (Travis Johnson – NV Energy)

- Approach to collect high resolution, time-synchronized data; technical challenges; proposed data format and metadata; possible ways to overcome commercial issues

4:30 p.m. – 5:00 p.m.

Open discussion of next steps and priority needs