

Sandia National Laboratories and the Electric Power Research Institute (EPRI) are pleased to host the

2013 PV Operations & Maintenance Workshop



Photo courtesy of Semptra Energy

Date: Monday, April 29, 2013 from 8:00 AM to 5:00 PM

Location: [EPRI Headquarters](#) at 3420 Hillview Avenue, Palo Alto, CA

*Solar PV O&M drives project life cycle costs and plant performance. What tools and techniques—combined with data analysis—can lead to operational improvements and best practices? This **actionable workshop** will share perspectives and findings, as well as establish a Working Group tasked with developing a robust set of industry-wide PV O&M standards and protocols.*

The 2013 PV Operations & Maintenance Workshop will define primary O&M issues and assess their potential operational and cost impacts. In addition, planning approaches will be identified for characterizing PV plant reliability through field data and other metrics. More generally, emphasis will be placed on interaction and dialog among participants with the intent of tackling the difficult O&M challenges facing the solar industry:

- What are the most pressing PV reliability and O&M challenges?
- What is and can be done to realize plant performance and cost improvements?
- What predictive tools are effective when paired with performance and reliability information?
- What tools and strategies successfully mitigate unplanned downtimes and system failures?
- What recommendations can enable progressive changes in advanced PV system designs?

Agenda

Welcome & Introduction: Why Are We Here? 8:00 am

An overview of the day-long workshop will be presented, along with intended outcomes, goals and next steps. In addition, meeting participants will introduce themselves.

8:00 am Opening Remarks / Workshop Purpose

Jennifer Granata, Sandia National Labs

8:10 am Industry Research & Development Roles

Nadav Enbar, EPRI (tentative)

8:15 am Benchmarking Reliability and Industry Activities (roll call)

Workshop Participants

Defining the Problem: Managing O&M Costs 8:30 am

A cross section of O&M stakeholders will discuss the cost-benefit impacts of increased plant reliability, reduced failures, and improved site-specific designs.

8:30 am Overview and Breakdown of Major O&M Costs

Rue Phillips, True South Renewables

- How O&M affects plant financial performance
- O&M cost modeling assumptions for levels of repairs and replacements
- Performance ratio calculations: When are O&M costs justified?

9:00 am Managing the Fleet: An Owner's Perspective on PV Reliability

Steve Voss, SunEdison (provider perspective); Joe Frani, San Diego Gas & Electric (utility perspective)

- Case studies: PV O&M approaches, tools, and economic impacts
- The effect of component (un)reliability on O&M costs
- Lessons learned

Break**10:00 am****Current O&M Practices****10:30 am**

Operators face numerous challenges surrounding the management of PV system performance and associated costs. Panelists will address core difficulties, relate major plant reliability issues, detail effective approaches, and identify areas in need of industry support. Specific topics of discussion will include: Market perceptions of PV O&M requirements, service trends, best practices (e.g., field repairs, panel washing, logistics/site upkeep, spare parts, warranty, workforce safety, etc.), reflections on the PV O&M ecosystem and transactional approaches, O&M liabilities, and “gray areas” in need of greater definition.

Session Panelists

- *Srini Devarajan, ViaSol Energy Solutions*
- *Larry Freeman, EDF Renewable Energy*
- *Aaron Marroquin, NRG Energy*
- *Jordan Shechter, Enfinity*
- *Dan Sweeney, Advanced Energy*
- *Steven Ng, Pacific Gas & Electric (tentative)*

Lunch**12:00 pm**

Data Gathering & Analysis Techniques

1:00 pm

Analysis paralysis! What is the right level of O&M analytics and prognostics? This session will address tools and techniques for monitoring system performance and events that affect PV O&M.

1:00 pm System Monitoring: Resolutions and Tradeoffs

Tom Tansy, SunSpec Alliance

- Key performance indicators
- Weighing the pros and cons of differing monitoring levels for failure prediction
- Available industry services and future-oriented developments

1:30 pm Leveraging SCADA and Condition-based Monitoring for Predictive Analysis

Rudy Perez, Southern California Edison

- Utility case study: Context, set-up, outcomes, and learnings

1:50 pm PV Reliability Operations Maintenance (PVRM) Database

Jennifer Granada, Sandia National Laboratories

- Project overview and rationale
- Current status, goals, and milestones

Breakout Session

2:15 pm

Attendees will provide feedback on issues raised during the workshop. Facilitated discussions will seek to enable all attendees to put their own issues and ideas forward, such as:

- *What's missing from current PV O&M practices?*
- *What's possible for the industry?*
- *Where could we be in 10 years and what is the roadmap to get there?*
- *What are the right data analysis techniques for O&M?*
- *What are the right approaches to standards/guidelines development?*

This interactive examination will be followed by breakout group reports to the broader collective and results will be recorded for future planning and implementation efforts.

Break

3:15 pm

Future Collaboration & Information Share

3:30 pm

Group discussion will explore potential industry actions for progressing solar PV O&M best practices and standards beneficial to industry stakeholders across the spectrum of buyers, sellers, and supporting organizations.

- *Review of key points*
- *Open discussion—what is important for progress?*
- *Protecting participants interests: Non-disclosure agreements*
- *Working groups, user groups, and data processes*
- *Closing the feedback loop*
- *Standards: Getting organized*

Wrap-Up & Closing Remarks

4:45 pm

The workshop's hosts will recap key meeting takeaways and propose next steps.

- *What we heard*
- *Getting organized*
- *Future communication, milestones, and schedule*

Adjourn

5:00 pm