



2024 PV Performance Modeling Workshop (V1)

Monday, May 6, 6:00 PM **CFV Labs** Welcome Happy Hour at Squatters Pub **CFV Labs**

Site: Salt Lake City, Utah USA

Day 1 **Tuesday, May 7, 2024**

7:00 1:00 Breakfast and Registration

8:00 0:10 Welcome from GroundWork Renewables Ann Will GroundWork Renewables

8:10 0:15 PVPMC Updates Joshua Stein Sandia National Laboratories

Session 1 **Complexities in PV Modeling** **Chair: TBD**

8:25 0:20 Tracking higher electricity prices Adam Jensen Technical University of Denmark

8:45 0:20 PV Atlas: charting a course to geographic insights for PV performance modeling Kevin Anderson Sandia National Laboratories

9:05 0:20 Modeling hybrid PV/CSP/ES systems for 100% Carbon Free Electricity to Load Jennifer Braid or Joshua Stein Sandia National Laboratories

9:25 0:10 Discussion

9:35 0:30 Networking Break

Session 2 **Site and Design Impacts and Derates** **Chair: TBD**

10:05 0:20 Building an Advanced Soiling Loss Model with AI and Ground-Level Data Catlin Mattheis Fracsun

10:25 0:20 Energy Impact of Different Solar Tracker Wind Stow Strategies Kendra Conrad Array Technologies

10:45 0:20 An approach to modeling linear and non-linear self-shading losses with pvlib Will Hobbs Southern Company

11:05 0:20 An Updated Modeling Framework for Technology- and Market-Specific Shading Impacts on Annual Energy Yield Kiran Balasubramanian Maxeon Solar Technologies

11:25 0:20 Near Shading Reductions of Diffuse Sky Irradiance and the Impact on PV Plant Performance Adam Kankiewicz Origis Energy

11:45 0:15 Discussion

12:00 1:00 Lunch

Session 3 **Posters**

13:00 1:00 **Poster Session**

Session 4 **Modeling Snow Effects on PV Systems** **Chair: Laurie Burnham**

14:00 0:20 Accurate modeling of albedo in winter (snow is an ever-changing substrate) Daniel Riley Sandia National Laboratories

14:20 0:20 Snow covered module I-V curve simulation Norman Jost Sandia National Laboratories

14:40 0:20 Snow shedding from single-axis tracking PV systems: observations from the Michigan Regional Test Center and implications for modeling widespread snow events Ayush Chutan Michigan Technical University

15:00 0:20 Proposed changes to snow-loss models Mark Mikofski DNV

15:20 0:20 Importance of modeling snow effects from an EPC perspective Peter Burgess EDF

15:40 0:15 Panel Discussion

15:55 0:30 Networking Break

Session 5 **PVPMC** **Chair: Joshua Stein**

16:25 0:10 FY25-27 PVPMC Project Priorities Marios Theristis Sandia National Laboratories

16:35 0:20 2023 PVPMC Blind Modeling Comparison Lelia Deville Sandia National Laboratories

16:55 0:10 DOE Solar PV Data and Modeling Initiatives Tassos Golnas DOE Solar Energy Technologies Office

17:05 1:05 Break before dinner

18:10 2:00

Welcome Reception and Dinner Hosted by GroundWork Renewables (open to all participants)



Day 2				Wednesday May 8, 2024	
7:00	1:00	Breakfast			
Session 6		Underperformance and Analytics for PV Plants	Chair:		
8:00	0:20	Outcomes of actual-environment demonstration of fault diagnostic loss factors and trend-based loss predictive maintenance for utility-scale photovoltaic systems	Jürgen Sutterlüti	Gantner Instruments	
8:20	0:20	A Practical Approach to Comparing Actual and Budgeted Production of Solar Sites: Solar Waterfall Analysis	Anjie Jiang	Univers	
8:40	0:20	Estimation of Soiling Loss in Utility-Scale PV Plants from Production Data	Karel De Brabandere	3E	
9:00	0:20	Validating Power Plant DC Performance	Jim Crimmins	CFV Labs	
9:20	0:20	Advancing Technoeconomic Modeling of Hail Risk and Resilience	Jon Previtali	VDE Americas	
9:40	0:15	Discussion			
9:55	0:30	Networking Break			
Session 7		P90 and the Financial Value of Accurate Modelling	Chair: Keith McIntosh		
10:25	0:15	<i>Lender (TBD)</i>	TBD		
10:40	0:15	<i>Independent engineering firm (TBD)</i>	TBD		
10:55	0:15	<i>Developer (TBD)</i>	TBD		
11:10	0:15	<i>Owner Developer (tBD)</i>	TBD		
11:25	0:15	<i>Modeler (TBD)</i>	TBD		
11:40	0:20	Moderated Discussion			
12:00	1:00	Lunch Break			
Session 8		Solar Resource Assessment	Chair:		
13:00	0:20	New Capabilities in the National Solar Radiation Data Base (NSRDB)	Manajit Sengupta	NREL	
13:20	0:20	Improving Performance Ratio Calculations Through Optimizing Front POA Irradiance Sensor Positioning	Damon Nitzel	OTT HydroMet	
13:40	0:20	Introducing an Improved SolarAnywhere Historical Irradiance Product: Benchmarking against BSRN	Marc Perez	Clean Power Research	
14:00	0:20	How much weather and solar resource data is enough?	Laura Hinkelman	Black & Veatch	
14:20	0:20	What to consider for improved accuracy and reduced uncertainty in resource measurement campaigns	Annalise Miller	Luminate LLC	
14:40	0:20	Gap-Filling Ground Measurements of Solar Irradiance	Alex Bryan	GroundWork Renewables	
15:00	0:15	Discussion			
15:15	0:30	Networking Break			
Session 9		Open Source Software and Applications			
15:45	0:20	Solar Data Tools Version 1 Release	Bennet Meyers	SLAC National Accelerator Laboratory	
16:05	0:20	Degradation and Soiling Loss Analysis Improvements in RdTools 3	Michael Deceglie	NREL	
16:25	0:20	Enterprise wide PVlib Implementation	Ishtiza Azad	Southern Company	

16:45	0:20	The "PVLib" of Degradation: PVDeg	Michael Kempe or Martin Springer	NREL
17:05	0:15	Discussion		
17:20		End of Day 2		
Day 3 Thursday May 9, 2024				
7:00	1:00	Breakfast		
Session 10		Spectral Modeling		
8:00	0:20	Photovoltaic module energy losses due to cell-level spectral mismatch	Rajiv Daxini	University of Nottingham
8:20	0:20	Simple Photovoltaic Spectral Correction Predictive Model Based on FARMS-NIT Modeled Spectra	Alan Curran	First Solar
8:40	0:20	The uncertainty in yield forecasts due to the ever-changing solar spectrum	Keith McIntosh	PV Lighthouse
9:00	0:10	Discussion		
Session 11		Modeling Updates from Industry	Chair:	
9:10	0:15	Modeling of advanced solar tracking algorithms with PVcase Yield	Andres Calcabrini	PVcase
9:25	0:15	Latest updates and future developments in Pvsyst	Bruno Wittmer	PVsyst SA
9:40	0:15	Progress and lessons learned in the development of the 3D energy yield calculation model for the RatedPower software	Félix Ignacio Pérez Cicala	RatedPower
9:55	0:15	Tackling the Terrain: Custom Tracking Algorithms in Solar PV Plants in Complex Terrain	Javier Lopez-Lorente	DNV
10:10	0:15	Effect of Binning on 3D Shade Results	Kurt Rhee	Terabase Energy
10:25	0:15	Impact of High Fidelity Modeling on Estimating SAT (Single Axis Tracker) Plant Performance	Josh Wirth	Daly Energy
10:40	0:15	Discussion		
10:55	0:30	Networking Break		
Session 12		O&M Harmonization		
11:25	0:15	A Uniform Taxonomy for Photovoltaic System Operations and Maintenance Data	Cliff Hansen	Sandia National Laboratories
11:40	0:45	Group discussion on opportunities for standardizing O&M data and processes		
12:25	1:00	Lunch		
		Parallel Session A	Parallel Session B	Parallel Session C
13:25	2:00	PVPMC and pvlib-python Updates and Users Group Meeting	SAM Updates and User Group Meeting	Industry Modeling Software Office Hours
15:25	0:20	Networking Break		
		Parallel Session D	Parallel Session E	Parallel Session C (contined)
15:45	1:30	TBD (Depends on survey responses)	TBD (Depends on survey responses)	Industry Modeling Software Office Hours
17:15		End of Workshop		



Poster Session

Number	Title	Name	Institution
1	Spectral Correction for Systems with CdTe Modules During the Capacity Test	Bahram Emami	McCarthy Building Companies, Inc. – Renewable Energy
2	Spatial Smoothing Reduces PV Clipping!	Tim Townsend	South Face Solar
3	In-Situ I-V for Soiling Measurement	Michael Gostein	Atonometrics
4	Achieving Stable and Efficient Perovskite Solar Cells: A Synergistic Approach Combining Inorganic Hole Transport Layer and Interface Modifier	Zahra Abadi	University of Tehran
5	Subhourly Clipping Correction Model Comparison	Matthew Prillman	NREL
6	An Algorithm for Enhanced PV Performance Analysis Utilizing Clipping Success Rates	Taylor Hollis	HK Analytics
7	Comparison of PAN File Generation Methods	Daniel Zirzow	CFV Labs
8	Clipping and curtailment: Impact on module temperature and degradation	Moonyong Kim	UNSW Sydney
9	GAIA: Green AI Apprentice	Sai Krishna Gottipati	AI Redefined Inc
10	Spectral and Diffuse-Angular Corrections in Pvfir	Mark Campanelli	Intelligent Measurement Systems LLC
11	The National Climate DataBase (NCDB): A Bias-Corrected High-Resolution Climate Dataset	Manajit Sengupta	NREL
12	Recent Update of ASTM G173 Standard, Downstream Implications and Future Plans	Manajit Sengupta	NREL
13	An Assessment of the Impact of Height Dependent Windspeed on Energy Yield Estimation	Manajit Sengupta	NREL
14	Pre-construction Modeling of Shade Loss due to Wind Turbine Shadow Flicker on Solar PV	Alana Benson	UL Solutions
15	Effects of On-site Diffuse Irradiance Measurements on Pre-Construction Energy Estimates	Lucila (Lucy) Tafur	UL Solutions
16	Diagnosis of under-performing PV plants	David Smith	Wood PLC
17	The Impact of Climate Change on PV Plant Production	David Smith	Wood PLC
18	Optimal Partitioning Practices PVSyst Near Shadings	Suveer Panditrao	Standard Solar Inc.
19	Best practices for determining sub-hourly clipping losses for PV system simulations	Branislav Schnierer	Solargis
20	Ultra-high efficiency modules: The end of the single-diode model?	Phillip Hamer	UNSW Sydney
21	Modelling Challenges with Irregular Utility-scale PV Plant Layouts	Shail Bajpai	Black & Veatch
22	Time Dilated Bundt Cake Analysis of PV Output	Mehmet Giray Ogut	Stanford University
23	Long-term shading impact on modules due to increase in tree height year over year using Pvsyst	Stephen John	Black & Veatch
24	Diagnostic value of the inverter performance ratio in plant performance troubleshooting	Jay Miller	Black & Veatch
25	Bifacial Solar Expected Energy Model	Ishtiza Azad	Southern Company
26	Shaded fraction and backtracking on rolling terrain	Adam Jensen	Technical University of Denmark

