2026 PV Performance Modeling Collaborative Workshop (V3)

Mon, May 11	**5:00-6:30 PM**	**Happy Hour**		
Site:		**Hotel Albuquerque, 800 Rio Grande Blvd NW, Albuquerque, New Mexico USA**		
Day 1		**Tuesday, May 12, 2026**		
8:00	1:00	Breakfast and Registration		
9:00	0:10	Welcome from Sandia National Laboratories	Erik Webb	Sandia National Laboratories
9:10	0:10	Welcome from Groundwork Renewables	Ann Will	GroundWork Renewables
9:20	0:10	PVPMC Updates	Joshua Stein	Sandia National Laboratories
Session 1		**Irradiance Modeling-** Session description	**Chair:**	
9:30	0:15	Comprehensive review of satellite data site-adaptation to ground-measured Global Horizontal Irradiance across the US	Nate Croft	GroundWork Renewables
9:45	0:15	**Evaluation of Decomposition–Transposition Methods for POA Irradiance Estimation in Tropical High-Cloudiness Conditions Using High-Resolution Field Measurements**	**Erick Cepeda (Student)**	**Ingeniería Creativa - ICREA and Universidad Nacional de Colombia**
10:00	0:15	Uncertainty evaluation of PR measurement with focus of meteorological parameters	Kees van den Bos	Hukx
10:15	0:15	Q&A		
10:30	**0:45**	**Networking Break**		
Session 2		**Modeling Single Axis Trackers-** Session description	**Chair:**	
11:15	0:15	Thermal-Aware Single-Axis Tracking: Reducing PV Module Temperature and UV Exposure Without Sacrificing Yield	Philip Hamer	The University of New South Wales
11:30	0:15	A Workflow to Analyze the Impact of Terrain Undulations on Energy Yield for Different Motor Block Sizes	Umay Akkoseoglu	DNV
11:45	0:15	Probabilistic reconstruction of unknown tracker angles for sub-hourly loss quantification	Thore Müller	PVRADAR Labs GmbH
12:00	0:15	A framework for improving wind stow models with field validation	Justin Roelant	Array Technologies Inc.
12:15	0:20	Q&A		
12:35	**1:00**	**Lunch**		
Session 3		**Posters**		
13:35	1:00	**Poster Session 1 - PV Performance Posters**		
Session 4		**PV Performance Model Development-** Session description	**Chair:**	
14:35	0:15	Low Breakdown Voltage Cell in Pvsyst	Bruno Wittmer	PVsyst SA
14:50	0:15	**Impact of Spectrum, Luminescent Coupling, and Temperature Coefficient on Tandem Device Performance**	**Zihui Zhang (Student)**	**The University of New South Wales**
15:05	0:15	Application of the Intrinsic-Adjusted Single Diode Model to Production Data	Phillip Hamer	The University of New South Wales
15:20	0:15	Q&A		
15:35	**0:45**	**Networking Break**		
Session 5		**Modeling PV + Battery Systems-** Session description	**Chair:**	
16:20	0:15	Sizing DC-Coupled Utility-Scale BESS Using a Charging Reliability Metric Under High Curtailment Conditions	Andres Fernandez	Ingeniería Creativa - ICREA
16:35	0:15	Gaps in PV-Coupled Battery Modeling	Janine Keith	National Laboratory of the Rockies (NLR)
16:50	0:15	Combined Lost Energy and Fault Analysis for DC-Coupled PV+BESS	Nicholas Ward	AES Clean Energy
17:05	0:15	PV + Li-Ion BESS: Modeling and Evaluation of Energy Arbitrage and Ancillary Service Use Cases	Richard Holz	Bechtel Corporation
17:20	0:20	Q&A		
17:40	**1:30**	**Happy Hour**		
19:10		End of Day 1		

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Day 2		Wednesday May 13, 2026		
	6:30 AM	Fun Run - Meet at Entrance to Hotel		
8:00	1:00	Breakfast		
9:00	0:10	PVMAC Updates	Marios Theristis	Sandia National Laboratories
Session 6		**Key Performance Indicators-** Session description	**Chair:**	
9:10	0:15	Reliable and Actionable Performance Metrics for Heavily Curtailed Plants	Gofran Chowdhury	3E
9:25	0:15	KPI best practices	Kevin Anderson	Sandia National Laboratories
9:40	0:15	Energy accounting harmonization	Dan Leary	Denowatts
9:55	0:15	How spectral effects impact capacity testing — a case study	Keith McIntosh	PV Lighthouse and Kiewit Engineering
10:10	0:20	Q&A		
10:30	**0:45**	**Networking Break**		
Session 7		**Closing the loop from operations to design-** Session description	**Chair:**	
11:15	0:15	Interpreting Field Data from Five Utility-Scale PV Projects	Graham Gallop	Mortenson
11:30	0:15	Measurement of Single-Axis Solar Tracker Availability for a >100 GW Operating Fleet Across 6 Continents	Aron Dobos	Nextpower
11:45	0:15	Understanding discrepancies in module degradation and performance loss rate	Norman Jost	Sandia National Laboratories
12:00	0:15	Quantifying Losses and Failure Rates in Large-Scale PV Fleets with the SUPER Benchmarking Tool	Daniel Fregosi	EPRI (Electric Power Research Institute)
12:15	0:20	Q&A		
12:35	**1:00**	**Lunch Break**		
Session 8		**Posters**		
13:35	1:00	**Poster Session 2 - PV Operations Posters**		
Session 9		**Model Validation-** Session description	**Chair:**	
14:35	0:15	Comparative analysis: Validating PV simulation uncertainty against field measurements	Tomas Cebecauer	Solargis
14:50	0:15	Evaluating Error Propagation Across the Photovoltaic Modeling Pipeline Through Blind Modeling	Lelia Deville	University of Lousiana at Lafayette
15:05	0:15	Validation with PV plant data and updates of the 3D energy yield calculation model for the RatedPower software	Félix Ignacio Pérez Cicala	Rated Power
15:20	0:15	Q&A		
15:35	**0:45**	**Networking Break**		
Session 10		**Uncertainty-** Session description	**Chair:**	
16:20	0:15	Climate-Dependent Differences in Energy-Yield Exceedance Levels: Parametric (PVsyst) vs Monte Carlo Uncertainty for Four U.S. PV Sites	Rounak Kharait	E3 Consulting Services, LLC
16:35	0:15	An Operational Evaluation of Modeled Uncertainties to Measured Solar Irradiance and Grid Energy	Halley Darling	Natural Power
16:50	0:15	Why Nominal Generation Is Not P50: Quantifying Systematic Bias In Solar Performance Modeling	Chetan Chaudhari	PowerUQ
17:05	0:15	Adding Context to P50: A Practical Approach for Pre-Construction Energy Assessments	Jon Kalantar	DNV
17:20	0:20	Q&A		
17:40	0:05	***Poster Award Ceremony***		
17:45	**1:30**	**Happy Hour**		
19:15		End of Day 2		

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Day 3		Thursday May 14, 2026		
8:00	1:00	Breakfast		
Session 11		**Forecasting-** Session description	**Chair:**	
9:00	0:15	How Hybrid Forecasting Improves Earnings of Utility-Scale Energy Assets	Juergen Sutterlueti	Gantner Instruments
9:15	0:15	Reducing Month-Ahead PV Yield Uncertainty with ENSO-Informed Machine Learning	Marc Perez	Clean Power Research
9:30	0:10	Q&A		
Session 12		**Modeling Tool Updates 1-** Session description	**Chair:**	
9:40	0:10	pvcaptest Evolves: Streamlined Bifacial Testing	Ben Taylor	Tailored Data Consulting
9:50	0:10	Updates on the National Solar Radiation Data Base	Manajit Sengupta	National Laboratory of the Rockies (NLR)
10:00	0:10	PVCollada: A Schema for Exchange of Digital PV System Design Data	Clifford Hansen	Sandia National Laboratories
10:10	0:10	What's New in System Advisor Model	Janine Keith	National Laboratory of the Rockies (NLR)
10:20	0:20	Q&A		
10:40	**0:45**	**Networking Break**		
Session 13		**Modeling Tool Updates 2-** Session description	**Chair:**	
11:25	0:10	Solargis Evaluate: Browser-based high-fidelity PV plant modelling using high-resolution terrain	Tomas Sasko	Solargis
11:35	0:10	Updates and future developments in PVsyst	Bruno Wittmer	PVsyst SA
11:45	0:10	DNV SolarFarmer: latest developments and insights	Javier Lopez-Lorente	DNV
11:55	0:10	PlantPredict: Software Updates and Roadmap	Jason Spokes	Terabase
12:05	0:20	Q&A		
12:25	0:10	Closing Remarks	Joshua Stein	Sandia National Laboratories
12:35	**1:00**	**Lunch**		

Afternoon parallel sessions continue on next page

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Day 3, Continued		Thursday May 14, 2026		
		Parallel Sessions A	**Parallel Sessions B**	**Parallel Session C**
13:35	0:45	**The Future of PV - A discussion about trends affecting PV performance and operations (Joshua Stein & Marios Theristis)**		**Industry Modeling Software Office Hours** **Clean Power Research** **PlantPredict** **PowerUQ** **PVFarm** **pvlib-python** **PV Lighthouse** **PVsyst SA** **RatedPower** **SolarFarmer** **Solargis Evaluate** **Solesca**
14:20	**0:05**	**Transition break**		
14:25	0:45	**Introduction to PlantPredict 3D Workflow (Arthur Onno, Terabase)-** This session will introduce the new 3D workflows enabled by PlantPredict V12: generating, exporting, and importing 3D scenes, determination of tracker rotation angles, 3D transposition, 3D shade engine, analysis of results, API calls for 3D calculations.	**PowerUQ training session: Moving Beyond RSS to True P50/P90 (Chetan Chaudhari, PowerUQ)** - This session will cover why separating weather variability from model uncertainty is critical for credible energy yield assessments, and why conventional RSS methods fail to do so. The session includes a live walkthrough of how to calculate P50 model bias and determine the P90 during pre-build analyses, with a quick look into financial impact.	
15:10	**0:30**	**Networking Break**		
15:40	0:45	**SAM and PySAM co-located hybrid system with self-sufficient dispatch tutorial (Matt Prilliman, NLR) -** Learn how to use SAM and PySAM to model co-located PV, storage, and other generation sources for their performance, project economics, and ability to meet large-scale electric loads without grid electricity purchases.	**API-centric workflow from resource data to energy yield calculations using DNV Green Data Products (Javier Lopez-Lorente, DNV) -** This session is a hands-on introduction to the API workflows of DNV's solar resource and PV modeling tools—Solcast, Solar Resource Compass and SolarFarmer—from data acquisition to cloud-based energy yield calculations.	
16:25	**0:05**	**Transition break**		
16:25	0:45	**End-to-End PV Plant Optimization with RatedPower: From Conception to 3D Yield Analysis (Félix Pérez Cicala & Irene Negro Torres, RatedPower [Enverus]) -** In this technical workshop, we'll explore how to leverage the RatedPower software to engineer PV and BESS designs, starting from site selection. We will then showcase the more advanced capabilities such as 3D Energy simulations and the Layout Editor, enabling teams to move from early feasibility to detailed engineering without losing momentum.	**Accounting for spectrum in capacity tests and yield forecasts (Keith McIntosh, PV Lighthouse):** Topics to be covered: extracting atmospheric data from satellites, differences in humidity or PWV, ground-based or satellite AOD, why AOD data is sketchy and what to do about it, how to derive coefficients for the SAPM, First Solar and other parameterisation models, demonstrated with SunSolve, general trends for CdTe, Si, and tandems (i.e. vs PWV, AOD, AM, cloud, season etc.) and when those atmospheric conditions are relevant, how to correct for capacity tests and yield forecasts.	
17:10		**End of Workshop**		
Day 4		**Friday May 15, 2026**		
		Hiking - tbd		

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Poster Session 1 - 13:35 -14:35 on Day 1 (May 12)

Number	Position	Title	Name	Institution
1	1-1	How Complex Are Satellite-Based Irradiation Data? From Global to Location-Specific Accuracy for PV Performance Modeling	Malcorps Philippe	3E
2	1-2	Quantifying Performance Differences Between Manufacturer-produced and Third Party-produced PAN Files	Scott Meredith	Anza Renewables
3	2-1	Impacts on backtracking energy generation from underlying terrain undulations and varying motor block size	Billy Hayes	Array Technologies, Inc
4	2-2	Comparative Analysis of Third-Party Measured Incidence Angle Modifier Profile with Manufacture-based Profile for PV Modules	Stephen John	Black & Veatch
5	3-1	A Designer's Perspective on Complex 3D Shading Scenes in Solar PV Performance	Stephen Sherwood	Black and Veatch
6	4-1	Integrated day-to-hour downscaling of irradiance and temperature for climate projection	Marc Perez	Clean Power Research
7	4-2	When Resolution Reveals Geometry: Correcting Parallax Bias in Satellite-Derived GHI	Marc Perez	Clean Power Research
8	5-1	Impact of Long-Term Average Soiling and Temporal Resolution on Energy Yield Analysis	Umay Akkoseoglu	DNV
9	5-2	From GHI-MLE to POA-MLE: Configuration-Relevant Solar Resource Selection for PV Performance Modeling	Rounak Kharait	E3 Consulting Services LLC
10	6-1	Validation of PVsyst and PVlib Transposition Models Implementations Using Long-Term Operational Data	Vivek B. Mahtani	Enertis Solar Inc.
11	6-2	Validation of Diffuse Irradiance Estimation Models for Use with the Pérez Transposition Model in PVsyst	Javier W. Delgado Hernandez	Enertis Solar Inc.
12	7-1	Laboratory and Outdoor Measurement Insights for CdTe Module Performance Evaluation	Daniel Zirzow	GroundWork Renewables
13	7-2	Backyard PV Module Partial Shade Characterization	Will Hobbs	Hobbs Family
14	8-1	Comparison of Horizon Shading Models	Sydney Eiss	Invenergy LLC
15	8-2	From GHI to POA: Validation of Decomposition and Transposition Models Using Field Measurements	Bahram Emami	McCarthy Building Companies, Inc.
16	9-1	Exploring terrain modeling through PVfarm -PVsyst integration	Levi Brown	McCarthy Building Companies, Inc.
17	**9-2**	**Hybrid Physics-Informed Digital Twin for PV Performance Modeling with Field Validation**	**Daniel Okon (Student)**	**Morgan State University**
18	10-1	Enhancements in voltage degradation modeling for multi-year analyses	Matt Prilliman	National Laboratory of the Rockies (NLR)
19	10-2	The Integration of GOES Data for Solar Resource Assessment of the Contiguous U. S.	Yu Xie	National Laboratory of the Rockies (NLR)
20	11-1	A Systematic Review and Integrated Approach to Modeling of Aging Utility Scale PV Systems	Joseph Simon	National Laboratory of the Rockies (NLR)
21	11-2	Improving the National Solar Radiation Data Base using PSM V4	Manajit Sengupta	National Laboratory of the Rockies (NLR)
22	12-1	High-resolution WRF-based Downscaling of Earth System Model Projections for Energy Applications across CONUS	Jaemo Yang	National Laboratory of the Rockies (NLR)
23	12-2	Modeling wind in agrivoltaics and its impact on eddy covariance flux measurements	Brooke Stanislawski	National Laboratory of the Rockies (NLR)
24	13-1	Assessing Uncertainty in Solar Measurements: Key Findings from NLR's SUNI Application across 89 Stations	Aron Habte	National Laboratory of the Rockies (NLR)
25	13-2	Skewed results: Can diagonal arrays maintain/improve performance?	Laura Hinkelman	Origis Energy, Inc.
26	14-1	Impact of Time-Series Weather Dataset Selection on NEC-Compliant PV String Sizing and Balance-of-System Economics	Vatan Kumar	RWE
27	14-2	Using electrical circuit tool pvspice for potential induced degradation simulations on a string level	Norman Jost	Sandia National Laboratories
28	15-1	**Evaluating the Variability of Photovoltaic Capacity Factor Utilizing Long-Term Satellite-Derived Solar Resource Data in the Brazilian Climate**	**Joao Frederico (Student)**	**Universidade Estadual de Campinas and NLR**
29	15-2	Integrating a Next-Generation Model into SAM: The Physics-Informed Logistic Nonlinear (PILoN) Approach	Ambe Harrison	University of Buea
30	**16-1**	**Thermal & Electrical Model coupling – Modelling Recombination effects for high efficiency modules at module scale**	**Robinson Cavieres Abarca (Student)**	**University of New South Wales**
31	**16-2**	**Towards an Improved Thermal Model with Physically Consistent Heat Loss Coefficients**	**Zeinab Haydous (Student)**	**University of New South Wales**
32	17-1	Evaluating Photovoltaic Inverter Clipping Using Minute-Resolution Irradiance Data	Albert Chang	VDE Americas
33	17-2	Building Weather-Resilient and Insurance-Defensible Solar PV Projects	Sukanya Prabhudesai	Wood Group USA Inc.
34	18-1	Leveraging ArcGIS Pro for 10%–30% Civil Grading Estimation	Matthew Gagne	Wood PLC
35	18-2	Designing for Terrain: A Case Study for PV Yield Optimization	Matthew Gagne	Wood PLC

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Poster Session 2 - 13:35-14:35 on Day 2 (May 13)

Number	Position	Title	Name	Institution
36	1-3	Universal Analytical Model for Inter-Row Shading Loss Estimation in PV Plants	Maitheli Nikam	3E
37	1-4	Comparative Assessment of ASTM E2848 and Temperature-Normalized Solar PV Capacity Testing Protocols	Shail Bajpai	Black & Veatch
38	2-3	Diagnostic techniques for PV plant performance	Jay Miller	Black & Veatch
39	2-4	An Alternative Approach for Determining Reporting Conditions and Expected Capacity for PV Capacity Testing	Parag Pathak	Black & Veatch
40	3-3	ASTM E2848-13 Based Energy Forecasting Methodology for Underperforming Solar PV Plants	Saurav Kadel	Black & Veatch
41	3-4	Quantifying Wind-Solar Covariance and Its Impact on Expected Yield in Hybrid Power Systems	Juan Pedro Montiel	Bureau Veritas Renewable Technical Advisory
42	4-4	A Data-Driven Method for Predicting PV Energy Losses from Shading	Radhika Lampuse and Andrea Quattrone	DNV
43	5-3	Evaluation of Dust Soiling Models Against Operational Data	Umay Akkoseoglu	DNV
44	5-4	Is IEC-61853 testing useful for predicting the energy yield of tandem solar cells?	Rajiv Daxini	National Laboratory of the Rockies (NLR)
45	6-3	FIRST SOLAR TRUE-TRACKING VS. BACKTRACKING IN VARIOUS DIFFUSE CONDITIONS	Anna Raper	DNV Energy USA Inc
46	6-4	A review of the data landscape for solar & storage reliability analyses	Peter Burgess	EDF power solutions
47	7-3	Beyond Performance Ratio: Differentiating Model Bias from Field Underperformance using Physics-Based Modeling	Trevor Coathup	Enurgen
48	7-4	Improving PV Performance Modeling Through Data Quality Flagging and Classification	Devin Widrick	EPRI
49	8-3	Stress-Aware Intelligence for Renewable Power Electronics	Theo Theoharis	Future LessEnergy LLC
50	8-4	Soiling losses: quantifying soiling using operational data	Malcolm Heath	GreenPowerMonitor, a DNV Company
51	9-3	Measurement-Supported Soiling Loss Modeling: Incorporating Site-Specific Preconstruction Measurements with Standard and Advanced Soiling Models	Julie Chard	GroundWork Renewables
52	9-4	Optimizing statistical sampling of in-situ PV module performance metrics for protection against plant total loss	Lawrence Pratt	GroundWork Renewables
53	10-3	Forecast-Driven BESS Scheduling in PV Plants: Intraday Updates to Maximize Arbitrage and Effective Utilization	Rafael Avila Naranjo	ICREA
54	10-4	Solar Capacity Test Case Study – Uncertainty Calculation	Kyle LaBrosse	Invenergy
55	11-3	Quantifying Power Losses from Inverter Voltage Floor Limitations	Sha Li	Leeward Renewable Energy
56	11-4	Combiner-Level Operational Performance Analysis Improvements	Tim Zimet	Longroad Energy
57	12-3	Short Form Energy Performance Index (EPI) Test vs Capacity Testing – A Legitimate Alternative to Industry Standard Milestone Testing	Lucas Smith	Moss
58	12-4	Multiphysics and Multi-Objective Optimal PV Tracking Control	Ethan Young	National Laboratory of the Rockies (NLR)
59	13-3	The importance of high-fidelity modeling of single-axis tracker PV systems	Ricky Dunbar	Nextpower
60	13-4	Distinguishing Soiling and Degradation Losses Using In-Situ I-V	Michael Gostein	OTT Hydromet
61	14-3	Use of a modeled-to-measured comparison approach to detect stalled tracker events in a monofacial photovoltaic power plant	Riccardo Adinolfi Borea	RSE - Ricerca sul Sistema Energetico
62	14-4	Impact of Quality Control on Uncertainty in Solar PV Performance Evaluation	Marketa Hulik Jansova	Solargis
63	15-3	Implementing pvlib-based modeling from a grid operator perspective	Matt Malles	Southern Company
64	15-4	Free near-real-time irradiance data from NOAA GOES satellite program	Will Hobbs	Southern Company
65	16-4	Applying Advanced Wind and Precipitation Sensing to Improve Solar Plant Weather Data Reliability and O&M Decisions	Mikko Krapu	Vaisala Oyj
66	17-3	RSS vs. Monte Carlo for Overbuilt Solar: Evaluating Accuracy Across the Distribution	Daniel Moghtader	VDE Americas
67	17-4	Operational Energy Yield Assessments: Comparing Approaches and Managing Uncertainty	David Smith	Wood plc
68	18-3	Energy Losses due to Temporally or Spatially Significant Tracker Faults	Innes MacMillan	Wood PLC