Sandia National Laboratories | GroundWork | U.S. DEPARTMENT of ENERGY | PVPerformance MODELING COLLABORATIVE

2026 PV Performance Modeling Collaborative Workshop (V7)

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**	**Chair: Joshua Stein**	**Sandia National Laboratories**
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**	**Chair: Kevin Anderson**	**Sandia National Laboratories**
11:15	0:15	Thermal-Aware Single-Axis Tracking: Reducing PV Module Temperature and UV Exposure Without Sacrificing Yield	Robinson Cavieres	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**	**Chair: Janine Keith**	**National Laboratory of the Rockies (NLR)**
14:35	0:15	Low Breakdown Voltage Cell in Pvsyst	Bruno Wittmer	PVsyst SA
14:50	0:15	PVCollada: A Schema for Exchange of Digital PV System Design Data	Clifford Hansen	Sandia National Laboratories
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**	**Chair: Balamurali Rammohan**	**Arevon Energy**
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**	**Chair: Marios Theristis**	**Sandia National Laboratories**
9:10	0:15	Reliable and Actionable Performance Metrics for Heavily Curtailed Plants	Gofran Chowdhury	3E
9:25	0:15	O&M KPIs: You get what you pay for	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**	**Chair: Rhonda Baily**	**RB RE Consulting LLC**
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**	**Chair: Sha Li**	**Leeward Renewable Energy**
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**	**Chair: Clifford Hansen**	**Sandia National Laboratories**
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**	**Chair: Andres Calcabrini**	**PVcase**
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**	**Chair: Amir Asgharzadeh Shishavan**	**Nextpower**
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	Yu Xie	National Laboratory of the Rockies (NLR)
10:00	0:10	What's New in System Advisor Model	Janine Keith	National Laboratory of the Rockies (NLR)
10:10	0:15	Q&A		
10:25	**0:45**	**Networking Break**		
Session 13		**Modeling Tool Updates 2**	**Chair: Kendra Conrad**	**Array Technologies**
11:10	0:10	Solargis Evaluate: Browser-based high-fidelity PV plant modelling using high-resolution terrain	Tomas Sasko	Solargis
11:20	0:10	Updates and future developments in PVsyst	Robin Vincent	PVsyst SA
11:30	0:10	DNV SolarFarmer: latest developments and insights	Javier Lopez-Lorente	DNV
11:40	0:10	PlantPredict: Software Updates and Roadmap	Jason Spokes	Terabase
11:50	0:20	Q&A		
12:10	0:10	Closing Remarks	Joshua Stein	Sandia National Laboratories
12:20	**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**
13:20	0:45	**The Future of PV - A discussion about trends affecting PV performance and operations (Joshua Stein & Marios Theristis)**		
14:05	**0:05**	**Transition break**		
14:10	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.	**Industry Modeling Software Office Hours** **Clean Power Research** **Enurgen** **PlantPredict** **PowerUQ** **PVcase** **PVFarm** **pvlib-python** **PV Lighthouse** **PVsyst SA** **RatedPower** **SolarFarmer** **Solargis Evaluate** **Solesca**
14:55	**0:30**	**Networking Break**		
15:25	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.	
16:10	**0:05**	**Transition break**		
16:15	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.	
17:00		**End of Workshop**		

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

Number	Board-Position	Title	Name	Institution
1	1-1	How Complex Are Satellite-Based Irradiation Data? From Global to Location-Specific Accuracy for PV Performance Modeling	Gofran Chowdhury	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	3-2	Integrated day-to-hour downscaling of irradiance and temperature for climate projection	Marc Perez	Clean Power Research
7	3-4	When Resolution Reveals Geometry: Correcting Parallax Bias in Satellite-Derived GHI	Marc Perez	Clean Power Research
8	4-1	Impact of Long-Term Average Soiling and Temporal Resolution on Energy Yield Analysis	Umay Akkoseoglu	DNV
9	5-1	Validation of PVsyst and PVlib Transposition Models Implementations Using Long-Term Operational Data	Vivek B. Mahtani	Enertis Solar Inc.
10	5-2	Validation of Diffuse Irradiance Estimation Models for Use with the Pérez Transposition Model in PVsyst	Javier W. Delgado Hernandez	Enertis Solar Inc.
11	6-1	Laboratory and Outdoor Measurement Insights for CdTe Module Performance Evaluation	Daniel Zirzow	GroundWork Renewables
12	6-2	Backyard PV Module Partial Shade Characterization	Will Hobbs	Hobbs Family
13	7-1	Comparison of Horizon Shading Models	Sydney Eiss	Invenergy LLC
14	7-2	From GHI to POA: Validation of Decomposition and Transposition Models Using Field Measurements	Bahram Emami	McCarthy Building Companies, Inc.
15	8-1	Exploring terrain modeling through PVfarm -PVsyst integration	Levi Brown	McCarthy Building Companies, Inc.
16	**8-2**	**Hybrid Physics-Informed Digital Twin for PV Performance Modeling with Field Validation**	**Daniel Okon (Student)**	**Morgan State University**
17	9-1	Enhancements in voltage degradation modeling for multi-year analyses	Matt Prilliman	National Laboratory of the Rockies (NLR)
18	9-3	A Systematic Review and Integrated Approach to Modeling of Aging Utility Scale PV Systems	Matt Prilliman	National Laboratory of the Rockies (NLR)
19	9-2	The Integration of GOES Data for Solar Resource Assessment of the Contiguous U. S.	Yu Xie	National Laboratory of the Rockies (NLR)
20	9-4	Improving the National Solar Radiation Data Base using PSM V4	Yu Xie	National Laboratory of the Rockies (NLR)
21	10-1	High-resolution WRF-based Downscaling of Earth System Model Projections for Energy Applications across CONUS	Jaemo Yang	National Laboratory of the Rockies (NLR)
22	10-2	Modeling wind in agrivoltaics and its impact on eddy covariance flux measurements	Nick de Vries	Silicon Ranch
23	11-1	Assessing Uncertainty in Solar Measurements: Key Findings from NLR's SUNI Application across 89 Stations	Aron Habte	National Laboratory of the Rockies (NLR)
24	11-2	Skewed results: Can diagonal arrays maintain/improve performance?	Laura Hinkelman	Origis Energy, Inc.
25	12-1	Impact of Time-Series Weather Dataset Selection on NEC-Compliant PV String Sizing and Balance-of-System Economics	Vatan Kumar	Sun2O
26	12-2	Using electrical circuit tool pvspice for potential induced degradation simulations on a string level	Norman Jost	Sandia National Laboratories
27	13-1	**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**
28	**13-2**	**Thermal & Electrical Model coupling – Modelling Recombination effects for high efficiency modules at module scale**	**Robinson Cavieres Abarca (Student)**	**University of New South Wales**
29	**14-1**	Impact of Spectrum, Luminescent Coupling, and Temperature Coefficient on Tandem Device Performance	Phillip Hamer	University of New South Wales
30	14-3	Towards an Improved Thermal Model with Physically Consistent Heat Loss Coefficients	Phillip Hamer	University of New South Wales
31	15-1	Evaluating Photovoltaic Inverter Clipping Using Minute-Resolution Irradiance Data	Albert Chang	VDE Americas
32	16-1	From GHI-MLE to POA-MLE: Configuration-Relevant Solar Resource Selection for PV Performance Modeling	Rounak Kharait	E3 Consulting Services LLC
33	16-2	PV Snow Losses for the Contiguous U.S.: A Gridded Model with Ground-Based Validation	Josh Peterson	GroundWork Renewables
34	17-1	Correction of Solar Radiation Bias in Compact Weather Sensors for PV Monitoring	Ajay Singh	Campbell Scientific

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

Number	Position	Title	Name	Institution
35	1-3	Universal Analytical Model for Inter-Row Shading Loss Estimation in PV Plants	Gofran Chowdhury	3E
36	1-4	Comparative Assessment of ASTM E2848 and Temperature-Normalized Solar PV Capacity Testing Protocols	Shail Bajpai	Black & Veatch
37	2-3	Diagnostic techniques for PV plant performance	Jay Miller	Black & Veatch
38	2-4	An Alternative Approach for Determining Reporting Conditions and Expected Capacity for PV Capacity Testing	Parag Pathak	Black & Veatch
39	3-3	ASTM E2848-13 Based Energy Forecasting Methodology for Underperforming Solar PV Plants	Saurav Kadel	Black & Veatch
40	4-2	Evaluation of Dust Soiling Models Against Operational Data	Umay Akkoseoglu	DNV
41	4-4	Soiling losses: quantifying soiling using operational data	Umay Akkoseoglu	DNV
42	5-3	A Data-Driven Method for Predicting PV Energy Losses from Shading	Radhika Lampuse and Andrea Quattrone	DNV
43	5-4	Is IEC-61853 testing useful for predicting the energy yield of tandem solar cells?	Rajiv Daxini	National Laboratory of the Rockies (NLR)
44	6-3	First Solar True-Backtracking vs. Backtracking in Various Diffuse Conditions	Anna Raper	DNV Energy USA Inc
45	6-4	A review of the data landscape for solar & storage reliability analyses	Peter Burgess	EDF power solutions
46	7-3	Beyond Performance Ratio: Differentiating Model Bias from Field Underperformance using Physics-Based Modeling	Trevor Coathup	Enurgen
47	7-4	Improving PV Performance Modeling Through Data Quality Flagging and Classification	Devin Widrick	EPRI
48	8-3	Measurement-Supported Soiling Loss Modeling: Incorporating Site-Specific Preconstruction Measurements with Standard and Advanced Soiling Models	Julie Chard	GroundWork Renewables
49	8-4	Optimizing statistical sampling of in-situ PV module performance metrics for protection against plant total loss	Lawrence Pratt	GroundWork Renewables
50	10-3	Forecast-Driven BESS Scheduling in PV Plants: Intraday Updates to Maximize Arbitrage and Effective Utilization	Rafael Avila Naranjo	ICREA
51	10-4	Solar Capacity Test Case Study – Uncertainty Calculation	Kyle LaBrosse	Invenergy
52	11-3	Quantifying Power Losses from Inverter Voltage Floor Limitations	Sha Li	Leeward Renewable Energy
53	11-4	Combiner-Level Operational Performance Analysis Improvements	Tim Zimet	Longroad Energy
54	12-3	Short Form Energy Performance Index (EPI) Test vs Capacity Testing – A Legitimate Alternative to Industry Standard Milestone Testing	Lucas Smith	Moss
55	12-4	The importance of high-fidelity modeling of single-axis tracker PV systems	Ricky Dunbar	Nextpower
56	13-3	Distinguishing Soiling and Degradation Losses Using In-Situ I-V	Michael Gostein	OTT Hydromet
57	13-4	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
58	14-2	Impact of Quality Control on Uncertainty in Solar PV Performance Evaluation	Marketa Hulik Jansova	Solargis
59	15-3	Free near-real-time irradiance data from NOAA GOES satellite program	Will Hobbs	Southern Company
60	16-3	Applying Advanced Wind and Precipitation Sensing to Improve Solar Plant Weather Data Reliability and O&M Decisions	Mikko Krapu	Vaisala Oyj
61	16-4	RSS vs. Monte Carlo for Overbuilt Solar: Evaluating Accuracy Across the Distribution	Daniel Moghtader	VDE Americas
62	17-3	Operational Energy Yield Assessments: Comparing Approaches and Managing Uncertainty	David Smith	Wood PLC
63	17-4	Energy Losses due to Temporally or Spatially Significant Tracker Faults	Innes MacMillan	Wood PLC
64	18-3	Implementing pvlib-based modeling from a grid operator perspective	Matt Malles	Southern Company
65	18-4	Evaluating Cyber-Physical Cybersecurity in PV systems	Birk Jones	Sandia National Laboratories