

Modeling and Validation Subcommittee

Meeting Minutes

Virtual

Day 1—September 10, 2025

2–5 p.m. MDT

1. Welcome, Call to Order

Song Wang, Modeling and Validation Subcommittee (MVS) chair, called the meeting to order at 9 a.m. MST September 10, 2025. A quorum was present to conduct business. A list of attendees is attached as Exhibit A.

2. Review WECC Antitrust Policy

Doug Tucker, senior engineer, read aloud the WECC Antitrust Policy statement. The policy can be found on wecc.org.

3. Approve Agenda

S. Wang introduced the proposed meeting agenda.

On a motion by Pouyan Pourbeik, Power and Energy, Analysis, Consulting and Education, PLLC, the MVS approved the agenda.

4. Review and Approve Previous Meeting Minutes

S. Wang introduced the minutes of the meeting on May 7–10, 2025.

On a motion by S. Wang, the MVS approved the minutes of the meeting on May 7–10, 2025.

5. Review Previous Action Items

Maya Brimhall, administrative coordinator, reviewed action items carried over from the MVS meeting on May 10, 2025. Action items that are not closed and will be carried forward can be found on wecc.org.

6. Review Unapproved Dynamic Model List

D. Tucker reviewed the Unapproved Dynamic Model List and encouraged MVS members to look at the list for any models that are listed for their area and submit any corrections to WECC.

7. Establishing a Naming Convention for WECC Generic Models

The MVS discussed establishing a naming convention for WECC general models.

8. MVS Governance and Process Update

S. Wang provided a governance and process update to the MVS and presented the proposed MVS Model Approval Procedure draft, describing the two-stage approval framework. The draft will be listed for formal approval at a future MVS meeting.

In addition, S. Wang nominated Songzhe Zhu, Qualus, LLC, to serve as the MVS vice chair, and the MVS will vote for approval at the next MVS meeting.

9. Wide-Area Oscillation Damping & IBR Power Oscillation Damper: Field Results and Development Roadmap

Lin Zhu, EPRI, presented on the wide-area oscillation damping and IBR power oscillation damper field results and development roadmap.

10. MOD-33 Update

The following updates were made:

- Licheng Jin, CAISO, provided RC West updates.
- D. Tucker shared that SPP posted the cases about the October 2, 2024, MOD-33 update; anyone who would like to see the cases should contact RC West or SPP directly.

11. Prioritizing the Next Set of Model Development

The MVS prioritized the following set of model development:

- VHVDC2
- IBR Controls – REEC_E
- Grid-forming Inverter Model – Hybrid
- Large Load
 - EV Charging Model
 - Data Center
 - Electrolyzer model
- VHVDC3 – Offshore Wind
- Advanced Pump Storage Model
- SVSMO4 Model
- Multi-terminal VSC-HVDC

12. Program Updates

The following updates were made:

- Mengxi Chen, GE, provided PSLF program updates
- Jay Senthil, PTI, provided PSSE program updates
- Jamie Weber, PowerWorld Corporation, provided PowerWorld program updates



- Jeff Bloemink, Powertech Labs, provided Powertech Labs TSAT program updates

13. Review Upcoming Meetings

January 28–30, 2026	Virtual
May 6–8, 2026	Hybrid
September 9–11, 2026.....	Virtual

14. Adjourn Day 1

S. Wang adjourned Day 1 without objection at 4:42 p.m. MT.

Day 2 – September 11, 2025

9 a.m.–noon. MDT

2–5 p.m. MDT

15. Renewable Energy Modeling

The following updates were made:

- Wei Du, PNNL, presented on the Grid-Forming Hybrid Inverter Control Model and Plant Controller Model (REGFM_C1 and REPCGFM_C1). The MVS voted on the REGFM_C1 and REPCGFM_C1 models and voted unanimously to approve them for use in our planning models.
Approval Item: REGFM_C1 and REPCGFM_C1 models
By consensus, the MVS approved the REGFM_C1 and REPCGFM_C1 models.
- Pouyan Pourbeik, PEACE, presented on the proposed Renewable Plant-Controller Model (REPC_E). The REPC_E model was unanimously approved by the MVS.
Approval Item: REPC_E Model Specification
By consensus, the MVS approved the REPC_E Model Specification.
- P. Pourbeik provided an update on IBR model development and presented the REEC_E model for approval. The MVS voted unanimously to approve the REEC_E model.
Approval Item: REEC_E Model
By consensus, the MVS approved the REEC_E Model.
- Songzhe Zhu, Qualus, shared the IBR Model and Validation Guideline paper progress.
- The MVS engaged in a discussion on REPC_D Endorsement and Legacy REPC_B treatment.
- Vijay Vittal, ASU, presented on the development and validation of unbalanced RMS models.

16. Active Transmission System Modeling Update

- P. Pourbeik led an overview of the following active transmission system model specifications:



- hvdc2
- hvdc3
- svsmo4
- W. Du and Quan Nguyen, PNNL, updated the MVS on the Standard Library HVDC and MTDC model development.

17. Load Modeling

The following updates were made:

- The MVS discussed the modular-based composite load model.
- Hao Zhu, Minseung Ko, UT-Austin, presented on grid oscillations from large-scale AI workloads.
- Dmitry Kosterev, BPA, discussed modeling data centers using CMLD.
- Nick Hatton, senior engineer, led a discussion on DER vs. Load Trip Behavior in CMPLDW/LSDT9: Expected vs. Actual.
- Andreas Schmitt, BPA, and S. Wang discussed the following aspects of the load modeling work plan:
 - Transitioning the load model to a modular-based structure
 - Parameter calibration
 - Testing/verification: including equipment testing and model performance verification based on system events or other methods
 - WECC load model composition data
 - System-wide simulation
 - EV and data center control and protection
 - Support NERC emerging load plans

18. Power Plant Modeling

- Jin Tan, NERL, and Zerui Dong, OPAL-RT, provided APSH Specification Development updates. The MVS voted on the APSH model specification and unanimously approved it.

Approval Item: APSH Model Specification

By consensus, the MVS approved the APSH Model Specification.

- Greg Brooks, USACE Walla Walla District, introduced the GENQEJ model development. J. Weber called for a motion to add the GENQEJ model development as an approval item to the January 2026 MVS meeting, and Maggie Watkins, U.S. Army Corps of Engineers – Seattle District, seconded the motion.

By consensus, the MVS approved adding the GENQEJ model development to the January 2026 MVS meetings as an approval item.

19. Public Comment

There were no comments.

20. Review New Action Items

- Update the Approved Model list with models approved 9/10–9/11
 - Assigned To: Doug Tucker
 - Due Date: October 10, 2025
- Return feedback on the IBR Modeling Validation Guideline document
 - Assigned To: MVS Members; Song Wang
 - Due Date: October 20, 2025
- Add REPC_B model to the January agenda for approval to retire the model
 - Assigned To: Song Wang; Doug Tucker
 - Due Date: January 16, 2026
- Add GENQEJ model development to January 2026 meeting as an approval item
 - Assigned To: Song Wang; Doug Tucker
 - Due Date: January 16, 2026
- Add MVS Model Approval Procedure document to January 2026 meeting as an approval item
 - Assigned To: Song Wang
 - Due Date: January 16, 2026
- Draft a guideline for data centers using CMLD
 - Assigned To: Dmitry Kostev; Song Wang; Nick Hatton; Doug Tucker
 - Due Date: January 30, 2026

21. Adjourn Day 2

S. Wang adjourned Day 2 without objection at 5:37 p.m. MT.

Day 3—September 12, 2025

9 a.m.–noon MDT

22. Generation Modeling Validation Workshop

The MVS ran a workshop on generation modeling validation. The following was completed:

- Slaven Kincic, PNNL, introduced the workshop.



- Dewei Wang, PNNL, gave a Hy-DAT – overview and demonstration.
- Soumyadeep Nag and Shafiul Alam, INL, presented on the representation and impact of water head on power system planning and operation.
- Sameer Nekkallapu, PNNL, presented the hydrological modeling impact on Western Interconnection frequency response studies.
- Sohom Datta, PNNL, presented on the development of hydrologically accurate power flow and dynamics cases for stress events.
- Ningchao Gao and Jin Tan, NREL, presented multi-timescale hydro modeling with integrated hydrological conditions: flexibility analysis and its impact on grid stability.
- Jin Tan and Ningchao Gao, NREL, presented dynamic modeling of advanced pumped storage hydro technology.
- Shuchismita Biswas, PNNL, discussed how grid oscillations impact and are impacted by hydropower operations.
- David Daigle, CAISO, provided industry experience with forced oscillations originating from hydropower units.
- Jim Follum, PNNL, and Dan Trudnowski, Montana Tech, provided a measurement-based analysis of the properties of the British Columbia modes in the Western Interconnection.

23. Adjourn

S. Wang adjourned the meeting without objection at noon MDT.

Exhibit A: Attendance List

Members in Attendance

Angel Aquino	PowerWorld Corporation
Dirk Barton	Public Service Company of New Mexico
Zachary Beus	Puget Sound Energy, Inc.
Gregory Brooks	U.S. Army Corps of Engineers-Walla Walla District
Emerson Butler	Puget Sound Energy, Inc.
Daniel Cervantes	Los Angeles Department of Water and Power
Lakmal Chandrasekara	Turlock Irrigation District
Malati Chaudhary	Public Service Company of New Mexico
Ken Che	Public Utility District No. 1 of Snohomish County
Mengxi Chen	GE Vernova (GE Energy Consulting Group)
Christopher Corral	El Paso Electric Company
Tuan Dang	Public Utility District No. 1 of Snohomish County
Wei Du	Pacific Northwest National Laboratory
Roberto Favela	El Paso Electric Company
Carlos Flores Lopez	U.S. Army Corps of Engineers-Walla Walla District
Christopher Fuchs	California Independent System Operator
Cindy Fung	Alberta Electric System Operator
Miguel Garcia	Sacramento Municipal Utility District
Chris Gilden	Tri-State Generation and Transmission—Reliability
Joseph Gillette	Utility System Efficiencies, Inc.
Robert Jackson	Burns & McDonnell (1898 and Co.)
Licheng Jin	California Independent System Operator
Robert Jones	Seattle City Light
Seong Tae Kim	PacifiCorp
Slaven Kincic	Pacific Northwest National Laboratory
Yuriy Komlev	U.S. Bureau of Reclamation
Dmitry Kosterev	Bonneville Power Administration—Transmission
Mitchell Miller	NorthWestern Energy
Saurav Mohapatra	PowerWorld Corporation
Thura Nwe	Pacific Gas and Electric Company
Pouyan Pourbeik	Power and Energy, Analysis, Consulting and Education, PLLC
Sergey Pustovit	Bonneville Power Administration
Deepak Ramasubramanian	Electric Power Research Institute
Sohail Sayeed	Pacific Gas and Electric Company
Ratanak So	U.S. Army Corps of Engineers-Portland District
Xavier Sosa	Southern California Edison Company
Spencer Tacke	Auriga Corporation
Jin Tan	National Renewable Energy Laboratory
Anthony Taylor	Black Hills Corporation

Doug Tucker WECC
Ramin Vakili GE Vernova (GE Energy Consulting Group)
GuiHua Wang British Columbia Hydro and Power Authority
Song Wang Portland General Electric Company
Jeffery Watkins NV Energy
Maggie Watkins U.S. Army Corps of Engineers-Seattle District
James Weber PowerWorld Corporation
Trevor Werho Arizona Public Service Company
Xiaofei (Sophie) Xu Pacific Gas and Electric Company
Steve Yang Bonneville Power Administration—Transmission
Ratanan Yoopat Bonneville Power Administration

Members not in Attendance

Hassan Baklou San Diego Gas and Electric
Jess Boatwright NorthWestern Energy
Sean Brosig US Army Corps of Engineers
Jackson Daly Idaho Power Company
Jim Ding British Columbia Hydro and Power Authority
Fangfang Du PacifiCorp
Chris Effiong Western Area Power Administration
Xiaoyuan Fan Pacific Northwest National Laboratory
Jonathon Flores Los Angeles Department of Water and Power
Bo Gong Salt River Project
Allison Hidalgo U.S. Bureau of Reclamation
Gordon Kawaley Bonneville Power Administration—Transmission
James Keller Western Area Power Administration - Rocky Mountain Region
Rabi Kiran Pacific Gas and Electric Company
May Le Public Utility District No. 2 of Grant County
Ron Markham Pacific Gas and Electric Company
Parag Mitra Electric Power Research Institute
Michael (Logan) Pokallus Western Area Power Administration
Nathan Powell Deseret Generation & Transmission Cooperative
Anthony Rendon Salt River Project
Amanuel Selassie Los Angeles Department of Water and Power
Jayapalan (Jay) Senthil Siemens Industry, Inc.
Jonathan Stahlhut TransCo Energy, LLC
Muhammad Tayyab Western Area Power Administration
Chifong Thomas Thomas Grid Advisor
Patrick Truong Sacramento Municipal Utility District
George Zhou S&C Electric Company

Others in Attendance

Muthanna Abusbeaa.....	Electric Reliability Council of Texas
Baj Agrawal.....	Arizona Public Service Company
Urmila Agrawal.....	Electric Power Group
Shafiul Alam	Idaho National Laboratory
Chris Albrecht.....	WECC
Eric Bahr.....	NorthWestern Energy
Sheraz Baig.....	Powertech Labs, Inc.
Emma Beeler	Seattle City Light
Shuchismita Biswas.....	Pacific Northwest National Laboratory
George Boukarim	Peregrine Engineering Consulting
Maya Brimhall.....	WECC
Theodis Brown	Southwest Power Pool
Dahlia Byles	Public Service Company of New Mexico
Jared Campbell	Electrical Consultants, Inc.
Martin Caro-Garcia.....	Los Angeles Department of Water and Power
Alejandro Castro Jr.	El Paso Electric Company
Jyotsna Chatrati.....	Electrical Consultants, Inc.
Kaustav Chatterjee.....	Pacific Northwest National Laboratory
Luis Chiza	Escuela Politécnica Nacional
Paul Curtis	Public Utility District No. 1 of Chelan County
Sohom Datta.....	Pacific Northwest National Laboratory
Zerui Dong	OPAL-RT Technologies Inc.
William Dull.....	U.S. Army Corps of Engineers-Walla Walla District
Michael Ellerington	British Columbia Hydro and Power Authority
Tony Faris	Bonneville Power Administration
James Follum.....	Pacific Northwest National Laboratory
Bryan Friesen.....	British Columbia Hydro and Power Authority
Juan Gallego Calderon	Idaho National Laboratory
Ningchao Gao.....	National Renewable Energy Laboratory
Jack Gibfried	NERC
Andrew Glencross.....	U.S. Army Corps of Engineers
Ivan Guerrero	El Paso Electric Company
Brian Hallett.....	Reliability First
Nick Hatton.....	WECC
Karr Hersh.....	U.S. Department of Energy
Richard Höse	Siemens Energy, Inc.
Fred Howell.....	Powertech Labs, Inc.
Shawn Huang	Alberta Electric System Operator
Thomas Kauffmann	DIgSILENT North America
Menuka KC	Washington State University
Jinho Kim.....	Pacific Northwest National Laboratory

Min-Seung Ko	University of Texas at Austin
Ilhan Kocar	DIGSILENT North America
Mia Lara	Koch Engineered Solutions
Sam Li	British Columbia Hydro and Power Authority
Marck Llerena	National Renewable Energy Laboratory
Xue Lyu	Pacific Northwest National Laboratory
Richard Maguire	Electrical Consultants, Inc.
Mahdi Mahzouni Sani	Mitsubishi Electric Power Products, Inc.
Bibi Mathew	Pacific Northwest National Laboratory
C.D. McLean	California Energy Commission
Jerry Mitchell	Public Service Company of New Mexico
Elliott Mitchell-Colgan	Bonneville Power Administration
Sheik Mohiuddin	Pacific Northwest National Laboratory
Amir Mosaddegh	California Independent System Operator
Soumyadeep Nag	Idaho National Laboratory
Neeraj Nayak	Electric Power Group
Sameer Nekkallapu	Pacific Northwest National Laboratory
Ashley Ng	Powertech Labs, Inc.
Quan Nguyen	Pacific Northwest National Laboratory
Josh Niemi	ITC Holdings Corp.
Udoka Nwaneto	Pacific Northwest National Laboratory
Mohamed Osman	NERC
Milorad Papic	Independent Consultant
Shawn Patterson	U.S. Bureau of Reclamation
Juan Placid	JJ Power & Energy, Inc.
Madhu Ramesh	Oncor
Robert Reynolds	NorthWestern Energy
Antonio Richmond	Mitsubishi Electric Power Products, Inc.
Benjamin Rodriguez	El Paso Electric Company
Ricardo Rodriguez	El Paso Electric Company
Fahmid Sadeque	Pacific Northwest National Laboratory
Marco Salazar	Siemens Industry, Inc.
Fede Sanchez	University of Texas
Raakeshvarshan Sanjeevee	Arizona State University
Venkateswara Seshmasetti	Emirates Water and Electricity Company
Nitish Sharma	BayWa r.e. Solar Projects LLC
Ashank Sinha	Mitsubishi Electric Power Products, Inc.
Kaustubh Sinha	Mitsubishi Electric Power Products, Inc.
Ian Smith	Pacific Northwest National Laboratory
Eugen Starschich	Siemens Industry, Inc.
Christopher Stauffer	Mitsubishi Electric Power Products, Inc.
Lakshmi Sundaresh	Electric Power Research Institute

Adeyemi Taylor Electric Reliability Council of Texas
Sushrut Thakar Electric Power Research Institute
David Tovar El Paso Electric Company
Dan Trudnowski Montana Tech
Safayet Ullah Electric Reliability Council of Texas
John Undrill Independent Subject Matter Expert
Jerod Vandehey Public Utility District No. 1 of Cowlitz County
Jerry Vang Mitsubishi Electric Power Products, Inc.
Antos Varghese Pacific Northwest National Laboratory
Sai Gopal Vennelaganti Tesla, Inc.
Vijay Vittal Arizona State University
Bo Wang Quanta Technology LLC
Dewei Wang Pacific Northwest National Laboratory
Quincy Wang British Columbia Hydro and Power Authority
Shiyuan Wang Quanta Technology LLC
Daniela Yovine Seattle City Light
Chengwen Zhang Electric Power Research Institute
Hao Zhu University of Texas at Austin
Lin Zhu Electric Power Research Institute
Qing Zhu British Columbia Hydro and Power Authority
Songzhe Zhu Qualus, LLC
David Zirbel Pine Gate Renewables LLC
Scott Zuloaga Electric Reliability Council of Texas