

WECC Modeling Philosophy

June 2025

Advanced system models are critical to WECC and our industry partners to study how the bulk power system (BPS) and its components respond to disturbances, demand growth, resource retirements and additions or other changes. The information gathered from modeling work is crucial to identifying, understanding, and developing ways to mitigate and prevent risks to the system. In addition, WECC's models are used by industry planners to inform billion-dollar infrastructure decisions. Ensuring our system models are of the highest quality is a top priority for us. This philosophy underpins WECC's approach to our role and responsibility for creating and maintaining high-quality system models of the Western Interconnection BPS.

Background

What is Modeling?

A model of the bulk power system in the Western Interconnection is the data component of a computer simulation that captures the key elements and dynamics of the interconnected network of load, generation, and transmission facilities in the West. Modeling is the process of building and using these simulations and ensuring they reflect the electric system to a level that allows us to draw useful conclusions. The type of information a model contains, and the level of detail required to mimic system operation, depends on the purpose and needs of the model.

WECC's Models

We develop and use models to help fulfill our mission. WECC is the designated interconnection-wide model builder under mandatory Reliability Standard MOD-032. As such, WECC is responsible for providing accurate, high-quality models—called base cases—to industry. We take this responsibility very seriously because entities use the base case models as foundational input for decisions that directly affect BPS reliability. In addition to the base case models, WECC creates, curates, and manages other models that help us and our stakeholder partners study reliability risks.

Model Quality

High quality models are essential to BPS reliability. Through synthesis of the data, integration of risk considerations, and application of extensive modeling and engineering expertise, WECC is committed to developing worldclass system models. This process amounts to much more than simply stitching together data, and we have a strong sense of accountability for the quality and value of our models.

WECC uses data sent from entities in the Western Interconnection to create the models. The attention to detail in the data provided by entities in the West varies, with some just meeting the minimum requirement, and others providing higher quality data. This affects the quality of WECC's models because they are built from this data. WECC is committed to working with stakeholders to ensure the highest quality data is included in the models.

Continuous Improvement

With rapid changes occurring in the system, up-to-date, accurate models and data are critical to planning and operating the system. WECC is continuously improving its models to ensure they remain high-value tools for evaluating and understanding the implications of fast-changing challenges and risks to the BPS. As such, WECC strives to improve the quality of data it collects and the way it builds the models.

WECC cannot make model improvements in a vacuum. We rely on stakeholders—who own, plan, and operate system equipment—for accurate, high-quality data and insight into model quality. We issue regular data requests to obtain the information we need to build the models, and the quality of those models depends on the quality of the data we receive in response. In addition, we work with stakeholders to determine the needs for our models. These technical partnerships help us ensure we create models that are useful to industry. Our abilities to gather data, convene experts, and inform decision-makers, as well as our interconnection-wide perspective, help us make a material impact on the quality of models and data in the West.

Philosophy Focus Areas

WECC's modeling philosophy is built on seven principles: completeness, accuracy, consistency, validation, standardization, relevance, and availability.

1. Completeness: We are confident the models are complete

- All equipment needed to adequately model and study the BPS is provided.
 - We expect necessary equipment to be modeled regardless of BES or BPS designation
- We have methods/approaches to check for completeness
- All required data fields are populated with information (latitude and longitude, etc.)

2. Accuracy: We regularly review the performance accuracy of our models

- We use various methods to hone the accuracy of our models, including:
 - Back-casting
 - System disturbance validation
 - Performance trending, e.g., comparing new resource plans to actual build or comparing forecast generation to actual generation
 - Gap analysis, e.g., decline in system inertia that is not being reflected in models

3. Consistency: We expect data submission processes and submitters to use a consistent approach

- We use our partnership with stakeholders to get consensus about their approaches
- We document any deviations from the established approach and seek to understand the reason for the differences
- We expect, and work with data submitters to provide, data on everything that is connected to their transmission systems.

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- All equipment must be part of a Transmission Planner (TP) and Planning Coordinator (PC) area, there are no TP or PC gaps. We expect it to be a contiguous area. It must be coordinated at the seams.

4. Validation: We validate the data we receive

- We use tools to identify discrepancies, including:
 - Loads & Resources data to fully use the Data Management Solution
 - Base Cases use and add NERC Case Quality Metrics and the Steady-State and Dynamics Dashboard
 - Anchor Data Set tools and automation have been reviewed and scrutinized by our stakeholders
- We use the range of WECC's authority, including oversight authority, to ensure appropriate emphasis is put on model quality. We regularly share information about the ongoing data quality issues generally and from individual data providers with the Oversight team at WECC
 - Registration dashboard—can help us understand whether the model reflects what is showing up in the registration activities

5. Standardization: We use trusted, industry-standard software tools

- Power Flow and Dynamic tools
 - PSS/E
 - PowerWorld
 - PSLF
 - TARA
- Production Cost Models (Security Constrained Dispatch)
 - Gridview
 - SERVIM

6. Relevance: We build and provide models that are relevant and useful

- We regularly review which system models we build to verify the usefulness and relevance to the reliability of the bulk power system

7. Availability: We share data and models with those who promote reliability

- We consider appropriate restrictions and protection of sensitive information