Public Utility District No. 1 of Snohomish County

MOD-032 Model Data Requirements & Reporting Procedures

(Supplement to WECC Data Preparation Manual & BPA MOD-032 Modeling Data Requirements and Procedure)

(MOD-032)

Version 7

May 2026

Reviewed by:

Recoverable Signature

X

Tuan Dang, Principal Engineer
System Planning and Protection
Signed by: S-1-5-21-2099472759-1034109698-1640847306-37386/d2de8ab4-77e0-4c2a-9d84-65f4ece6fdf4/log

Approved by:

Recoverable Signature

X Jeanne Harshbarger

Jeanne Harshbarger, Manager
System Planning and Protection
Signed by: S-1-5-21-2099472759-1034109698-1640847306-17811/140f61c8-d50f-45c2-814b-ab483012fb2f/log

Table Contents

1. Introduction

As a registered transmission planner (TP), Snohomish County PUD (SNPD), and its Planning Coordinator (PC), Bonneville Power Administration (BPA), are obligated to collaboratively establish data requirements and common procedures for submitting the necessary information for the development of the WECC interconnection Seasonal Base Case models. These models must be made in compliance with requirements in MOD-032, as well as FAC-008, MOD-025, MOD-026, MOD-027, TPL-001-5, TPL-007 and PRC-024. This document outlines SNPD's data requirements and reporting procedures to ensure compliance with NERC Reliability Standard MOD-032-1: Data for Power System Modeling and Analysis. This document serves as a supplement to both WECC DPM and BPA's MOD-032 Modeling Requirement Procedure.

The foundation of SNPD's data submittal and modeling procedures is MOD-032-1 requirement R1, which states:

R1. Each Planning Coordinator and each of its Transmission Planners shall jointly develop steady-state, dynamics, and short circuit modeling data requirements and reporting procedures for the Planning Coordinator's planning area that include: [Violation Risk Factor: Lower] [Time Horizon: Long-term Planning]

1.1. The data listed in Attachment 1.

1.2. Specifications of the following items consistent with procedures for building the Interconnection-wide case(s):

1.2.1. Data format;
1.2.2. Level of detail to which equipment shall be modeled;
1.2.3. Case types or scenarios to be modeled; and
1.2.4. A schedule for submission of data at least once every 13 calendar months.

1.3. Specifications for distribution or posting of the data requirements and reporting procedures so that they are available to those entities responsible for providing the data

BPA has delegated the data submission activities to SNPD as a Transmission Owner and Transmission Planner; and BPA, as the Planning Coordinator, has agreed that SNPD will continue to submit the required data to the Area Coordinator (Western Power Pool) for the Northwest Area, known as WECC Area 40. In this arrangement, the Area Coordinator will continue to compile data for the data owners within the Area and submit data to WECC to comply with WECC's base case compilation schedule (**R1.2.3**, **R.1.2.4)**. Specific scenarios will be published on the WECC SRS website annually for the upcoming year.

When requested by BPA, SNPD shall submit the requested data to the following BPA Customer Service Reliability Program (CSRP) mailbox: CSReliabilityProgram@BPA.gov, or in the case of short-circuit modeling data directly to Jennifer Ferris (jbferris@bpa.gov), who is part of BPA's System Protection and Control (SPC) Technical Services Group (TEZP).

The North American Electric Reliability Corporation (NERC) serves as the Electric Reliability Organization (ERO) for the bulk power system across North America. Under NERC, the Western Electricity Coordinating Council (WECC) functions as a Regional Entity responsible for overseeing reliability within the Western Interconnection, which includes Snohomish County PUD (SNPD).

SNPD operates as a Transmission Planner and Transmission Owner under applicable NERC reliability standards and fulfills data reporting requirements in the latest WECC data Preparation Manual, and the Bonneville Power Administration (BPA) Annual Data Exchange Model Data Requirements & Reporting Procedures (https://www.bpa.gov/-/media/Aep/transmission/reliability-and-nerc-standards/bpa-mod-032-model-data-requirements-reporting-procedures.pdf). Any additional data required by WECC's DPM and BPA's modeling guidelines that are not in this document must also be submitted to support interconnection-wide planning models.

2. Modeling Criteria

Section 2.1.2 of the document "BPA Annual Data Exchange Model Data Requirements & Reporting Procedures" specifies inclusion criteria for the planning and operation base cases:

Table 2-1: Project Inclusion Criteria

Type & Status	Conceptual/Proposed/ Planned/Retirement	Designed/Funded/Construction/In Service/Corrections
Steady-State Dynamics Short Circuit	NOT MODELED	MODELED
GIC		
FAC-008		

Note: *SNPD is not registered as Planning Coordinator, Transmission Service Provider, Balancing Authority, or Resource Planner. SNPD does not submit interchange schedules other than submitting expected peak load and generation output to the Data Representative and to BPA for inclusion in the WECC base case.*

3. Steady State Data

MOD-032-1 Attachment 1 lists the minimum required modeling data to request from customers and includes in WECC base cases (**R1.1**). The steady-state data should encompass, but is not

limited to, the elements specified in this attachment. The data required, along with the relevant functional entity, are as follows:

1. Each bus [TO][1]
    a. Nominal voltage
    b. Area, zone and owner [2]
2. Aggregated Demand [LSE][3]
    a. Real and reactive power
    b. In-service status
3. Generating units [GO, RP (for future planned resources only)][4]
    a. Real power capabilities – gross maximum and minimum values
    b. Reactive power capabilities – maximum and minimum values at real power capabilities in 3a above
    c. Station service auxiliary load for normal plant configuration (provide data in the same manner as that required for aggregate Demand under item 2, above).
    d. Regulated bus and voltage set point (as typically provided by the TOP)[5]
    e. Machine MVA base
    f. Generator step up transformer data (provide same data as that required for transformer under item 6, below)
    g. Generator type (hydro, wind, fossil, solar, nuclear, etc)
    h. In-service status
4. AC Transmission Line or Circuit [TO]
    a. Impedance parameters (positive sequence)
    b. Susceptance (line charging)
    c. Ratings (normal and emergency)
    d. In-service status
5. DC Transmission systems [TO]
6. Transformer (voltage and phase-shifting) [TO]
    a. Nominal voltages of windings
    b. Impedance(s)
    c. Tap ratios (voltage or phase angle)
    d. Minimum and maximum tap position limits
    e. Number of tap positions (for both the ULTC and NLTC)
    f. Regulated bus (for voltage regulating transformers)
    g. Ratings (normal and emergency)
    h. In-service status
7. Reactive compensation (shunt capacitors and reactors) [TO]

[1] TO: Transmission Owner
[2] The Area, zone and owner can be obtained upon request from the Transmission Planner.
[3] LSE: Load Serving Entity
[4] GO: Generator Owner. RP: Resource Planner
[5] TOP: Transmission Operator

a. Admittances (MVars) of each capacitor and reactor
b. Regulated voltage band limits (if mode of operation not fixed)
c. Mode of operation (fixed, discrete, continuous, etc.)
d. Regulated bus (if mode of operation not fixed)
e. In-service status

8. Static Var Systems [TO]
    a. Reactive limits
    b. Voltage set point
    c. Fixed/switched shunt, if applicable
    d. In-service status
9. Other information requested by the Planning Coordinator or Transmission Planner necessary for modeling purposes. [BA, GO, LSE, TO, TSP][6]

In addition to the items specified in MOD-032-1 Attachment 1, the WECC DPM requires further information to be submitted for the Interconnection-wide cases. The following data, required by the WECC DPM but not included in Attachment 1 of MOD-032-1, are: **(R1.2.2)**

1. Each bus [TO]
    a. Bus type
    b. Scheduled voltage
    c. System Operating bus voltage Limit (SOL)
    d. Substation in which bus assigned
    e. Data Maintainer
    f. Balancing Authority
2. Aggregated Demand [LSE]
    a. Load Long ID
    b. Non-conforming load flag
    c. Distributed Energy Resources (DER)
    d. Area, zone and owner (see footnote 2)
    e. Data Maintainer
    f. Balancing Authority
3. Generating units [GO, RP (for future planned resources only)]
    a. Pgen (real power output)
    b. Qgen (reactive power output)
    c. Generator scheduled voltage
    d. Indication of base load capabilities
    e. Area, zone and owner (see footnote 2)
    f. Data Maintainer
    g. Balancing Authority
4. AC Transmission Line or Circuit [TO]
    a. Area, zone and owner (see footnote 2)
    b. Data Maintainer

[6] BA: Balancing Authority. TSP: Transmission Service Provider

c. Connectors
d. Balancing Authority

5. DC Transmission systems [TO]
    a. DC line resistance
    b. DC line inductance
    c. DC line capacitance
    d. DC current ratings
    e. DC line loss assignment factor (pu)
    f. Area, zone and owner (see footnote 2)
    g. Data Maintainer
    h. Balancing Authority
6. Transformer (voltage and phase-shifting) [TO]
    a. Transformer MVA base of windings
    b. Tap control type
    c. Area, zone and owner (see footnote 2)
    d. Data Maintainer
    e. Balancing Authority
7. Reactive compensation (shunt capacitors and reactors) [TO]
    a. Area, zone and owner (see footnote 2)
    b. Data Maintainer
    c. Balancing Authority
8. Static Var Systems [TO]
    a. Device/Control Type
    b. Regulated bus
    c. Voltage dead band
    d. Actual shunt conductance
    e. Actual shunt susceptance
    f. Minimum susceptance of continuous element
    g. Maximum susceptance of continuous element
    h. Susceptance of each switched element per step
    i. Number of steps
    j. Area, zone and owner (see footnote 2)
    k. Data Maintainer
    l. Balancing Authority

The DPM should be consulted to identify any additional data requirements applicable to specific models. A copy of the most recent DPM can be provided upon request. All required data shall be submitted in a written or tabular format with all items clearly labeled, ensuring that each data element is explicitly identified. Alternatively, data may be provided in a format compatible with accepted power flow software, such as a PowerWorld .aux file or a GE PSLF .epc file. **(R.1.2.1)**

Ratings:

Thermal ratings shall be provided in MVA, based on the nominal voltage of the pertinent bus, and consistent with data submitted under FAC-008. The seasonal ratings should follow ambient temperature assumptions:

- Summer – Based on 30°C (86°F) Ambient Air Temperature
- Fall/Spring - Based on 20°C (68°F) Ambient Air Temperature
- Winter - Based on -5°C (23°F) Ambient Air Temperature

The ratings shall be given for each season below:

- Summer Normal (Continuous)
- Summer Emergency (30-min)
- Winter Normal (Continuous)
- Winter Emergency (30-min)
- Fall/Spring Normal (Continuous)
- Fall/Spring Emergency (30-min)

Inverter Base Resources (IBR) Inverter-based resources, such as wind, photovoltaic power plants (PV), and battery energy storage system (BESS), must adhere to the WECC Wind Power Plant Powerflow Modeling Guide, the WECC Solar Plant Dynamic Modeling Guideline, and WECC Guidelines for Modeling of Energy Storage Devices, as applicable.

4. Dynamic Data

Detailed generator modeling shall conform to the requirements specified in MOD-032 Attachment 1. **(R.1.2.2).** As specified in the WECC Data Preparation Manual (DPM) and BPA Annual Data Exchange Model Data Requirements and Reporting Procedure, generator modeling must comply with the following:

- Individual generator units rated 10 MVA or larger and connected to the transmission system at 60 kV or higher shall submit steady-state and dynamic data for each generator.
- For non-collector-based generation with an aggregated capacity of 20 MVA or larger and connected to the transmission system at 60 kV or higher, steady-state and dynamic data shall be submitted for each generator.
- For collector-based generation facilities with an aggregated capacity of 20 MVA or larger and connected to the transmission system at 60 kV or higher, such as wind, solar, or battery energy storage resources, steady-state and dynamic data shall be submitted using a single aggregated generator model representing the total facility capacity.
- Modeling of Utility-scale Distributed Energy Resource (U-DER) should comply with the following:
    - Individual U-DER facilities with an aggregated generation capacity of 10 MVA or greater shall be modeled explicitly at low-side of the interconnecting transformer and shall include an appropriate dynamic model.

- Individual U-DER facilities with an aggregated generation capacity of less than 10 MVA shall be represented within the load model at the low-side of the interconnecting transformer.

Dynamic data is submitted annually as part of the MOD-032 data reporting requirements. If there are no changes to the existing dynamic data, a written notification must be provided to the Transmission Planner (TP) from generation owners confirming that the data remains unchanged.

In addition, every ten years, a separate request will be sent to generation owners by Transmission Planning requiring generator testing and the submission of updated dynamic data in accordance with MOD-026-2 standards.

Synchronous Generators:

A detailed model of a generator must include:

- Generator Model
- Excitation System Model
- Turbine-Governor Model
- Power System Stabilizer Model *
- Reactive Line Drop Compensation Model *
- Over Excitation Limiter *
- Under Voltage Ride Through Relays *
- Under Frequency Ride Through Relays *
- Other information requested by the Planning Coordinator or Transmission Planner necessary for modeling purposes *

* May be omitted if the device is not installed or not active.

Renewable Energy Facilities and Inverter-Based Resources:

A Renewable Energy Facility should be modeled using equivalent generator representation as outlined in the Solar PV Plant Modeling and Validation Guideline, the WECC White Paper on Modeling Hybrid Power Plants, and the WECC Wind Plant Power Flow Modeling Guide. The models must be WECC-approved generic models and should include the following components:

- Renewable Energy Generator/Converter models
- Renewable Energy Electrical Controls models
- Renewable Energy Plant Controller models
- Mechanical Element Models for Wind Turbine Generator
- Protection Models
    - Low/High Voltage Ride-Through model
    - Low/High Frequency Ride-Through model

The dynamic data mentioned above must align with the steady-state data provided for each facility and comply with the WECC Approved Dynamic Model Library found on the WECC MVS website. Data submissions should clearly identify the model being submitted and include the model parameters necessary for complete model configuration. Data should be submitted in a written or tabular format with all items clearly labeled, or in a format compatible with PowerWorld or GE PSLF power flow programs, such as a PowerWorld .aux file or a GE PSLF .dyd dynamic file format. **(R.1.2.1)**

If there are updates to the dynamic data, SNPD's transmission planners will send revised data to WECC to update the WECC Master Dynamic File (MDF).

5. Short Circuit Data

A detailed report of short circuit data must follow MOD-032 Attachment 1 and should include the following: **(R.1.2.2)**

1. Provide for all applicable elements in column "steady-state" [GO, RP, TO]
    a. Positive Sequence Data
    b. Negative Sequence Data
    c. Zero Sequence Data
2. Mutual Line Impedance Data [TO]
3. Other information requested by the Planning Coordinator or Transmission Planner necessary for modeling purposes. [BA, GO, LSE, TO, TSP]

Short circuit data should be submitted in the preferred format of the data owner. This data will only be shared with WECC upon request and will not be included in regular data submissions. WECC annually collects the short circuit data from the Planning Coordinator.

SNPD's Transmission Protection engineers annually send SNPD short circuit updates (ASPEN model) to BPA SPC Technical Services Group, as SNPD's PC, and SNPD transmission planners. **(R.1.2.1)**

6. Schedule

Data must be submitted at least once every 13 calendar months. SNPD's transmission planners will issue annual data request notices each November to all data owners, with an expected response deadline in mid-December. If there have been no changes to the data in the past 13 months, a notification confirming that the data remains unchanged is required. **(R.1.2.4)**

7. Distribution, Posting and Data Request

The SNPD MOD-032 Model Data Requirements and Reporting Procedures is available at https://www.snopud.com/account/services/connecting-gen-projects/. Additionally, SNPD will provide a copy of this document to all agencies upon request **(R1.3)**.

Any requests related to this document or for verification of submitted data may be directed to the Snohomish County PUD Transmission Planning group at transmissionplanning@snopud.com. The MOD-032 standard lead or transmission planner will respond within 90 calendar days of receipt. (**R.3**)

8. Data Owner Responsibilities

In accordance with requirement **R2** in MOD-032, data owners are responsible for providing the data necessary to model their assets in accordance with the criteria outlined in the applicable data preparation documents. BPA, as SNPD's PC, requires the following submissions from data owners:

- Generator Owners (GO) are responsible for submitting modeling data for their existing and approved future generating facilities and associated relays.
- Load Serving Entities (LSE) are responsible for providing their load forecasts corresponding to the scenarios developed.
- Transmission Owners (TO) are responsible for submitting data for modeling their existing and approved future transmission facilities.

9. WECC Base Case Update Process

SNPD participates in the WECC System Review Subcommittee (SRS), which develops eleven (11) base cases each year for both planning and operation (WECC base case schedule) including:

a. Five operating cases
b. Two specialized cases
c. One 5-year summer planning case
d. One 5-year winter planning case
e. One 10-year summer planning case and
f. One 10-year winter planning case

These base cases represent a variety of system conditions, scenarios, and study types provided by SRS members. SNPD follows the WECC base-case schedule to submit and update model data in accordance with WECC requirements, including submitting data to support updates to the base cases (**R1.2.3**)

Each year, the SNPD MOD-032 Standard Lead assigns responsibility for updating each WECC Base Case, as identified in the WECC base case schedule, to designated transmission planners.

SNPD follows the established WPP process to update each assigned base case. Each base case update consists of four (4) formal update rounds, as outlined below:

1. Initial Update
2. Initial Update Pre-run
3. WECC Review
4. WECC Review Pre-run

The updating process is initiated when transmission planners receive an email notification from WECC and/or WPP (Area Coordinator) with sufficient advance notice to adhere to the Area Coordinator's submittal schedule (**R.2**). Transmission planners should follow the procedure outlined below to update the WECC base case:

1. The Transmission Planner downloads Seed Case(s) based on the WECC data request letter from either the WECC website or the secure WPP GlobalScape platform.
2. The designated updater verifies all required system conditions as outlined in the WECC data request letter, including but not limited to:
   - The modeled year and season
   - Load parameters
   - Generation details
   - System configuration
   - Line data characteristics and transformer information
3. Review and revise topology from the WECC base case as necessary.
   In order to be incorporated into the WECC base case, future projects are required to meet the criteria outlined in Section 2.
4. Review and update SNPD's system load
   Transmission planning uses SNPD's 20-year system peak load forecast for all seasons from the Rate department, plus summer and winter distribution peak load forecasts from distribution planners. The transmission planner calculates WECC base case peak loads by applying the system-to-distribution substations peak load ratio. This forecast is matched with data submitted to BPA (SNPD's Planning Coordinator).
   Light season loads are determined as follows:
   - Light winter: 60% of Heavy winter load.
   - Light summer: 60% of Heavy summer load.
   - Light spring: 50% of Heavy summer load.

   The yearly load forecast will be stored here with the corresponding year.

   W:\PLANNING DEVELOPMENT\XMISSION PLANNING DATA\SUBSTATION LOAD DATA for BASE CASES

5. Review and update SNPD's generation dispatch

   Steady-State:

   MOD-032's standard lead annually requests and uses generation dispatch data for each peak season (winter, summer, and spring) provided by Generation Owners (GO). Since light generation dispatch data are not included, transmission planning will use the median the plant's output based on historical seasonal data from the past five years.

   For new generation projects, the project may be modeled in the WECC base case; however, it must remain offline until the generation passes MOD-026-2 (Model Validation Process). Once model validation is complete, generation dispatch will use data from the GO. For new battery energy storage (BESS) projects, they should remain offline in planning base cases and only be brought online for operation base cases, as requested by the operations engineer.

   All of the generation dispatch data will be stored here in the corresponding year.
   W:\PLANNING DEVELOPMENT\NERC Compliance\WECC\Base Cases\2026\WECC\Ref

   Dynamic:

   SNPD has an agreement with our Area Planning Coordinator that dynamic data does not need to be submitted with every base case submittal unless the data has changed. If there is a change (such as re-verification per MOD-026, MOD-027 for existing plants or model verification for new plants), transmission planning will submit the updates directly to WECC for approval and update the data in their master dynamic file (MDF). Once WECC notifies transmission planning that the MDF file has been updated, the transmission planner should download, verify the MDF file, and send the updated model to WPP (AC), and BPA (PC)
6. Review and update SNPD's branch model characteristics and Facility Ratings

   Facility ratings in the WECC base are sourced from the Facility Rating Spreadsheet (FAC-008), using the defined seasons in rating section above. For planning cases, only continuous ratings are applied; 30-minute emergency ratings are considered on case-by-case basis. In operation cases, both normal and 30-minute emergency ratings are used.

   The updated facility ratings spreadsheet will be stored at:
   W:\PLANNING DEVELOPMENT\XMISSION PLANNING DATA\FACILITY RATINGS\Transmission Facility Ratings
7. Base case quality data check

   After collecting updates, the changes are compiled into an aux file and loaded into the base case to create the updated case. Transmission planners must verify that the case is free of errors on both the WECC Steady-State and Dynamic Dashboard (SADD), as well as WPP's Data validation spreadsheet. All errors identified in these spreadsheets must be corrected prior to finalizing the case.

8. Peer review and case sign-off
   Each updated planning case must be reviewed by another transmission planner, while each operation case requires review by an operations engineer. The transmission planner signs off the planning case; both the transmission planner and operation engineer sign off the operation case. Submit the sign-off document to the area coordinator during the third-round update (WECC review).
9. Submit data and records.
   Upload the updated data as an auxiliary file to WPP's GlobalScape, then notify WPP staff by email. Ensure all case updates and related documents are saved in the appropriate folder for the corresponding year.
   Directory: W:\PLANNING DEVELOPMENT\NERC Compliance\WECC\Base Cases
   Summarize submittals in the WECC Base Case Records Excel spreadsheet and save it to:
   W:\PLANNING DEVELOPMENT\NERC Compliance\WECC\Base Cases\2026\WECC
10. Short circuit updates
    Transmission Protection Engineers annually send SNPD’s short circuit updates (ASPEN model) to BPA SPC Technical Services Group and SNPD transmission planners.

Version History

Version	Date	Action	Name of Editor
1	June 2015	Initial Document	John Liang and Long Duong
2	December 2020	Revised document for new area coordinator	John Martinsen
3	July, 2023	Revised document to add posting requirements, and language changes	Tuan Dang
4	December, 2023	Revised document to update ratings for WECC planning base case, and short circuit submittal to PC and TP.	Tuan Dang and David Quashie
5	December, 2024	Revised document to add more details on the entire document	Tuan Dang
6	December 2025	Add details in the facility ratings Add data requirement for BESS Add transmission planner group email	Tuan Dang
7	May, 2026	Update process to update WECC base case Add timeline response to data request Add more details in generation and dynamic section	Tuan Dang