



Public Utility District No. 1 of Snohomish County

# MOD-032 Model Data Requirements & Reporting Procedures

(Supplement to WECC Data Preparation Manual)

**(MOD-032)**

Version 5

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## Table Contents

1. Introduction .....	3
2. Modeling Criteria .....	4
3. Steady State Data .....	4
Ratings:.....	7
Wind Farms and Photovoltaic Power Plants:.....	7
4. Dynamic Data .....	7
Synchronous Generators: .....	8
Renewable Energy Facilities and Inverter-Based Resources: .....	8
5. Short Circuit Data .....	9
6. Schedule .....	9
7. Distribution and Posting.....	9
8. Data Owner Responsible .....	9
9. WECC Base Case update process .....	10
Version History.....	11

# 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, 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.

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**).

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

The Western Electric Coordination Council (WECC) serves as the Electric Reliability Organization (ERO) for Snohomish County PUD. The data reporting requirements for the ERO are specified in the WECC Data Preparation Manual (DPM). SNPD functions as a Transmission Planner under

this standard and collects data following the WECC DPM and BPA Annual Data Exchange Model Data Requirement & Reporting Procedures. Any data required by WECC’s DPM and BPA’s Modeling Requirement that is not included 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/Funded/In Service/Corrections
Steady-State	NOT MODELED	MODELED
Dynamics		
Short Circuit		
GIC		
FAC-oo8		

Note: SNPD is not registered as Planning Coordinator, Transmission 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 outlines the minimum modeling data that must be requested. 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]<sup>1</sup>
  - a. Nominal voltage
  - b. Area, zone and owner <sup>2</sup>
2. Aggregated Demand [LSE]<sup>3</sup>
  - a. Real and reactive power
  - b. In-service status
3. Generating units [GO, RP (for future planned resources only)]<sup>4</sup>
  - a. Real power capabilities – gross maximum and minimum values

<sup>1</sup> TO: Transmission Owner

<sup>2</sup> The Area, zone and owner can be obtained upon request from the Transmission Planner.

<sup>3</sup> LSE: Load Serving Entity

<sup>4</sup> GO: Generator Owner. RP: Resource Planner

- 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)<sup>5</sup>
  - 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]
- 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]<sup>6</sup>

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<sup>5</sup> TOP: Transmission Operator

<sup>6</sup> BA: Balancing Authority. TSP: Transmission Service Provider

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. Balance 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. Balance 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. Balance Authority
4. AC Transmission Line or Circuit [TO]
  - a. Area, zone and owner (see footnote 2)
  - b. Data Maintainer
  - c. Connectors
  - d. Balance 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. Balance 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. Balance Authority
- 7. Reactive compensation (shunt capacitors and reactors) [TO]
  - a. Area, zone and owner (see footnote 2)
  - b. Data Maintainer
  - c. Balance 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. Balance Authority

Please consult the DPM to identify any additional data needed for specific models. A copy of the latest DPM can be provided upon request. Data should be submitted in a written or table 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 .epc file. **(R.1.2.1)**

#### **Ratings:**

Thermal ratings should 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

#### **Wind Farms and Photovoltaic Power Plants:**

Inverter-based resources, such as wind and photovoltaic power plants, must adhere to the [WECC Wind Power Plant Powerflow Modeling Guide](#) and the [WECC Solar Plant Dynamic Modeling Guideline](#).

## **4. Dynamic Data**

As mentioned in the WECC DPM and BPA Annual Data Exchange Model Data Requirements & Reporting Procedure, all generators with nameplates of 10 MVA, or a facility with an

aggregated nameplate of 20 MVA or larger must be modeled. A detailed model of a generator must follow MOD-032 Attachment 1. **(R.1.2.2)**

### **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 table 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 send revised data to WECC to update the WECC Master Dynamic File (MDF).



## 5. Short Circuit Data

A detailed 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. Currently, WECC does not create interconnection-wide cases for short circuit analysis.

SNPD’s 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 and Posting

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

## 8. Data Owner Responsible

In accordance with requirement **R2** in MOD-032, data owners are responsible for providing the data necessary to model their assets per criteria outlined in the data preparation documents. BPA, as SNPD’s PC, requires the following submittals 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's data submittal and documentation process is described below:

1. SNPD receives data requests from WECC and/or Western Power Pool (Area Coordinator) with adequate lead time to meet the Area Coordinator submittal schedules
2. Download Seed Case(s) based on WECC's data request letter from the WECC website and/or secured Western Power Pool (WPP) FTP.
3. Verify the required system conditions per WECC's data request letter, including but not limited to:
  - a. Year/season being modeled.
  - b. Load
  - c. Generation
  - d. System configuration
  - e. Line data characteristics and transformer data
4. Review and revise topology as needed from the WECC base case.
5. Review and revise loads, generation, branch model characteristics, and Facility ratings\*
  - \* It should be noted that planning studies will be performed using the normal branch ratings generally and emergency ratings on a case-by-case basis. For operations studies, the normal and 30-minute ratings are utilized.
6. When required by WECC, obtain approval signatures for planning and operating cases
7. When required by WECC and BPA, submit dynamic data and other files to WECC and BPA
8. Submit data as requested to the Area Coordinator who will then submit the solved power flow cases along with new and updated dynamic data to WECC in accordance with the required schedule.
9. Save emails/other documents related to requests and submittals in the following folder:
  - W:\PLANNING DEVELOPMENT\NERC Compliance\WECC\Base Cases ← This folder is separated by year
10. Summarize submittals in the WECC Base Case Records Excel spreadsheet.
11. Protection Engineers annually send SNPD 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