PUBLIC SERVICE COMPANY OF NEW MEXICO
DATA REQUIRED FOR INVERTER BASED RESOURCE (IBR) INTERCONNECTION STUDIES

Customers must provide the following technical information for interconnection service. For facilities under development, best available information is to be provided. The completed form is submitted through Power Clerk. Questions regarding the requirement can be submitted to LGIACluster@txnmenergy.com.

Facility Name: Click or tap here to enter text.

Cluster: Click or tap here to enter text.
IA-PNM-Click or tap here to enter text. (if known)

Submission Date: Click or tap here to enter text. **Revision:** Click or tap here to enter text.

1. **Description of facility**

Requested Net MW injection at the POI: Click or tap here to enter text. MW

Type of resources (check all that apply)

☐ PV ☐ BESS ☐ Wind

☐ Check here to indicate project site map has been submitted in Power Clerk which includes both plant site and generation tie line. (kmz or kml file)
Enter file name here: Click or tap here to enter text.

2. **Model Equivalent Single Line Diagram (SLD)**

The plant should be modeled using an equivalent collection system model. represented in the steady state model. For more information, refer to WECC guidelines. The representation could be a single collector system (Figure 1) or multiple collector systems (Figure 2).

Label each collector system element with a unique id and use that id when providing data in section 5. The ID does not have to match IDs used in the steady state model. Example of labeling showing Figure 1 and 2.

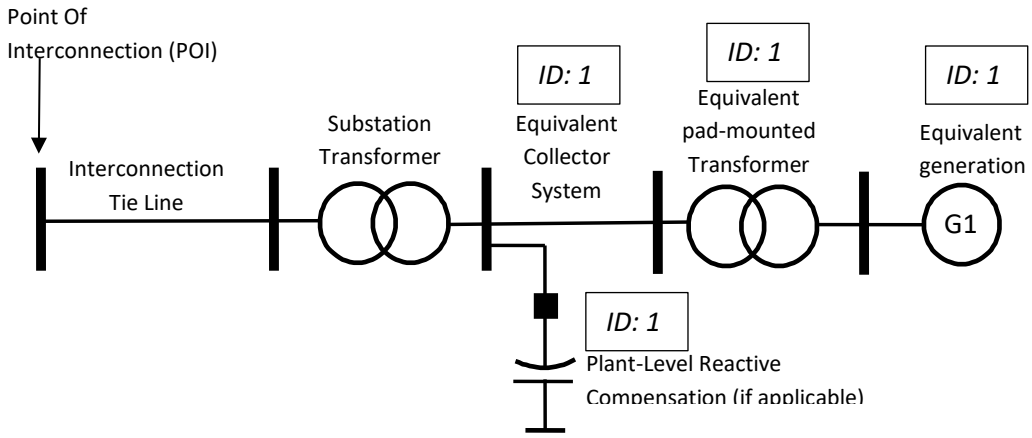

Figure 1 – Illustrative single-generator equivalent power flow representation for a plant

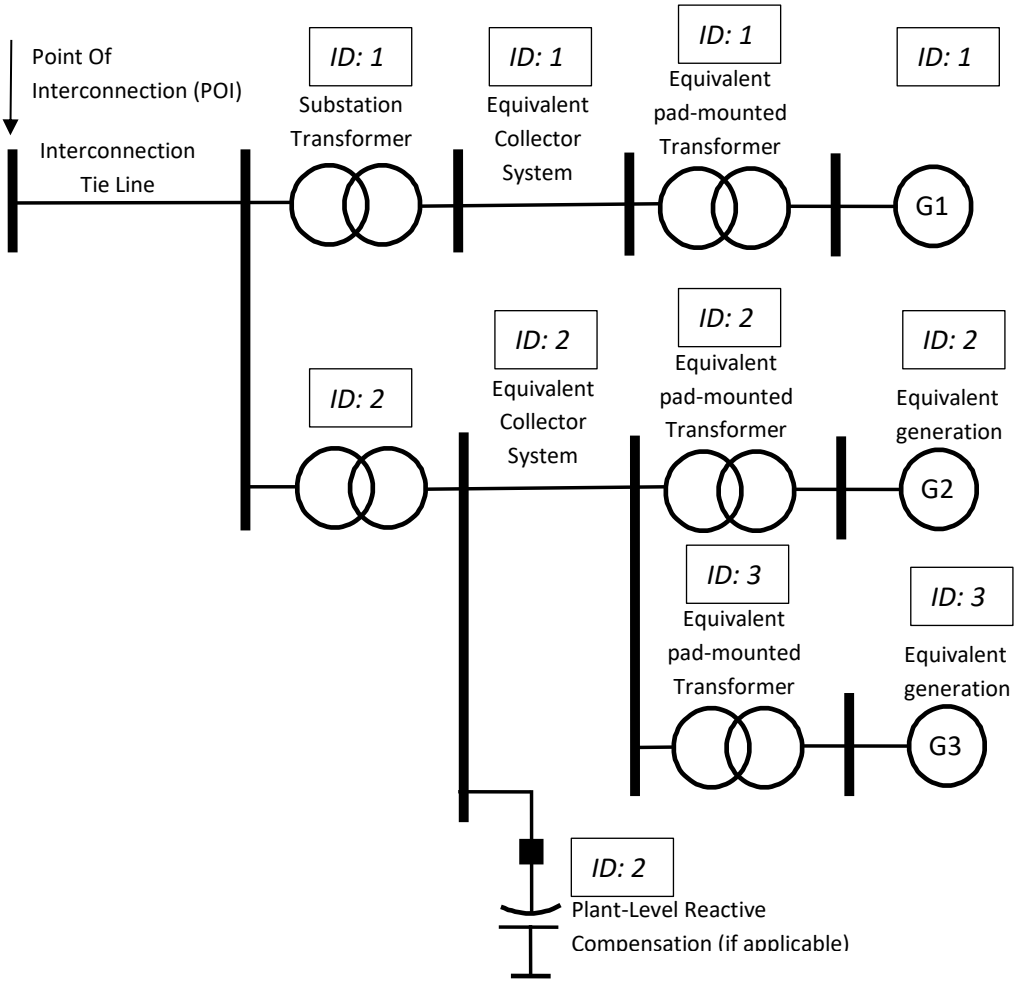

Figure 2 – Illustrative multiple-generator equivalent power flow representation for a plant

☐ Check here to confirm modeling SLD was submitted.

Enter file name here: Click or tap here to enter text.

3. Interconnection tie line

3.1 General characteristics

Conductor: Click or tap here to enter text.
Length (miles): Click or tap here to enter text. miles
Line voltage (kV): Choose a voltage. kV
Season Line ratings

Rating	Rating (MVA)	Duration (minutes)
Summer Normal	Enter rating	Continuous
Summer Emergency	Enter rating	Enter duration
Winter Normal	Enter rating	Continuous
Winter Emergency	Enter rating	Enter duration
Spring Normal	Enter rating	Continuous
Spring Emergency	Enter rating	Enter duration
Fall Normal	Enter rating	Continuous
Fall Emergency	Enter rating	Enter duration

3.2 Per unit positive sequence impedance (Z_1) parameters on a 100 MVA and line kV base

R = Click or tap here to enter text. pu
X = Click or tap here to enter text. pu
B = Click or tap here to enter text. pu

3.3 Per unit zero sequence impedance (Z_0) parameters on 100 MVA and line kV base

R = Click or tap here to enter text. pu
X = Click or tap here to enter text. pu
B = Click or tap here to enter text. pu

3.4 Per unit mutual coupling impedance parameters on 100 MVA and line kV base (if known)

☐ Check here to confirm mutual data not applicable

Define Line 1: Click or tap here to enter text.
Define Line 2: Click or tap here to enter text.

	From %	To %	From %	To %	From %	To %
Line 1	enter data	enter data	enter data	enter data	enter data	enter data
Line 2	enter data	enter data	enter data	enter data	enter data	enter data
Rm, pu	enter data		enter data		enter data	
Xm, pu	enter data		enter data		enter data	

4. Substation transformer

Number of substation transformers: Click or tap here to enter text.

If there are multiple substation transformers, provide data for each transformer. Use form PNM IBR Data Form Transformer_v1.docx for additional transformers.

Two winding transformer data

Transformer rating (ONAN/FA/FA): Enter rating/Enter rating /Enter rating MVA

Voltage ratio (high/low): Click or tap here to enter text./Click or tap here to enter text. kV

Winding connections (high/low): Choose an item./ Choose an item.

Positive sequence Z_1: Enter data % and Enter data X/R ratio on transformer ONAN MVA base

Zero sequence Z_0: Enter data % and Enter data X/R ratio on transformer ONAN MVA base

Three winding transformer data

☐ Check here if buried tertiary (PNM prefers the tertiary not be included in the steady state model if buried)

Connection and winding

	H Winding Data	**X Winding Data**	**Y Winding Data**
Full Load Ratings (MVA)	Enter data / Enter data / Enter data	Enter data / Enter data / Enter data	Enter data / Enter data / Enter data
Rated voltage base (kV)	Enter data	Enter data	Enter data
Connection	Choose connection	Choose connection	Choose connection
Neutral grounding resistance (ohms). Enter 0.0 if solidly grounded.	Enter data	Enter data	Enter data

Impedance data

	H-X Winding Data	**H-Y Winding Data**	**X-Y Winding Data**
Transformer base for impedance (MVA)	Enter data	Enter data	Enter data
Positive Sequence impedance (Z_1)	Enter data % Enter data X/R	Enter data % Enter data X/R	Enter data % Enter data X/R
Zero Sequence impedance (Z_0)	Enter data % Enter data X/R	Enter data % Enter data X/R	Enter data % Enter data X/R

Taps Settings (check all that apply and provide applicable tap data)

☐Fixed Tap

Location Choose winding

Available tap settings

Enter Tap / Enter Tap / Enter Tap / Enter Tap / Enter Tap kV or

Click or tap here to enter text. % and number of steps Click or tap here to enter text.

Assumed operating tap setting: Click or tap here to enter text.

☐ TCUL Tap (if provided, taps will be enabled in the model)

Location Choose winding

Max TCUL ratio (kV or pu): Click or tap here to enter text.

Min TCUL ratio (kV or pu): Click or tap here to enter text.

# of taps: Click or tap here to enter text.

Step Size: Click or tap here to enter text.

Voltage deadband (kV): Click or tap here to enter text.

5. Collector system equivalent

This data can be found by creating an equivalence of the collector system network. If detailed collector system data is not available, typical values for the system size and characteristics can be used. Large systems with multiple main branches may be more accurately represented with multiple equivalent feeders, in which case data for each equivalent collector system should be provided.

Number of collector systems: Click or tap here to enter text.

For each collector system provide data for each equivalent system feeder, reactive compensation, equivalent transformer(s), and equivalent generator (inverter) using the following forms.

Equivalent collector system feeder: PNM IBR Data Form Collector Feeder_v1.docx
Reactive Compensation: PNM IBR Data Form Feeder Reactive Compenstation_v1.docx
Equivalent step-up transformer pad-mounted: PNM IBR Data Form Transformer_v1.docx
Equivalent generator (inverter): PNM IBR Data Form Inverter_v1.docx

☐ Check here to confirm all required form are included in the submission

6. Computer Modeling Data

Model data is required for each equivalent inverter model.

6.1Steady State and Dynamic Models

*Steady state and Dynamic Data must be provided in **GE-PSLF text** format.*

☐ Check here to confirm steady state data was provided

Enter file name here: Click or tap here to enter text.

The following dynamic model components are currently required [1]:

[1] For more information, refer to the WECC Modeling and Validation Subcommittee (MVS) website, https://www.wecc.org/committees/mvs.

Generator model, currently ***regc or regfm*** for all IBRs (PNM will not accept regc_a models)
Electrical control model, currently ***reec_a*** for PV and Wind and ***reec_c*** for BESS
Plant controller model, currently ***repc***
Voltage ride through model, currently ***lhvrt***
Frequency ride rough model, currently ***lhfrt***

For Wind plants, provide the following additional models
Drive train model, currently ***wtgt*** (optional for type 4)
Aerodynamic model, currently ***wtga*** (not used for type 4)
Pitch controller, currently ***wtgp*** (not used for type 4)
Torque controller, currently ***wtgq*** (not used for type 4)

Be sure to include any model for dynamic reactive compensation if any.

☐ Check here to confirm dynamic data was provided
Enter file name here: Click or tap here to enter text.

6.2 Electromagnetic transient (EMT) model

*EMT model must be provided in **PSCAD** format.*

PNM uses Electranix PSCAD Model Requirements, http://www.electranix.com/publication/pscad-model-requirements-rev-13-feb-2025/

☐ Check here to confirm EMT model was provided
Enter file name here: Click or tap here to enter text.

6.3 Short Circuit Model

*Short Circuit Modeling must be provided in **ASPEN** format.*

The short circuit model submittal shall include the following:

- A *.olr (PNM preference) or *.chf file representing the proposed Project, compatible with ASPEN Oneliner™ version 15 or higher.
- **Type IV wind, PV, and BESS inverters** shall be modeled as a Converter-Interfaced Resource (CIR) in accordance with the guidelines outlined in ASPEN Oneliner™ Help Contents, Appendix K2.
- **Type 3** Wind Plants shall be modeled in accordance with ASPEN Oneliner™'s Type 3 wind plant model benchmark.
- Assumptions:
    - Loads and plant level Shunts are ignored in short circuit analysis and should be excluded from the model.
    - For gross MW generation, entering a value of 0 MW is recommended.
    - For CIR Reactive Power Injection Characteristics, the slope estimation method described in ASPEN Oneliner™ Help Contents, Appendix L is recommended as a reference.

In addition to the details mentioned above, the information below establishes the minimum PNM modeling requirements for representing the Project in ASPEN Oneliner™. Interconnection Customers are highly encouraged to submit any additional project-specific data or supplemental support files that provide greater modeling detail, as such materials will be accepted and may enhance the accuracy of the short circuit study.

☐ Check here to confirm short circuit model was provided
Enter file name here: Click or tap here to enter text.

7. Plant level data

7.1 Voltage Limits

Pre-Contingency Maximum Voltage: Click or tap here to enter text. pu
Pre-Contingency Minimum Voltage: Click or tap here to enter text. pu
Post-Contingency Maximum Voltage: Click or tap here to enter text. pu
Post-Contingency Minimum Voltage: Click or tap here to enter text. pu

7.2 High-side breaker

Rated maximum voltage: Click or tap here to enter text. kV
Rated ampere: Click or tap here to enter text. Amp
Interrupting Rating: Click or tap here to enter text. kA

7.3 Reactive compensation (if included)

Type Choose an item. If other enter type here: Click or tap here to enter text.
Range (lead/lag) Click or tap here to enter text.
Control mode Choose an item. If other enter mode here: Click or tap here to enter text.
Regulation bus Click or tap here to enter text.
Note: requires submission of a dynamic model in GE PSLF text format.

Describe the overall reactive power control strategy (i.e. manual switch shunt, etc.): Click or tap here to enter text.

7.4 Plant level losses

NOTE: The study will be conducted assuming that the full proposed MW capacity and MVAR capability are delivered to the Point of Interconnection (POI) as specified in Appendix 1 of the LGIP. **It is the developer's responsibility to make up for all internal active and reactive power losses.**

PNM studies using the losses determined by the modeling data. If the injection at the POI is less than the requested amount, the LGIA will be reduced to match the net output at the POI.

7.5 Station Service Load

Total project auxiliary load: Click or tap here to enter text. MW and Click or tap here to enter text. MVAR
Bus where auxiliary load is modeled:
☐ Check here if auxiliary load is modeled at multiple buses and provide the load by bus below.
Click or tap here to enter text.

8. Resources

a. NERC Reliability Guideline Electromagnetic Transient Modeling for BPS-Connected Inverter-Based Resources-Recommended Model Requirements and Verification Practices
https://www.nerc.com/globalassets/who-we-are/standing-committees/rstc/irps/reliability_guideline-emt_modeling_and_simulations.pdf

b. NERC Reliability Guideline Performance, Modeling, and Simulation of BPS-Connected Battery Energy Storage Systems and Hybrid Power Plants
https://www.nerc.com/globalassets/who-we-are/standing-committees/rstc/irps/reliability_guideline_bess_hybrid_performance_modeling_studies.pdf

c. WECC Inverter-Based Resource Power Plant Modeling and Validation Guideline
https://www.wecc.org/sites/default/files/documents/meeting/2026/IBR%20Power%20Plant%20Modeling%20and%20Validation%20Guideline.pdf