

Planning Center – Gen Model updates MOD-032 and TPL-007 compliance

May 2, 2019

Product - Action Required	Deadline	Who May Be Affected
Submit generator data via Gen Model	6/14/2019	Generator Owners



Gen Model allows generator owners to upload required data for NERC's MOD-032-1 and TPL-007-2 standards

- These standards establish consistent modeling data requirements and reporting procedures needed to develop planning horizon models
- These models are necessary to support reliability analyses of the transmission system

- Release 2019.4
 - Enhancements to Gen Model driven by user feedback and data deficiencies in previous versions

Redline version of MOD-032 Data Requirements and Procedures document available in 3/7/2019 Planning Committee meeting materials:

- <https://pjm.com/-/media/committees-groups/committees/pc/20190307/20190307-item-10b-pjm-mod-032-data-requirements-and-procedures-redline.ashx>
- Gen-model enhancements align with MOD-032 Requirements and Procedures document updates

Updated Gen Model screenshots

2019 1-1-2019 - In Progress

Generator Data Forms

	Form	Form Status	Actions	Not Applicable
	General Information	Complete		
	Synchronous Generator Parameters	Complete		<input type="checkbox"/>
	Wind Farm Parameters	Not Started		<input type="checkbox"/>
	Inverter-Based Parameters	Not Started		<input type="checkbox"/>
	Circuit Breakers and Relays	Not Started		<input type="checkbox"/>
	Main Transformer	Not Started		<input type="checkbox"/>
	Load Transformer	Not Started		<input type="checkbox"/>
	Attachment Line Data	Not Started		
	Additional Data Files			

Warning: Total Gross Energy (MW) summer for overall plant does not match sum of Unit Gross Energy Output (MW) summer. Please double check before submitting.

Back

Submit



Plant Information

Transmission Owner Area *

Plant Name *
Select 'Other' as Transmission Owner Area to enter an unlisted plant name

Number of Units *
Number of machines i.e. a 2x1 combined cycle plant = 3 machines. OR Number of wind/solar aggregated machines to be modeled i.e. 100 MVA wind farm represented by 2 aggregated 50 MVA machines = 2 machines

Plant Location

EIA Plant Code *
Plant ID from EIA-860 filing

State *

County *

City *

Zip Code *

Individual Completing Data

Name *
Changing this will not affect PJM account

Email *
Changing this will not affect PJM account

Phone *
Changing this will not affect PJM account

Company Name

Generator Details

Commercial Operation Year *

Total Plant Generation Capability

Name Plate (MVA) *

Maximum Facility Output (MW) *

PJM's Tariff (<http://www.pjm.com/directory/merged-tariffs/oatt.pdf>) defines MFO as: Maximum Facility Output: "Maximum Facility Output" shall mean the maximum (not nominal) net electrical power output in megawatts, specified in the Interconnection Service Agreement, after supply of any parasitic or host facility loads, that a Generation Interconnection Customer's Customer Facility is expected to produce, provided that the specified Maximum Facility Output shall not exceed the output of the proposed Customer Facility that Transmission Provider utilized in the System Impact Study. For plants without an ISA, enter the equivalent value from the applicable Interconnection Agreement. For plants without an Interconnection Agreement, enter nominal maximum seasonally independent net power output.

Summer

Winter

Total Gross Energy (MW) *

Auxiliary Load (MW) *

Load connected when generator is online related to producing power (ie fans, pumps, excitation system, etc.) that would not be present when generator is offline (due to forced or maintenance outage)

Auxiliary Load (MVAR) *

Where is the Auxiliary Load connected? *

Station Service Load (MW) *

Load not considered auxiliary that remains connected to the transmission system when the plant is offline (ie lighting, building HVAC, etc.)

Station Service Load (MVAR) *

Where is the Station Load connected? *

Single line diagram

+ Choose File

To submit multiple files at once, please place them into a Zip file before uploading.

Total Reactive Power Capability at Max Gross Energy Output

	Summer	Winter
Leading (Underexcited) (MVAR) *	<input type="text" value=""/>	<input type="text" value=""/>
Lagging (Overexcited) (MVAR) *	<input type="text" value=""/>	<input type="text" value=""/>

- Leading (Underexcited) (MVAR) is now required to be ≤ 0

Provide individual generator capability (All values requested here are for individual units)

(e.g. ST, CT, CT1, CT2, ST2, etc.) *

List all the Machine IDs that these data corresponds (e.g. CT1, CT2)

Prime Mover Code *

From EIA-860 filing

Energy Source Code *

From EIA-860 filing

MVA Base *

Terminal Voltage (KV) *

Nominal Power Factor

Unit Maximum Net Capacity Output (Unit CIR) (MW) *

Summer

Winter

Maximum Gross Output (MW) *

Minimum Gross Output (MW) *

Unit Reactive Power Capability at Maximum Gross Output

Leading (MVAR) (Underexcited) *

Lagging (MVAR) (Overexcited) *

Unit Auxiliary Load at Maximum Gross Output

MW

MVAR

Where is the Auxiliary Load connected? *

- Leading (Underexcited) (MVAR) is now required to be ≤ 0

Generator Parameters (All reactances and resistance values in PU on Machine MVA Base at machine terminal voltage)

Combined Turbine-Generator-Exciter Inertia, H
[kWs/kVA]
 $0.5 \leq H \leq 15$

Speed Damping Coefficient, D
MMWG Procedure Manual and NERC Case Quality Metrics require D=0

Generator Saturation

Generator Saturation at 1.0 p.u. Voltage, S (1.0)
 $0 < S_{1.0}$

Generator Saturation at 1.2 p.u. Voltage, S (1.2)
 $S_{1.0} \leq S_{1.2}$

Unsaturated Reactances

Direct Axis Synchronous, Xd(i)
 $x_d < 2.5$

Direct Axis Transient, X'd(i)
 $x'_d < 0.5 \times x_d$

Direct Axis Sub-Transient, X''d(i)
 $x''_d \leq x'_d$

Quadrature Axis Synchronous, Xq(i)
 $x_q < x_d$

Quadrature Axis Transient, X'q(i)
 $x'_q < x_q$

Quadrature Axis Sub-Transient, X''q(i) *
 $x''_q < x'_q$

Stator Leakage, XL
 $X''_d > X_L$

Negative Sequence, X2(i) *

Zero Sequence, X0(i) *

Saturated Reactances

Saturated Sub-Transient, $X''d(v)$ *

$X''d(v) < X''d(i)$

Transient Reactance, $X'd(v)$ *

$X'd(v) > X''d(v)$

Synchronous Reactance, $Xd(v)$ *

$Xd(v) > X'd(v)$

Negative Sequence, $X2(v)$ *

Zero Sequence, $X0(v)$ *

Resistances

DC Armature, Ra [Ohms] *

Positive Sequence, $R1$ *

Negative Sequence, $R2$ *

Zero Sequence, $R0$ *

Time Constants

Direct Axis Transient Open Circuit, $T'do$ [sec]

$1. < T'do < 15.$

Direct Axis Sub-Transient Open Circuit, $T''do$ [sec]

$0.01 < T''do < 0.2$

Quadrature Axis Transient Open Circuit, $T'qo$ [sec]

$T'qo \leq T'do$

Quadrature Axis Sub-Transient Open Circuit, $T''qo$ [sec]

$T''qo \leq T'qo$

Armature Three-Phase Short Circuit, $Ta3$ [sec] *

Stability Models

To submit multiple files at once, please place them into a Zip file before uploading.

Generator Models, Relay Model & Frequency Relay Model *

+ Choose File

Excitation System Models *

+ Choose File

Prime Mover & Governor Models *

+ Choose File

Static Var Compensator (SVC) & Frequency Changer Models

+ Choose File

Power System Stabilizer Models

+ Choose File

Maximum Excitation Limiter Models

+ Choose File

Minimum Excitation Limiter Models

+ Choose File

Compensation Models

+ Choose File

Other documents

+ Choose File



Generator Step-Up (GSU) Transformer Form

Transformer Id *

List all the Transformer IDs that these data corresponds (e.g. EG1, EG2)

MVA Base *

Transformer Ratings

How many ratings does the transformer have? *

One rating Two ratings Three ratings

Rating 1 *

Select cooling designation MVA

General Transformer Parameters

relevant to TPL-007

Core Type *

Select

K factor ($0 \leq K \leq 2$) *

Geomagnetically Induced Current (GIC) Blocking Device *

Select

- Same changes for Main and Load transformers



Impedances

Select Transformer Windings *

Gen Model Screenshots

Positive Sequence Impedances (All values in PU on Transformer MVA Base **at nominal winding voltage specified below**)

R X **X/R**

High-Side to Low-Side (PU) * ?

Zero Sequence Impedances (All values in PU on Transformer MVA Base **at nominal winding voltage specified below**)

R X **X/R**

High-Side to Low-Side (PU) * ?

DC Winding Resistance

Transformer **High Winding** DC Resistance (ohms/phase) *

Transformer **Low Winding** DC Resistance (ohms/phase)

Transformer **Tertiary Winding** DC Resistance (ohms/phase)

Substation Grounding

Substation grounding DC resistance (ohms) *

- Same changes for Main and Load transformers

Windings

Winding Voltages (kV)

High-Side (KV) Nominal *

Low-Side (KV) Nominal *

High-Side (KV) at Tap Setting *

If no tap changer on this winding enter nominal voltage

Low-Side (KV) at Tap Setting *

If no tap changer on this winding enter nominal voltage

Winding Connection Types (Delta, Wye, Wye Gnd, etc)

High-Side *

Low-Side *

Autotransformer *

Any Additional Comments on the Transformer?

Tap Position *

Off-Nominal Turns Ratio

Number of Taps

Step Size



Wind Farm Parameters

Machine Id *
List all the Machine IDs that these data corresponds (e.g. EG1, EG2)

Prime Mover Code *

Energy Source Code *

Specify Manufacturer *

Specify Model *

MW Value per Turbine (Nominal Rating) *

Number of Turbines *

MVA Base *

Terminal Voltage (KV) *

Nominal Power Factor *

Type 4 turbine *

Control Mode *

Voltage relays installed * Yes No

Voltage relay settings *

Please upload the document showing voltage relay settings for the model *

+ Choose File

Frequency relays installed * Yes No

Frequency relay settings *

Please upload the document showing frequency relay settings for the model *

+ Choose File

Additional Wind Farm Compensation *

*If yes, provide additional details **

Stability Models
To submit multiple files at once, please place them into a Zip file before uploading.

Generator Models, Relay Model & Frequency Relay Model *

Upload all applicable files *

Other documents

- Wind
- Inverter based

Circuit Breaker and Relay Parameters

Substation Name *

Breaker Name *

Manufacturer *

Model Number *

Nameplate Interrupting Rating (kA or MVA) *

Nameplate Rating Type *

Nameplate Interrupting Time (cycles) *

Nameplate K-factor

Nameplate Max Design (kV) *

Operating kV *

Contact Parting Time (cycles) *

Protective Equipment 1 (i.e., generator, line, transformer) *

Protective Equipment 2 (i.e., generator, line, transformer) *

Interrupting Medium (i.e., Gas, Oil, Air, Etc)

Reclosing Time One (seconds)

Reclosing Time Two (seconds)

Required to provide relay settings under PRC-024-2? *

PRC-024-2 comment

PRC-024-2 Compliance Files

To submit multiple files at once, please place them into a Zip file before uploading.

Attachment Line Data

Voltage level * kV **MVA base *** MVA

Attachment line length * Miles

Conductor type
 ▼

Impedance on 100 MVA Base

	R	X	
Total branch positive sequence impedance	<input type="text"/>	<input type="text"/>	P.U.
Total branch zero sequence impedance	<input type="text"/>	<input type="text"/>	P.U.
		B	
Total branch charging susceptance		<input type="text"/>	P.U.

Ratings

Normal * MVA **Short-Term Emergency** MVA

Long-Term Emergency MVA

Comments ?