Using PERC1 Model For Modeling Large Data Centers

Presented by Dmitry Kosterev, BPA

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Newsroom > NERC Issues Level 3 ...

NERC Issues Level 3 Alert, Reliability Guideline Focused on Large Load Challenges

May 04, 2026 • Headlines

WASHINGTON, D.C. – As the grid faces unprecedented challenges from a surge in large power consumers, NERC is taking significant steps to ensure the reliability of the bulk power system (BPS). NERC released a Level 3 Essential Action Alert, Computational Load Modeling, Studies, Instrumentation, Commissioning, Operations, Protection, and Control, outlining seven actions registered entities must implement to address immediate risks posed by computational loads interfacing with the BPS. The Level 3 Alert was issued as NERC observed customer-initiated large load reductions and significant oscillations that occur in seconds, leaving little or no room for real-time responses, threatening BPS reliability. The deadline for registered entities to submit their responses is August 3, 2026.

https://www.nerc.com/newsroom/nerc-issues-level-3-alert-reliability-guideline-focused-on-large-load-challenges

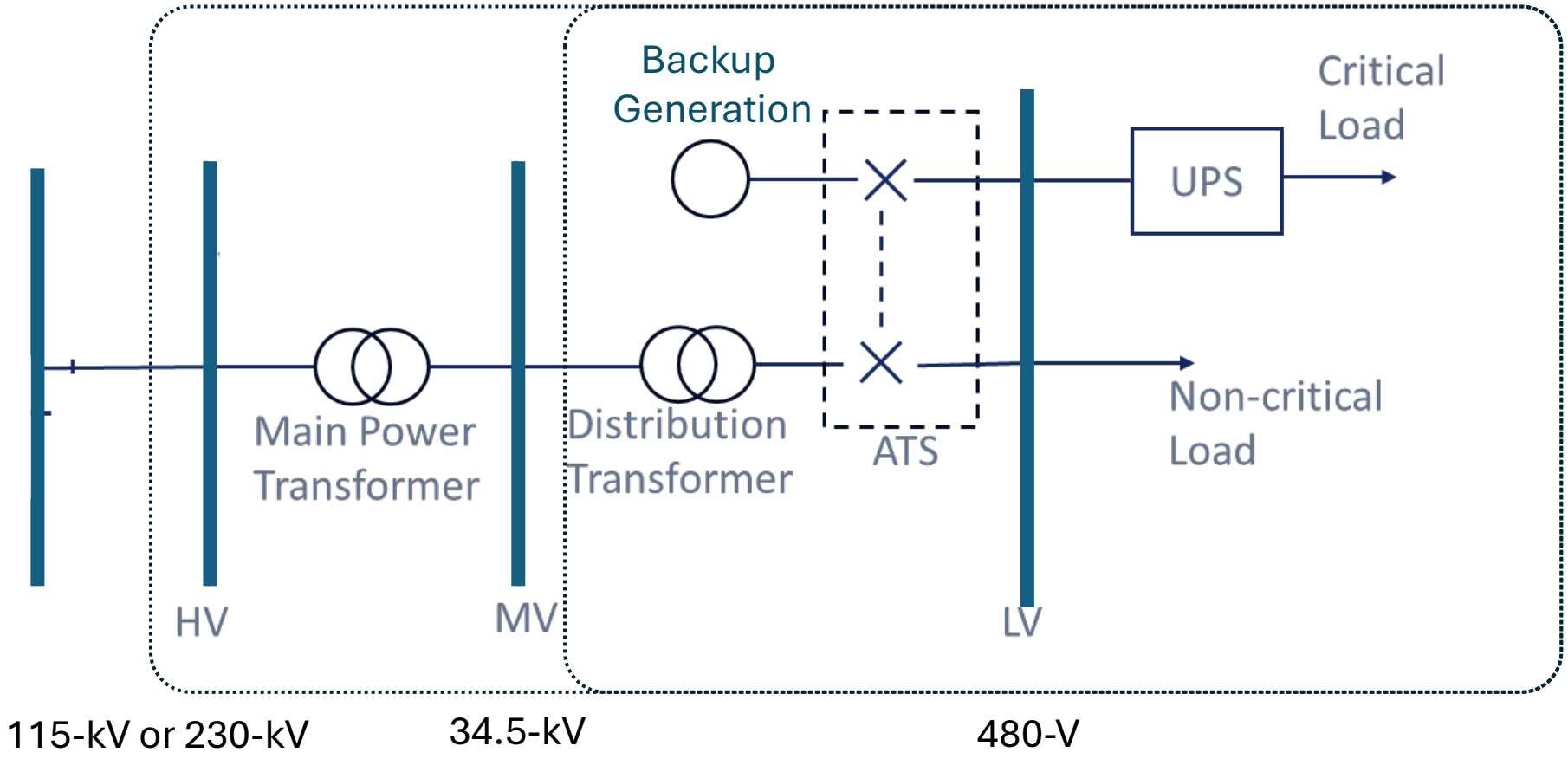
NERC Level 3 Alert Essential Action #1

https://www.nerc.com/globalassets/programs/bpsa/alerts/level-3-computational-load-alert.pdf

- TPs and PCs should develop a detailed list of modeling data, settings, and parameters needed from computational loads and distribute this to TOs in their footprint. TOs should reflect this in their facility interconnection requirements.
- TPs and PCs should use the PERC1 (Power Electronic Reconnecting and Ceasing) model, or a model with equivalent or better capabilities, at minimum, as a base for these requirements
- Model the computational load records separate from other industrial loads. Model the computational load facility's Information Technology (IT) load separate from the non-IT load

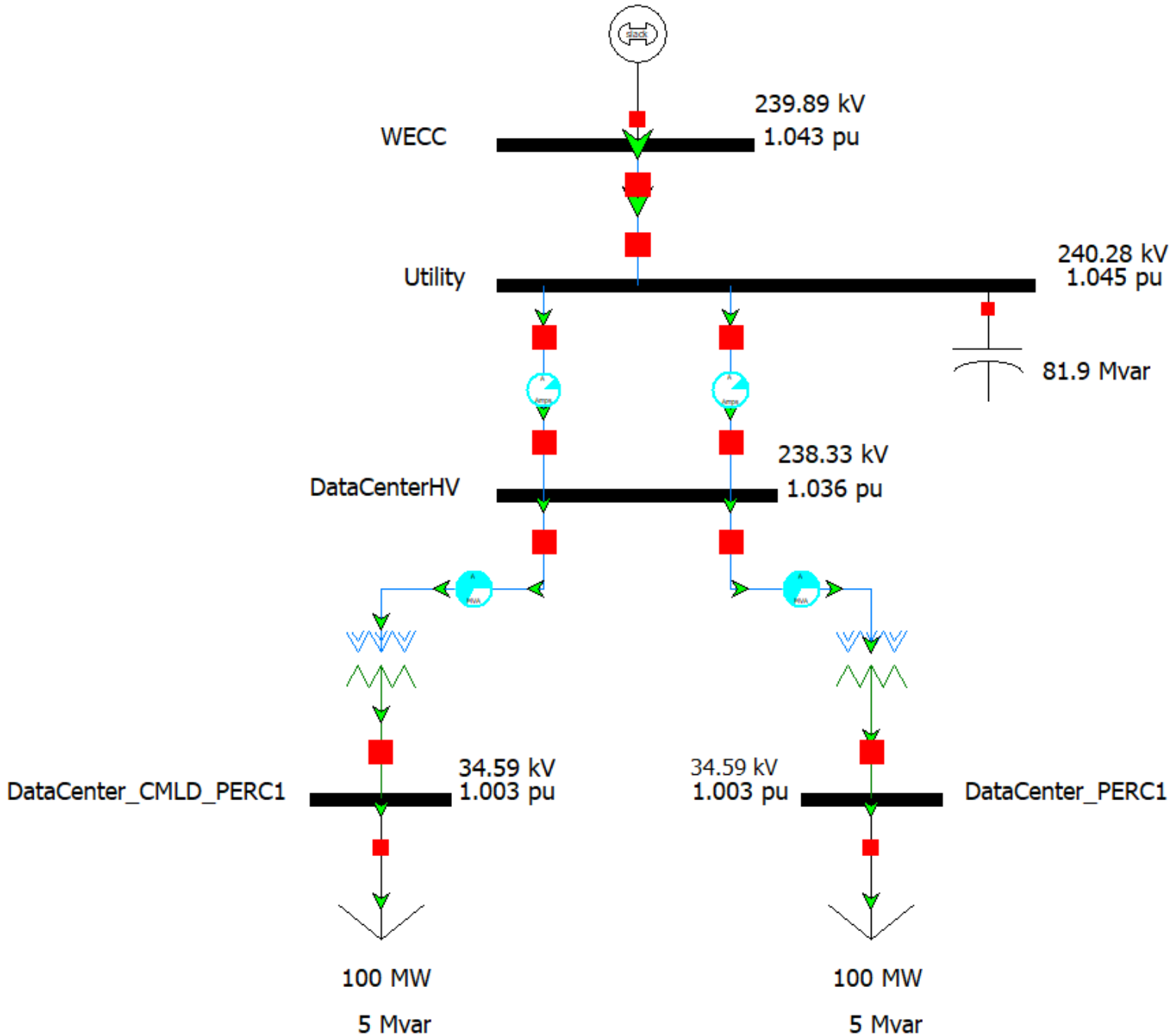
- Current data center model IND_SRF is no longer adequate in representing data center response to voltage sags

Electrical Overview of Data Centers



Credit: NERC, modified

PowerWorld

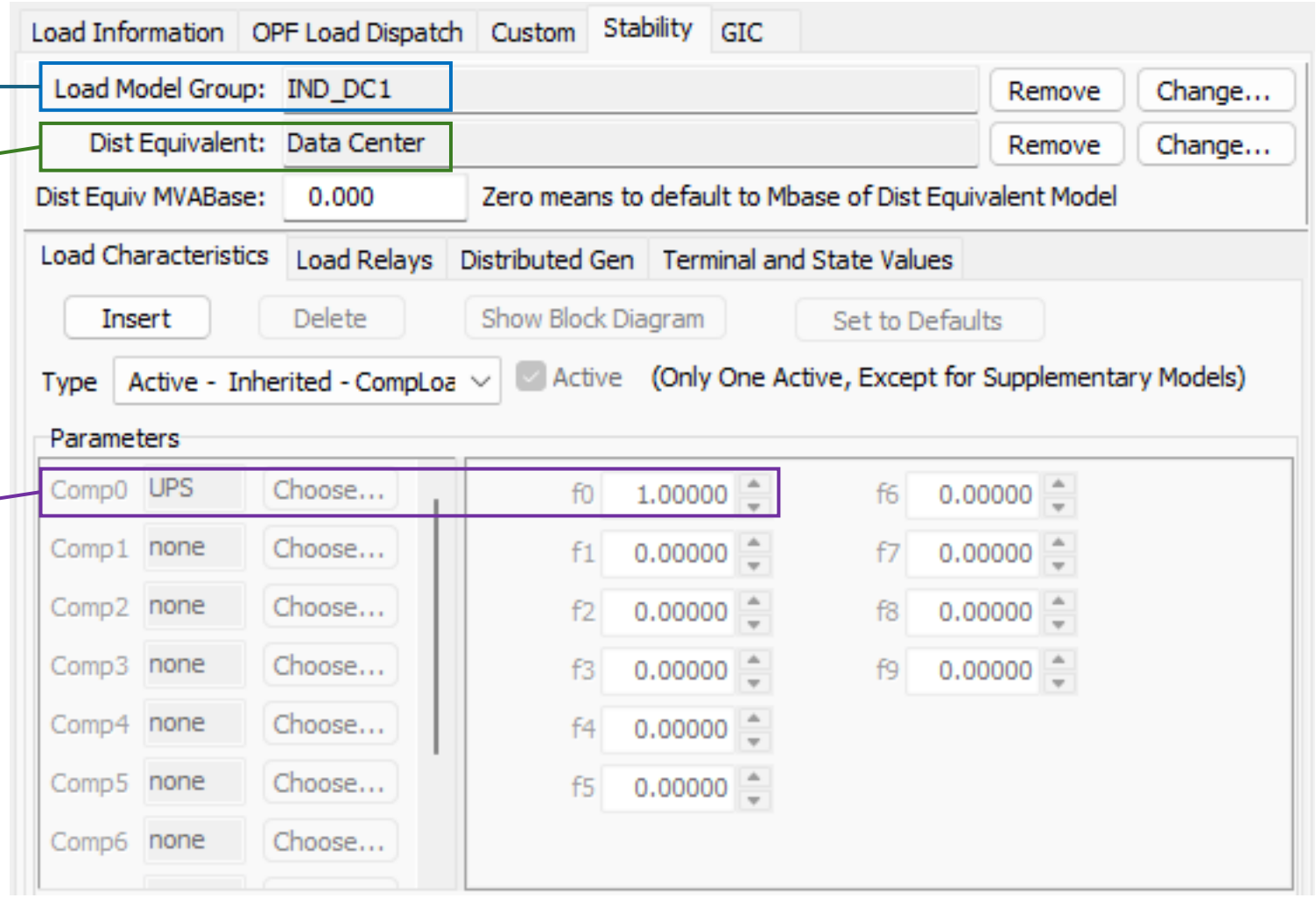

WECC
239.89 kV
1.043 pu
Utility
240.28 kV
1.045 pu
81.9 Mvar
DataCenterHV
238.33 kV
1.036 pu
DataCenter_CMLD_PERC1
34.59 kV
1.003 pu
34.59 kV
1.003 pu
DataCenter_PERC1
100 MW
5 Mvar
100 MW
5 Mvar

Modeling Data Centers in PowerWorld – Option1

Load Model Group – IND_DC1

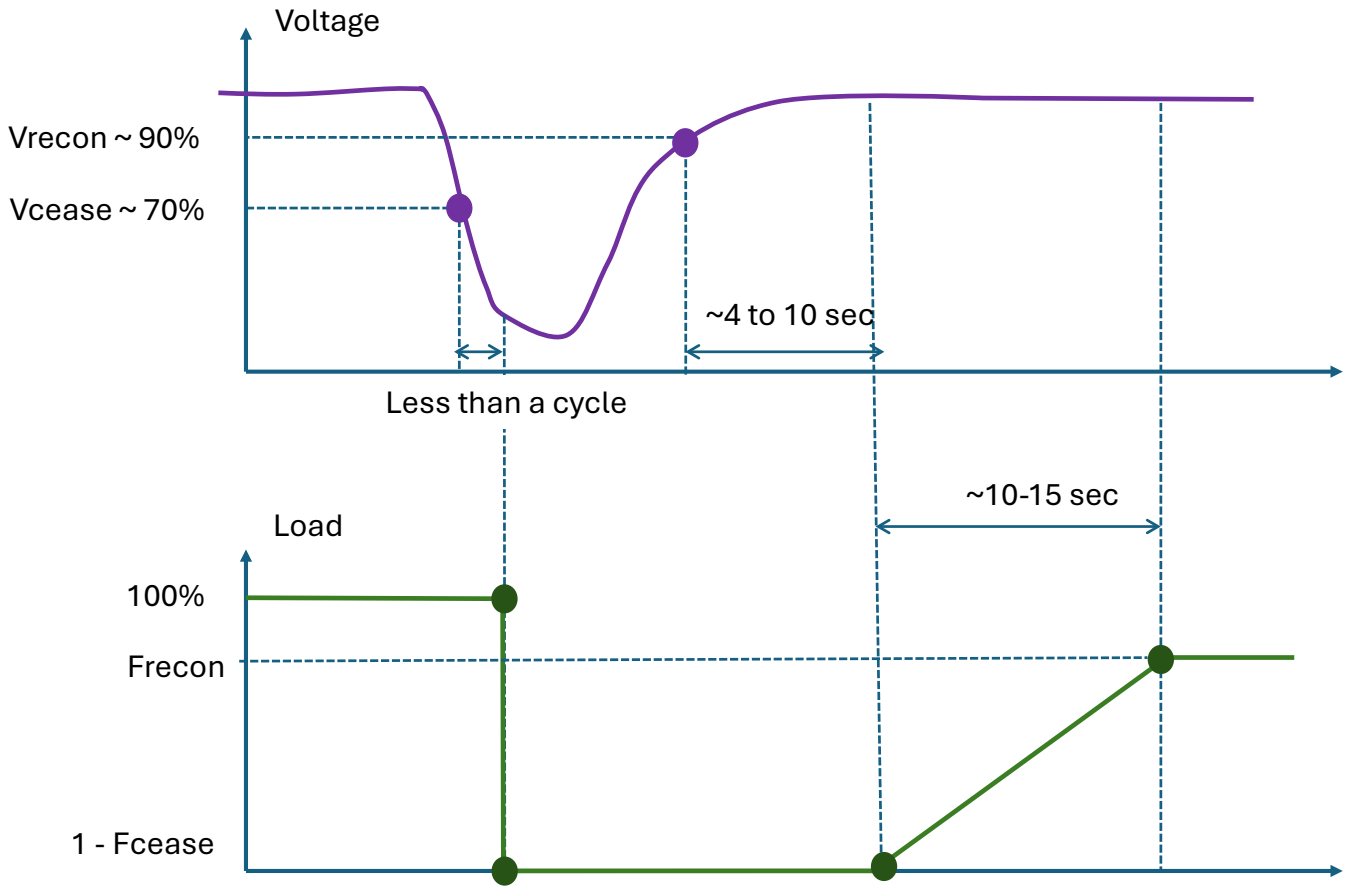
Distribution Equivalent to represent a 34.5kV/ 480V Tx and a short feeder

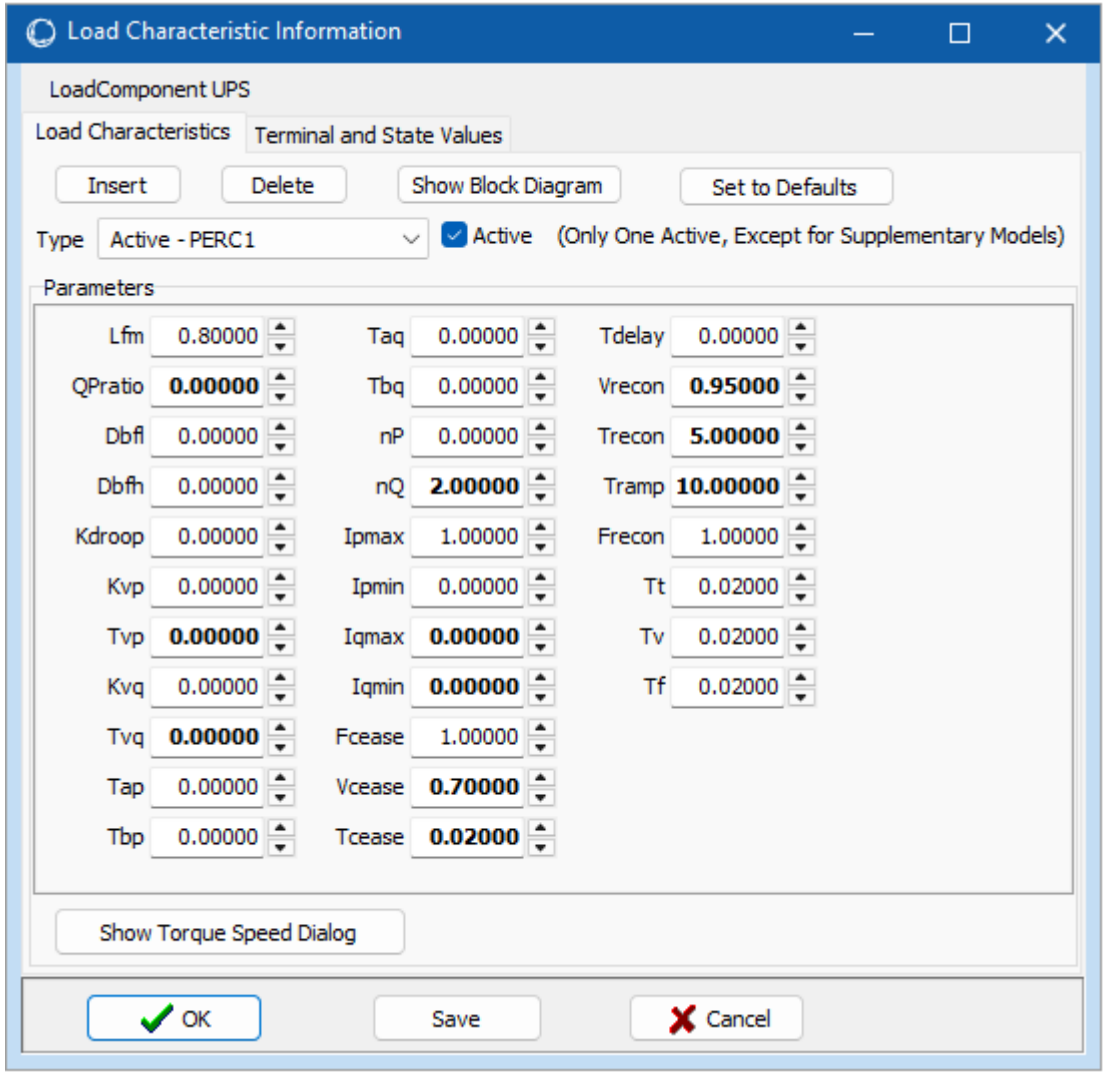
UPS is represented with PERC1, 100% of data center load is assigned to PERC1



UPS / PERC1 Modeling

NERC LMWG reached out to UPS OEMs and data center operators to parametrize PERC1 model

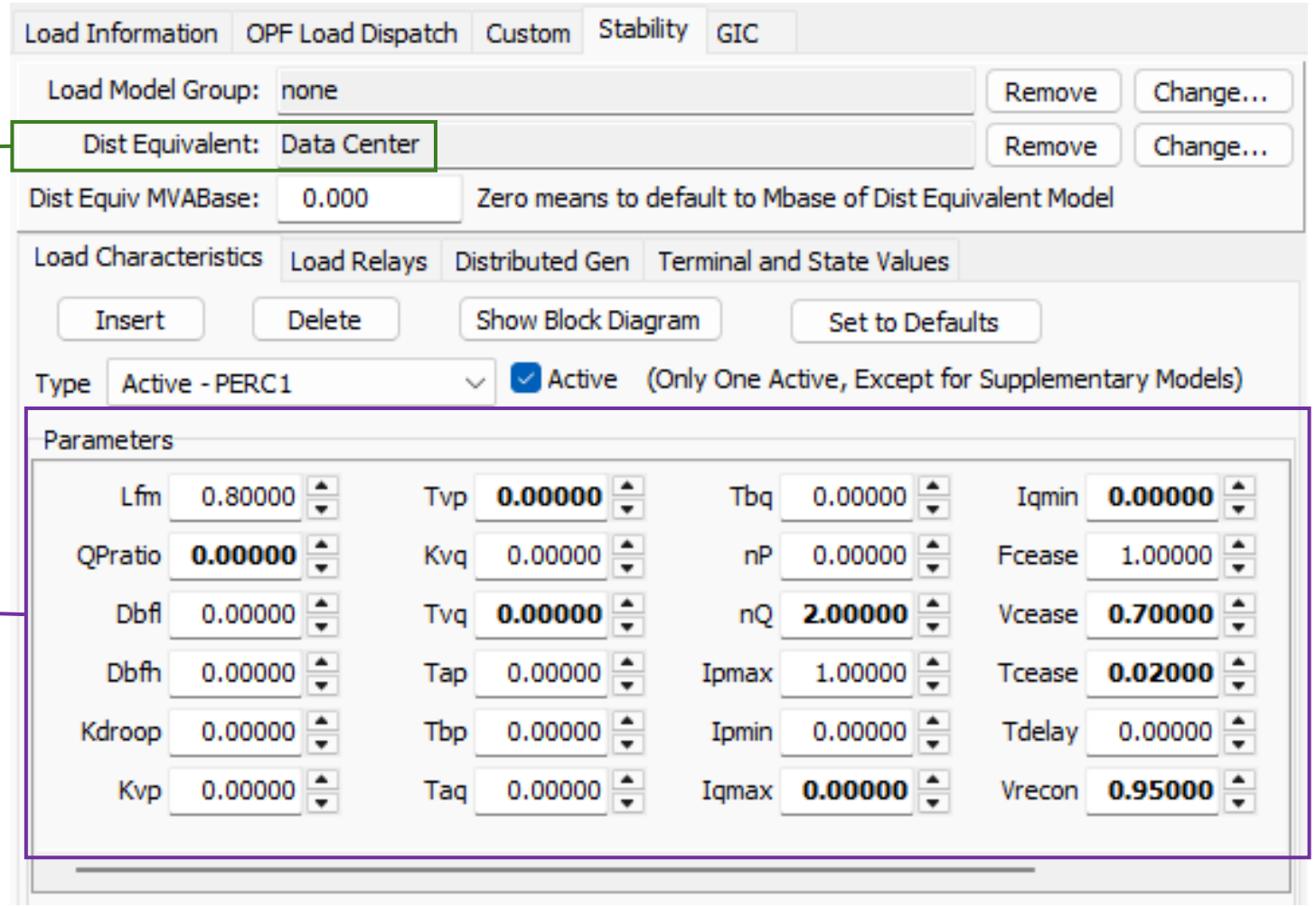




Modeling Data Centers in PowerWorld – Option2

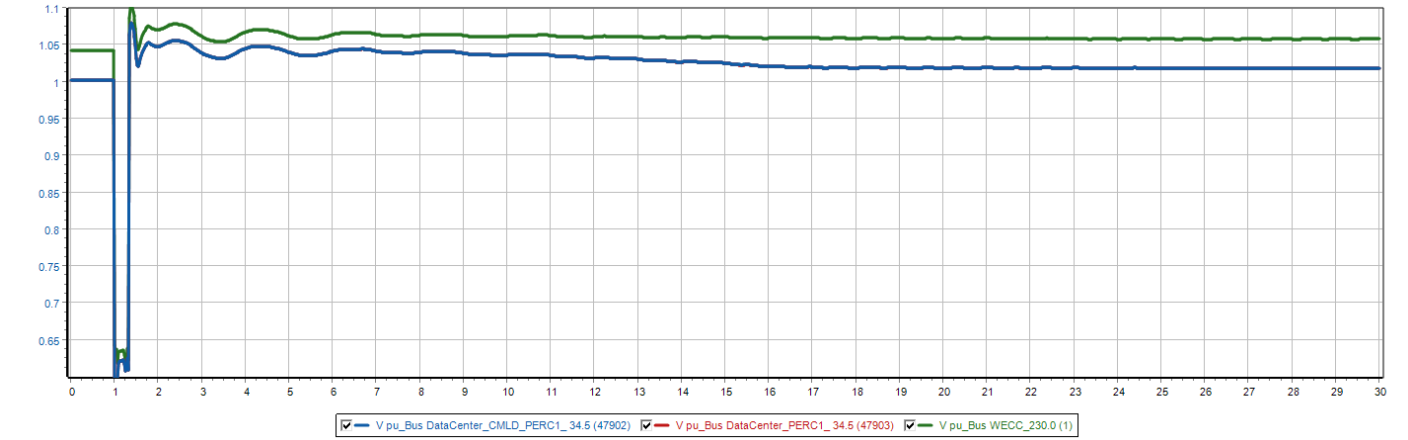
Distribution Equivalent to represent a 34.5kV/ 480V Tx and a short feeder

PERC1 model is used to represent a data center

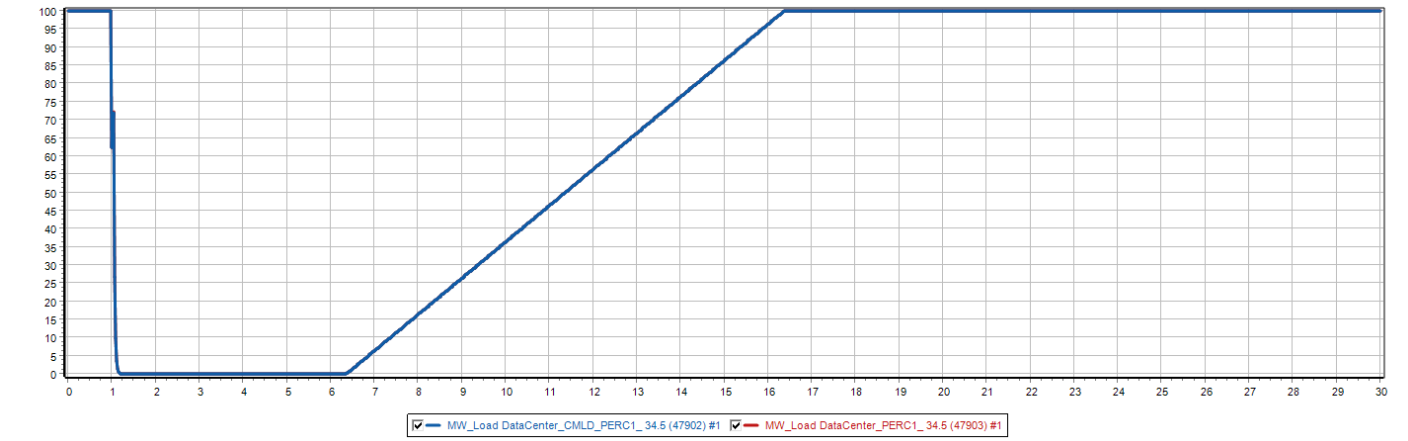


Voltage Sag Response

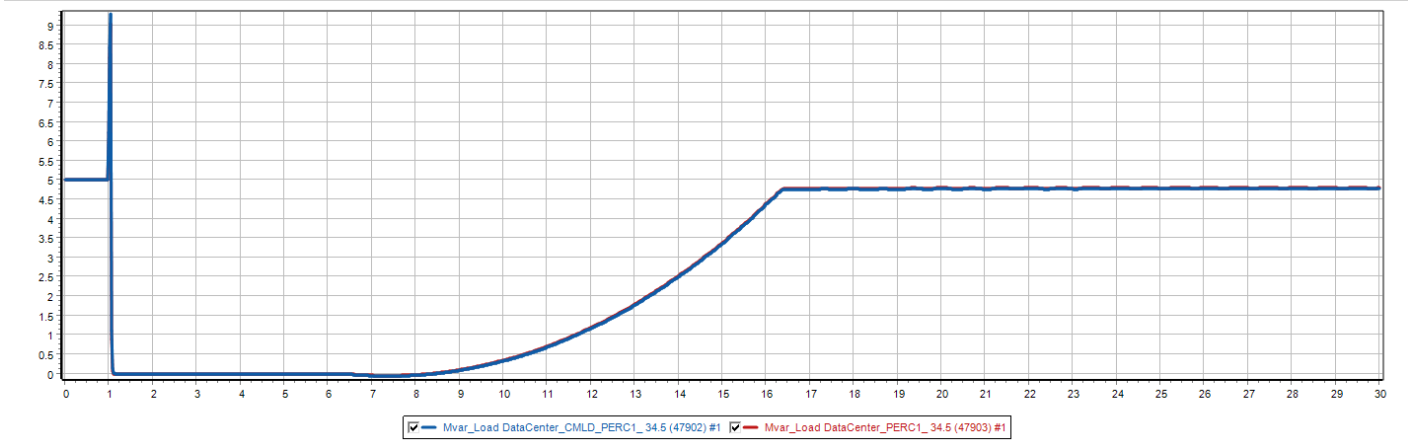
Voltages



Active Power

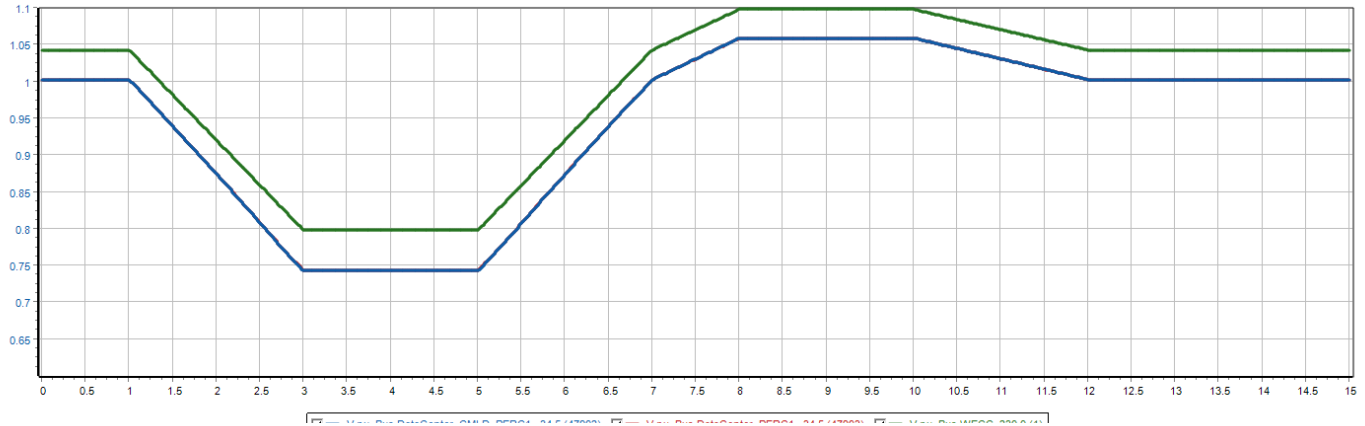


Reactive Power

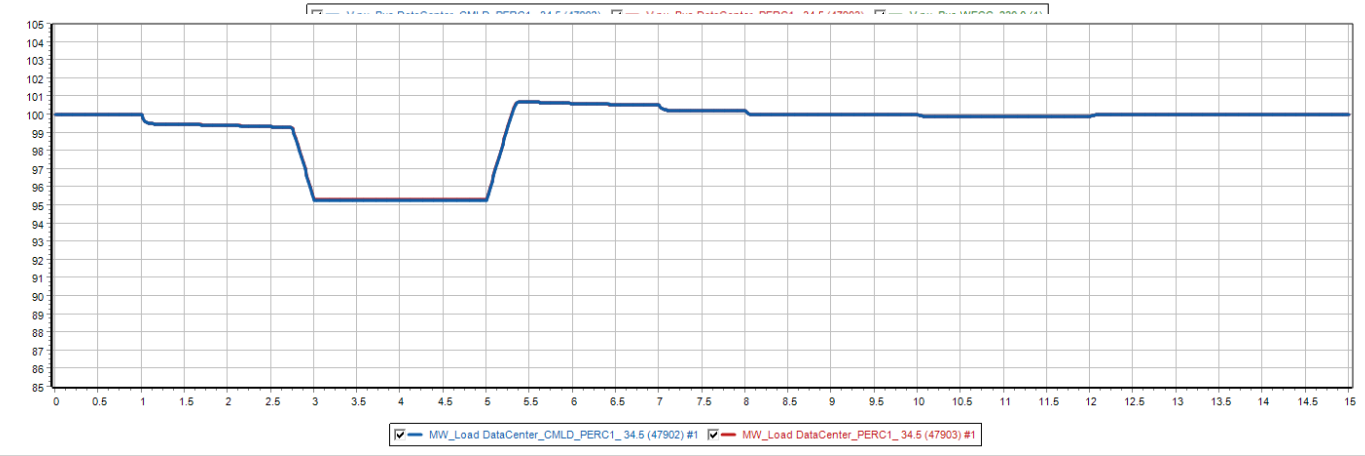


Voltage Swing Response

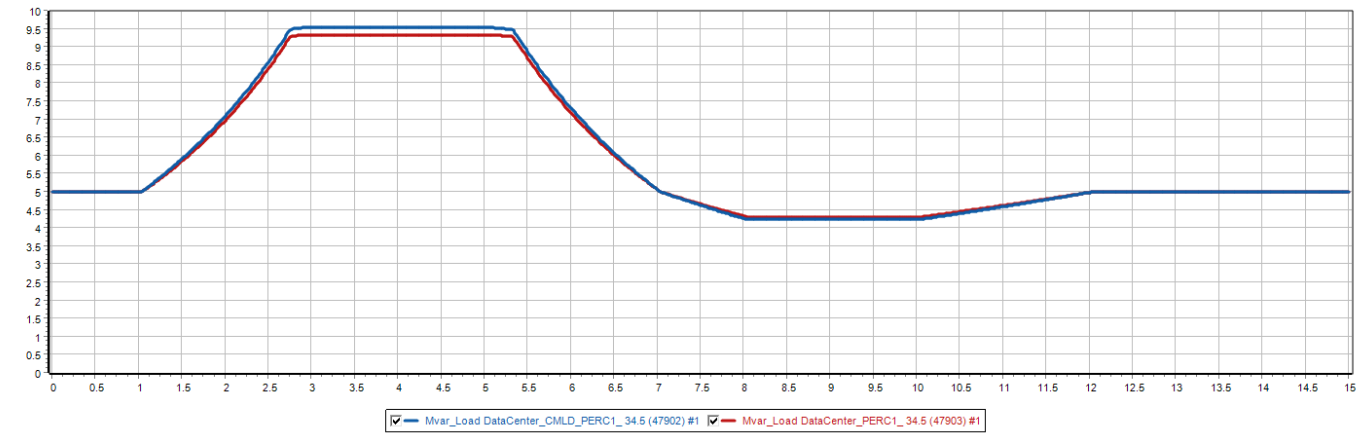
Voltages



Active Power



Reactive Power



NERC Activities

- NERC LMWG drafted **Data Center Load Modeling Technical Reference** document
- NERC LMWG developed **Data Center Information Collection** questionnaire to help transmission planners to collect plant-specific data for modeling data centers
- NERC LMWG has been engaged with OEMs on developing **PERC2** model required to represent emerging disturbance ride-through requirements
- NERC LMWG will have industry-wide workshop on September 15, 2026 https://www.nerc.com/events/09-15-26-lmwg-workshop

- NERC launched Project 2026-02 Computational Loads https://www.nerc.com/standards/reliability-standards-under-development/2026-02-computational-loads