Emerging Performance Requirements from a Utility Perspective

ESIG Large Load Modeling, Testing, and Interconnection Requirements Workshop

JUN-16-2026

Doug Fuller – Grid Stability & Special Studies

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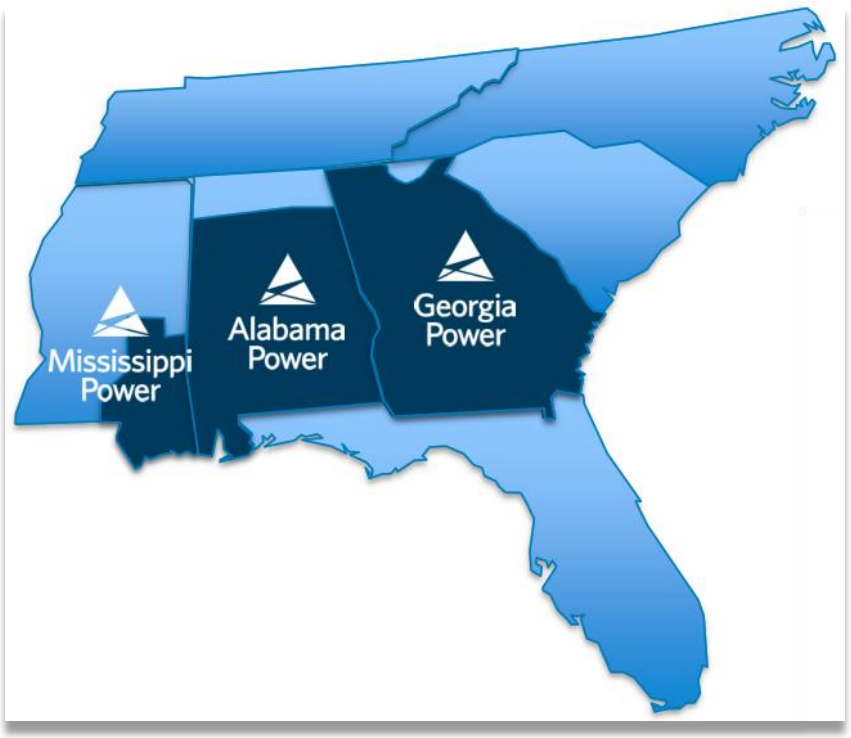


Southern Company is responsible for Planning & Operations – Generation & Transmission – to serve Large Loads

Owner	Operator	Planner	Service
• GO • TO	• RC • BA • TOP	• TP • RP	• LSE • DP

Large Load Growth

10 GW of Signed Contracts Across the Footprint

Another 10 GW in Late-stage Negotiations and 75+ GW in pipeline

Southern Company Reliability Strategy

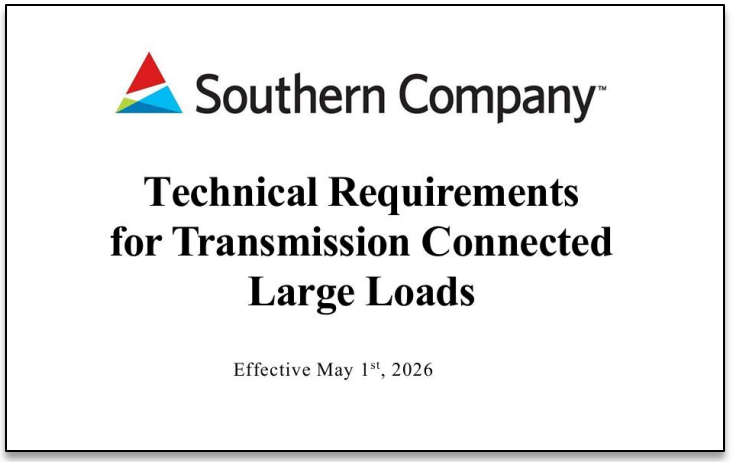
Reliability

Technical Requirements | Integration Process | Operational Protocols

1 Technical Requirements
- **Upfront** Modeling, Studies, & Performance Expectations

2 Integration Process
- Seamless & reliable integration into the BES
- **Site-specific** milestones (data sharing, studies, testing)

3 Operation Protocols
- **Ongoing** operational coordination and success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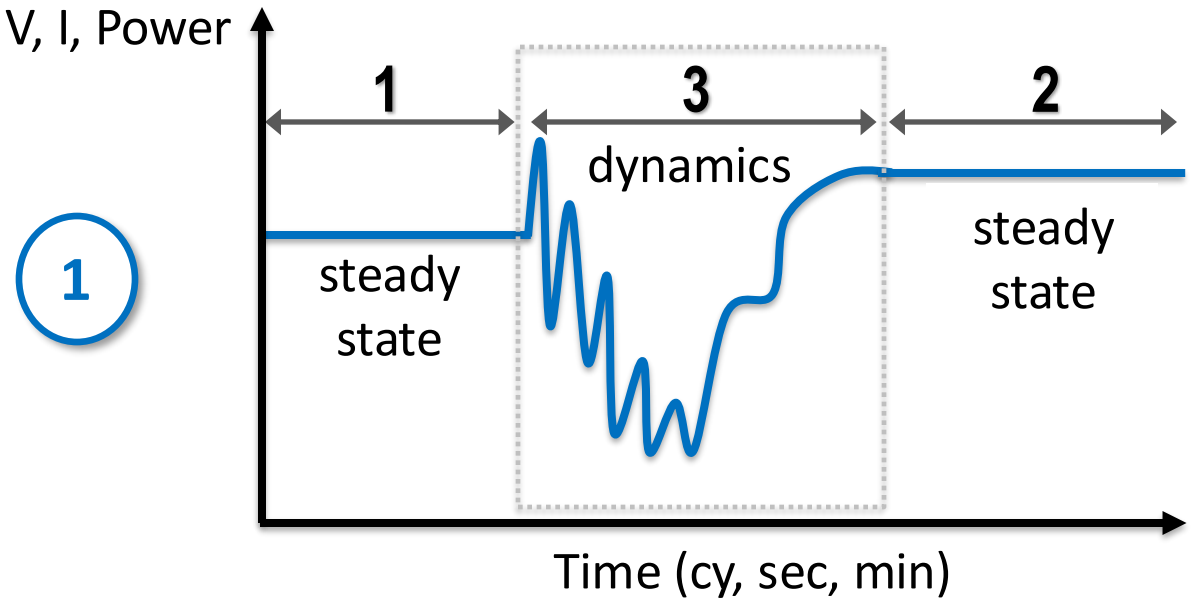
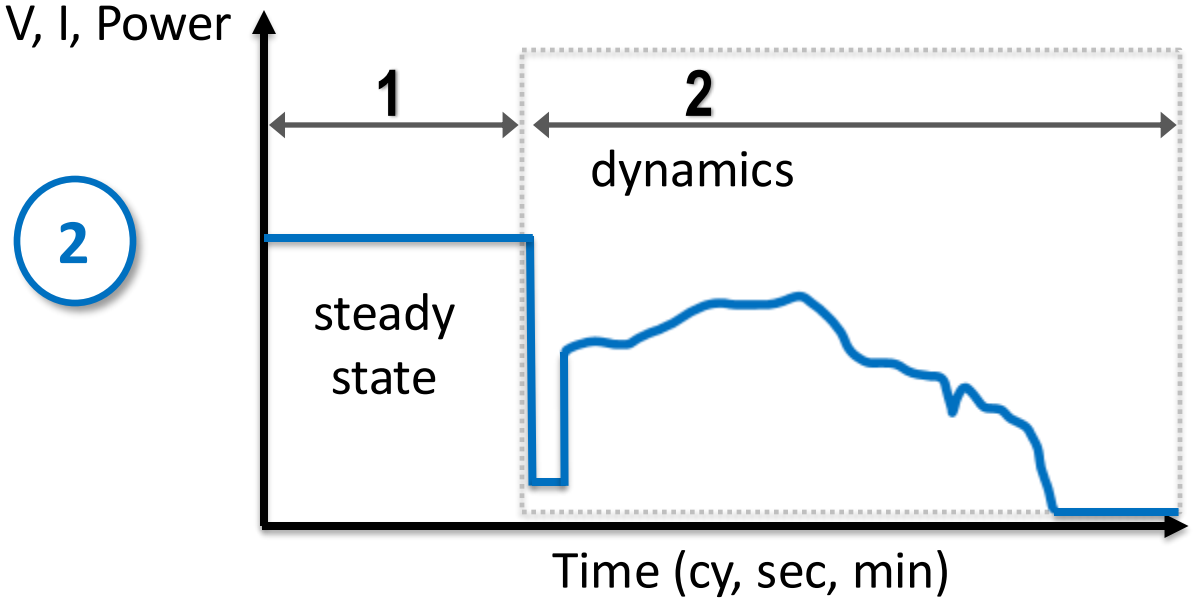
Technical Requirements for Transmission Connected Large Loads

Effective May 1st, 2026

Load Modeling Requirements





Key Takeaways

- **Incomplete data** or **assumptions** may lead to study results that differ significantly from actual system behavior:

1. May not reveal system instability.

OR

2. May drive needless upgrades.

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Computational Load Modeling Requirements

Version: 2.0

Updated: March 31st, 2026

Voltage and Frequency Ride-through

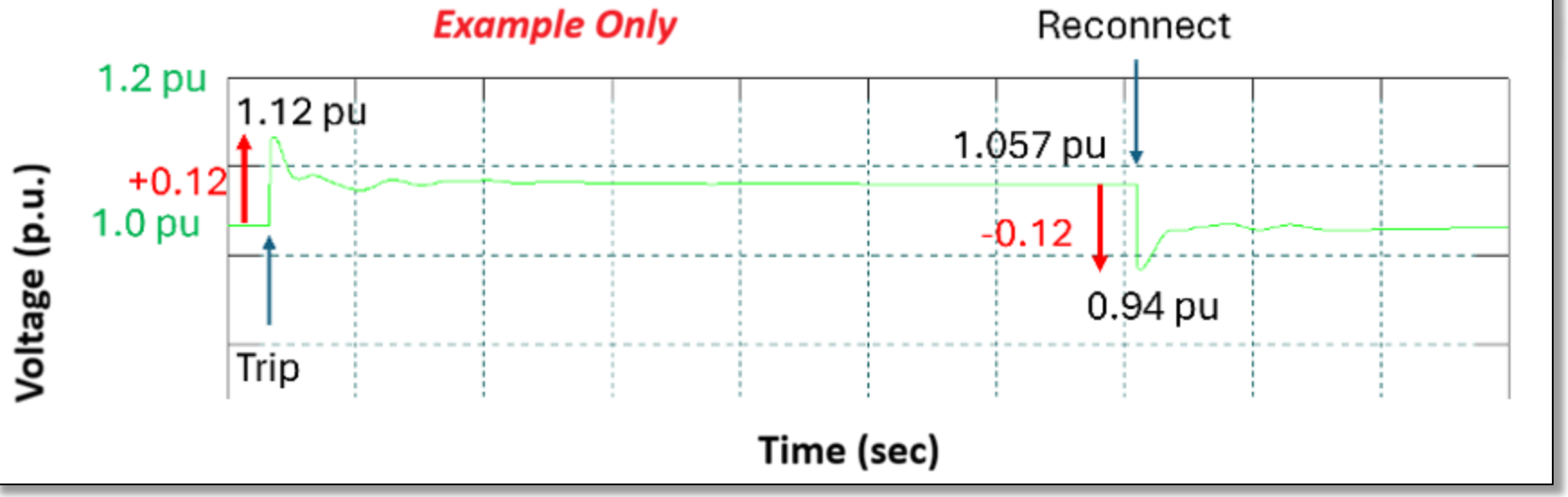
Computational Load Modeling Requirements

i. Threshold for low voltage magnitude per unit: 0.85 p.u.
ii. Measurement location (HV, MV, or LV bus): LV
iii. Low voltage transfer delay, in seconds: 1.2 sec
iv. Transfer back to utility supply, select one: Automatically / Manually
v. Recovery voltage magnitude per unit: 0.9 p.u.
vi. Recovered voltage transfer delay, in seconds: 10 sec
vii. Reconnection ramp rate/steps and timing: 20 MW/min

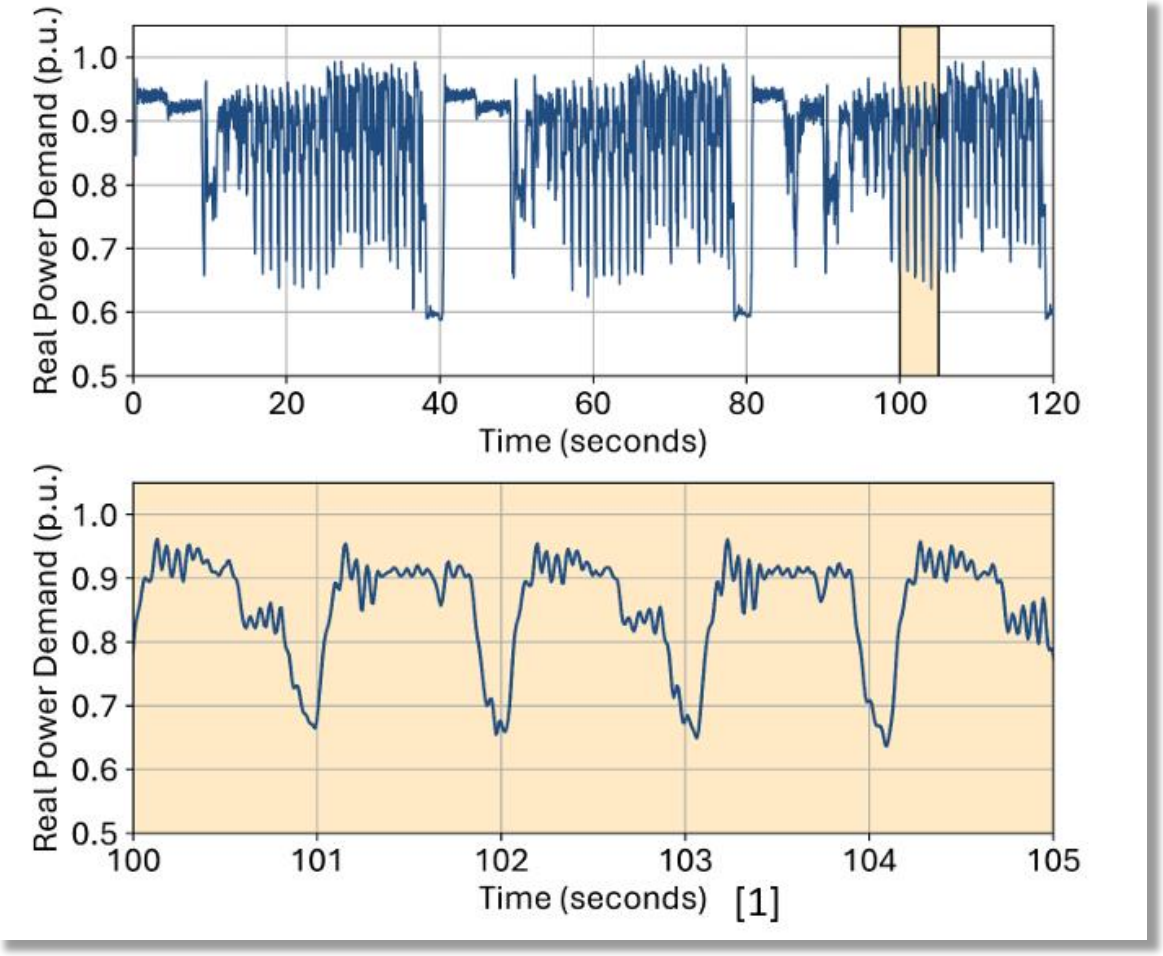
Example Only

- SoCo evaluates site-specific voltage and frequency impacts using customer's proposed settings:
  - Disturbance (e.g. fault)
  - No disturbance (sudden load loss)

Example Only



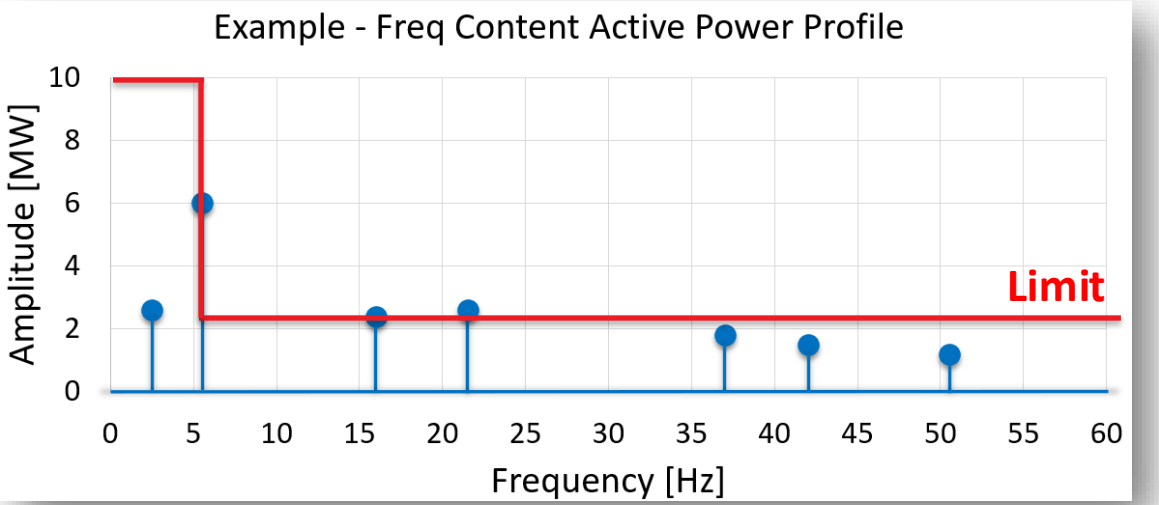
Forced Oscillations



[1]

Periodic active power fluctuations may drive **oscillations** in the power system:

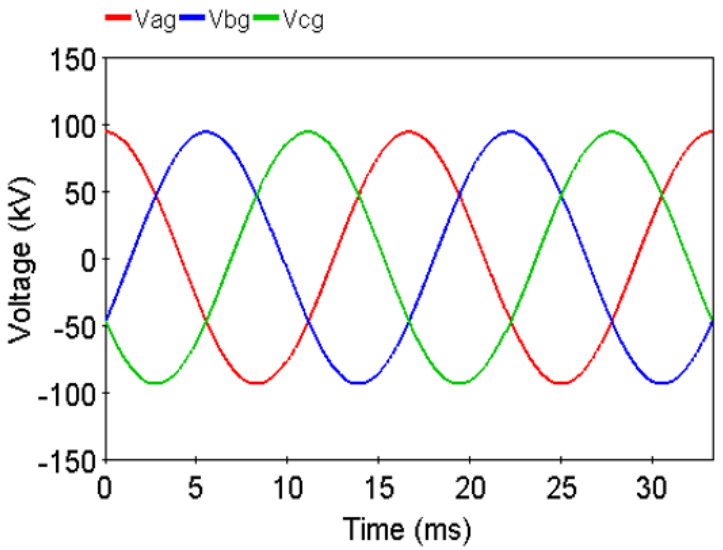
- **[0.1 – 5 Hz]** Eastern Interconnection, inter-area, and local modes
- **[5 – 55 Hz]** torsional frequency modes



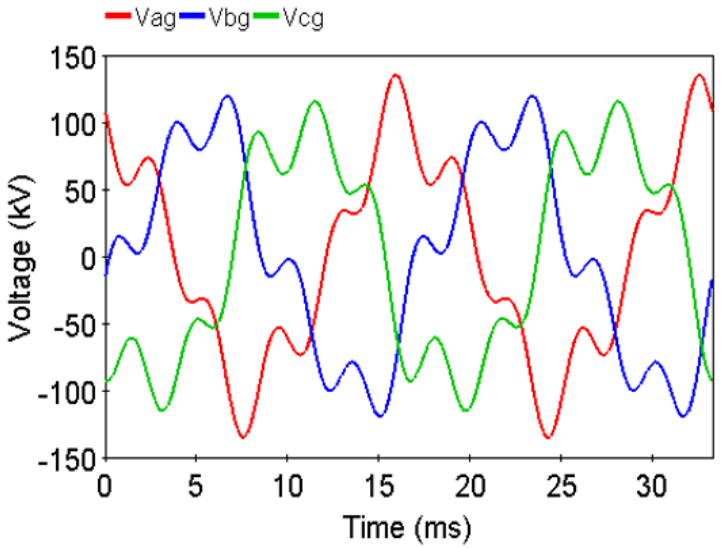
[1] North American Electric Reliability Corporation (NERC), "Characteristics and Risks of Emerging Large Loads," Large Loads Task Force White Paper, Jul. 2025. [Online]. p.30, Fig 3.8

Power Quality

- Data centers can contribute to harmonic distortion in power systems.
- Rapid shifts to high power demand can increase distortion.
- AI and crypto facilities may cause voltage fluctuations and lighting flicker.



Example of no *harmonic distortion*



Example of significant harmonic distortion

Questions?

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