System Model Validation

DOE NASPI Workshop

October 2013

Composite Load Model (CMPLDW)

69-kV
115-kV
138-kV

12.5-kV
13.8-kV

UVLS

UFLS

GE PSLF
Siemens PTI PSS®E
Power World
PowerTech TSAT

M

M

M

AC

Electronic

Static
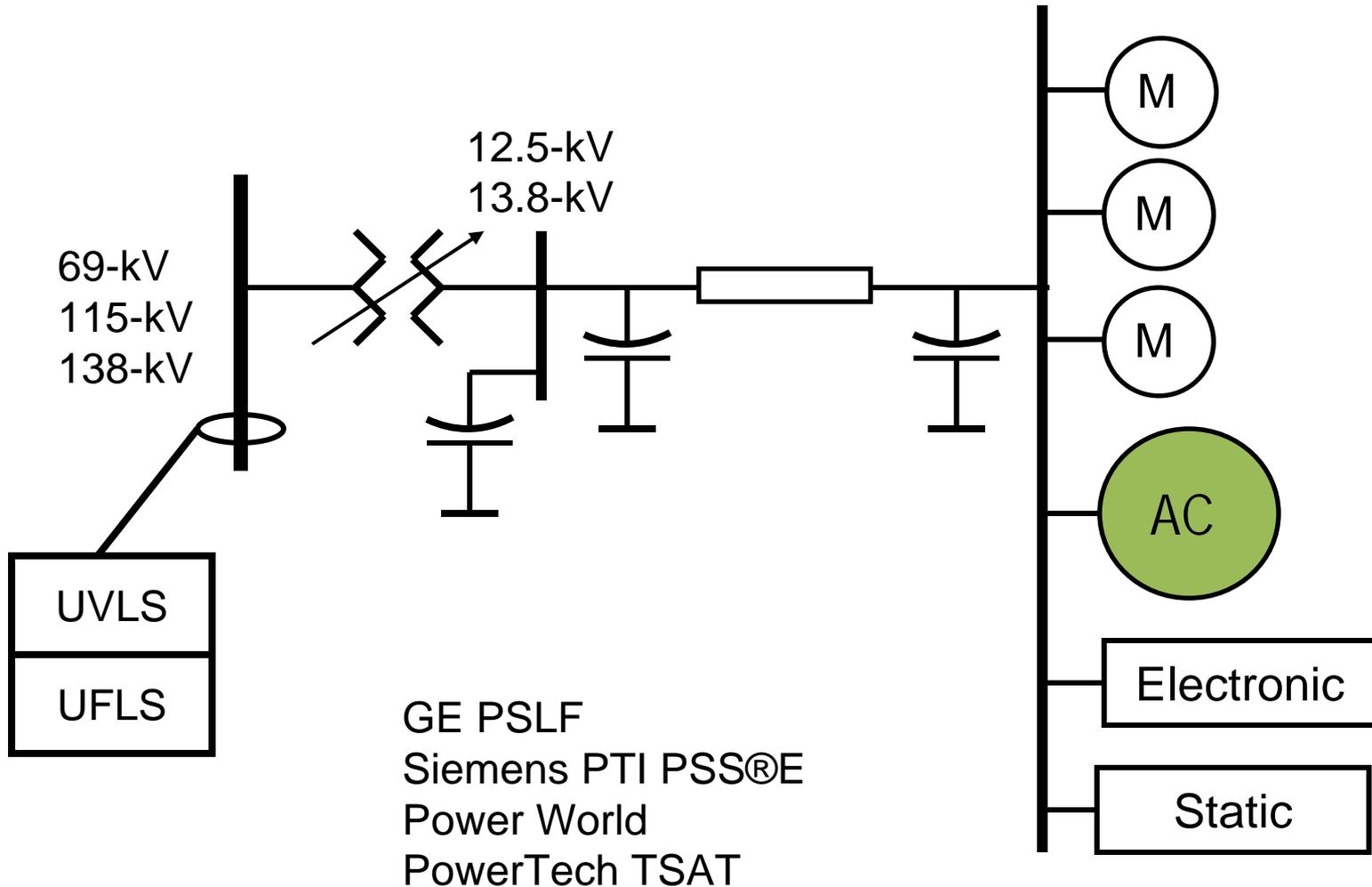
Where we are now …

- WECC Composite load model version 1 is implemented in GE PSLF and Siemens PTI PSS®E, similar models exist in Power World, Power Tech TSAT

  - Improvements to LTC models are requested in GE PSLF

  - Minor modifications are suggested for PSS®E Model

- Default sets are developed:

  - 12 climate zones in WECC,

  - four types of feeders (RES, COM, MIX, RAG)

  - Summer, winter and shoulder conditions

- Base cases will have LIDs populated

Climate Zones in the West
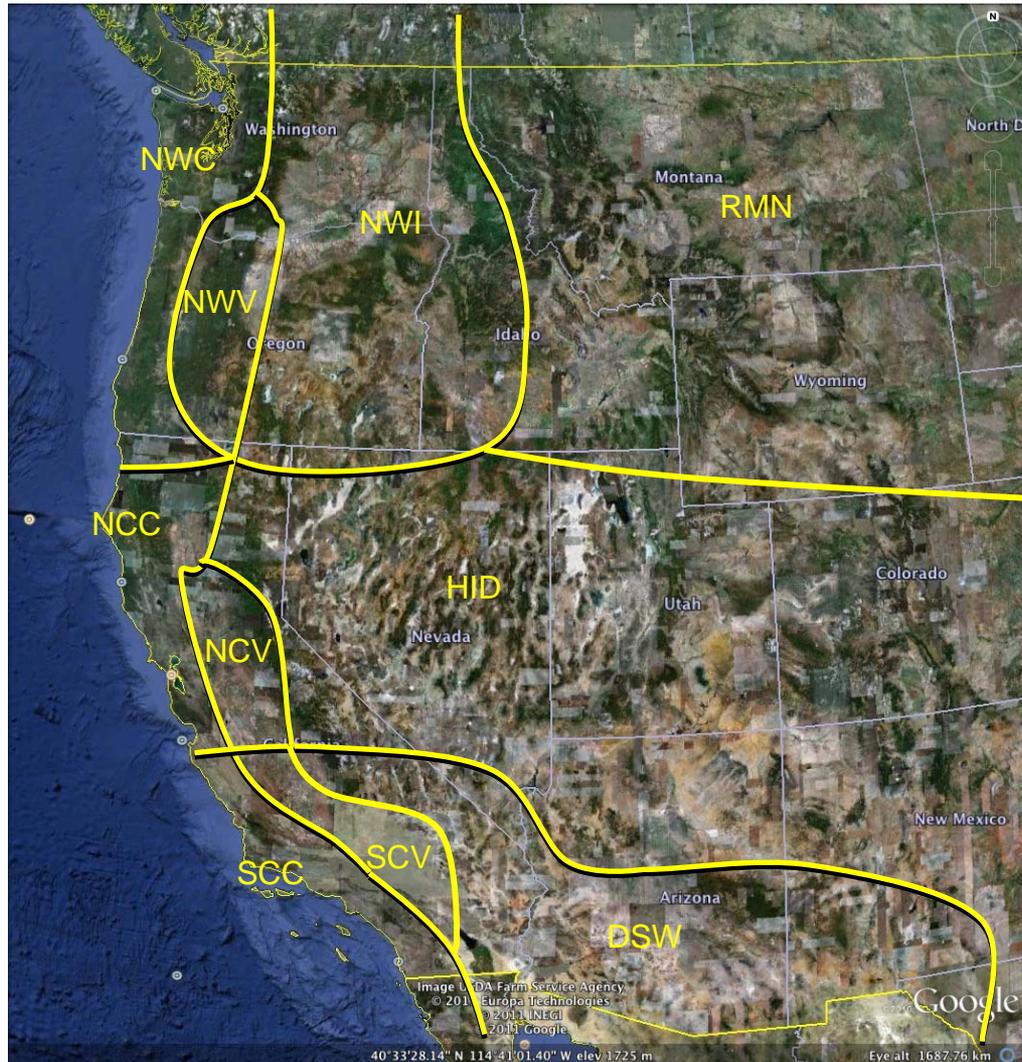
NWC – Northwest coast
NWV – Northwest valley
NWI – Northwest inland
RMN – Rocky mountain
NCC – N. Calif. coast
NCV – N. Calif. Valley
NCI – N. Calif. Inland
HID – High desert
SCC – S. Calif. coast
SCV – S. Calif. Valley
SCI – S. Calif. Inland
DSW – Desert southwest

WECC Load Composition Model
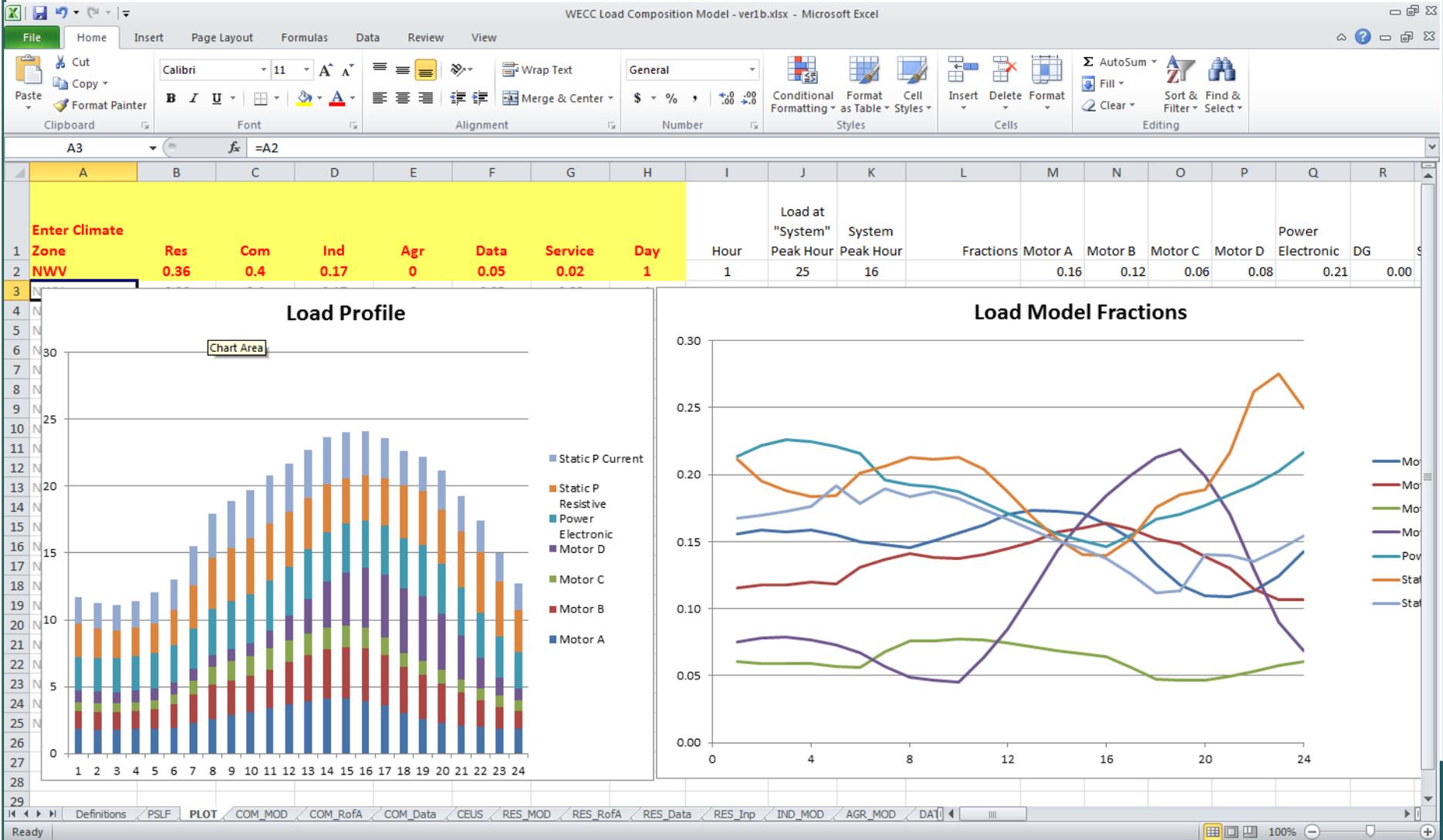
Load Model Validation Studies

August 4, 2000 Oscillation – Old Model
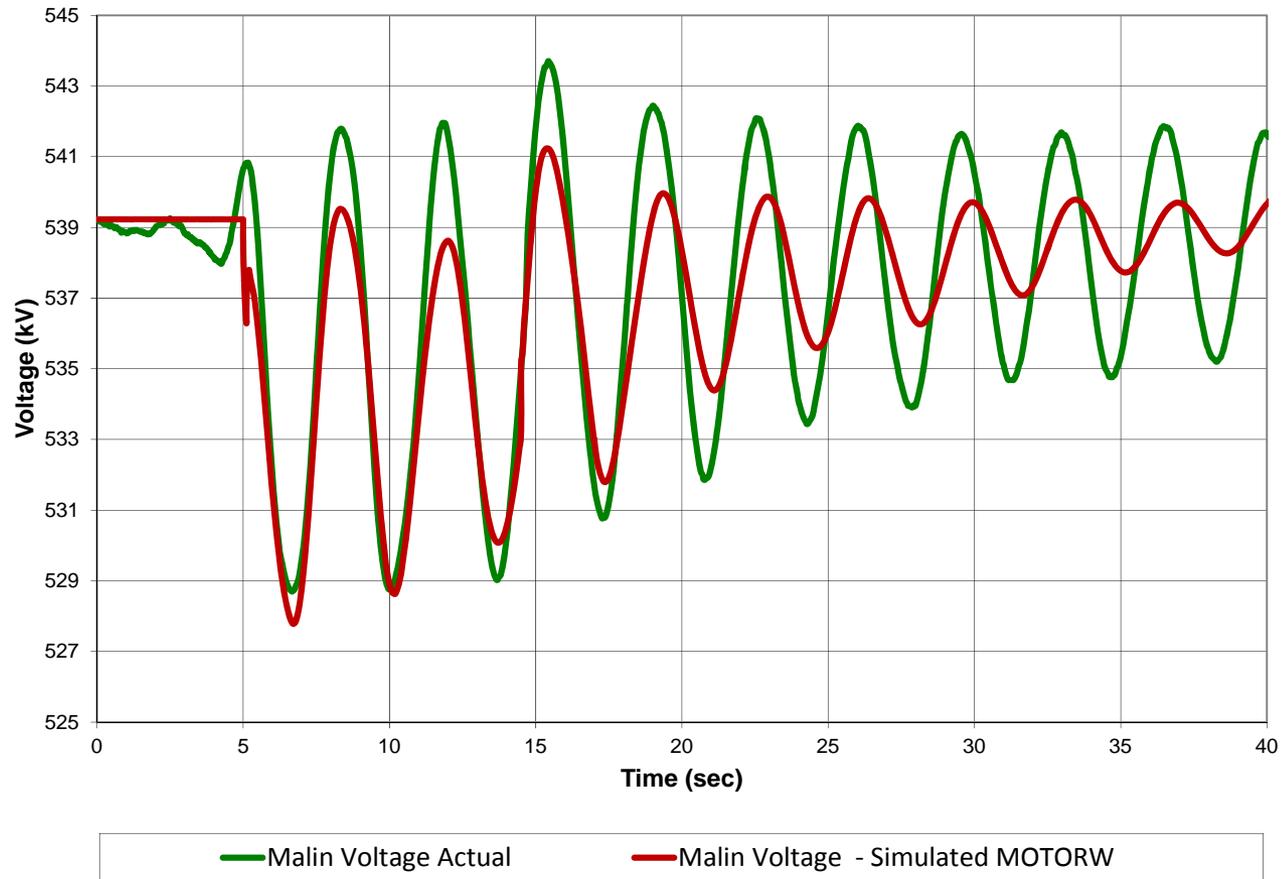
August 4, 2000 Oscillation - CMPLDW

Malin Voltage Actual — Malin Voltage Simulated
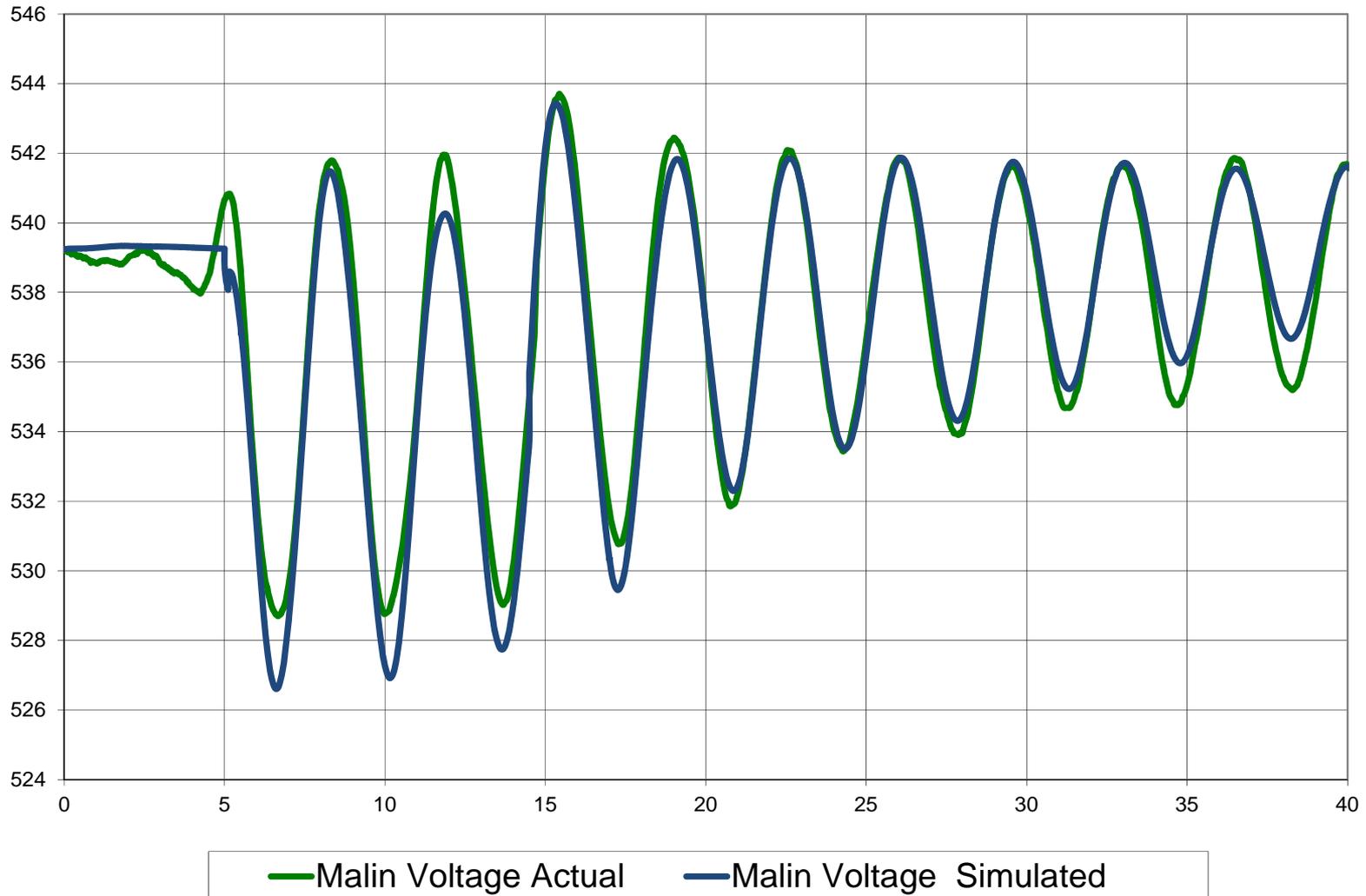
Reproducing Delayed Voltage Recovery Events with CMPLDW
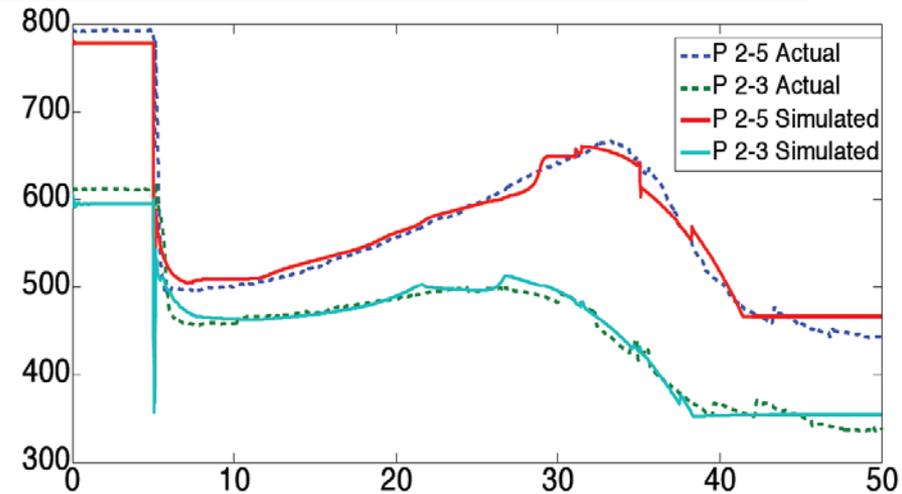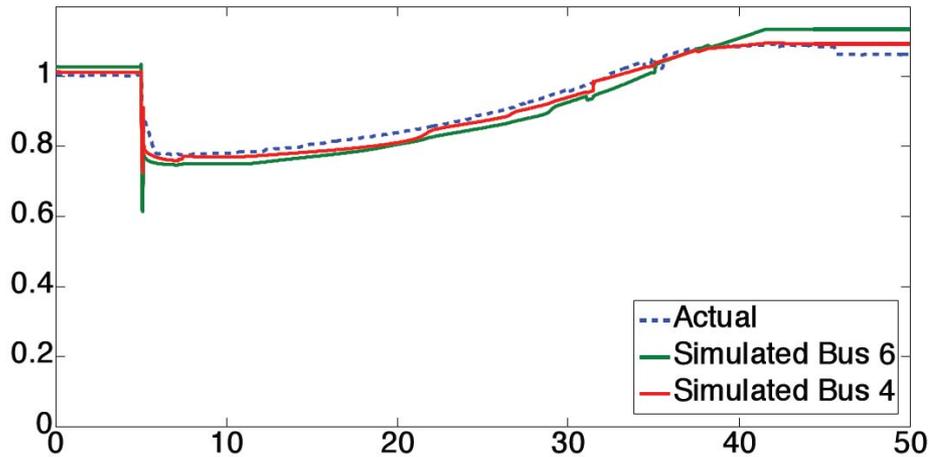
Simulations of delayed voltage recovery event due to air-conditioner stalling
Models can be tuned to reproduce historic events reasonably well

Done by Alex Borden and Bernard Lesieutre at University of Wisonsin
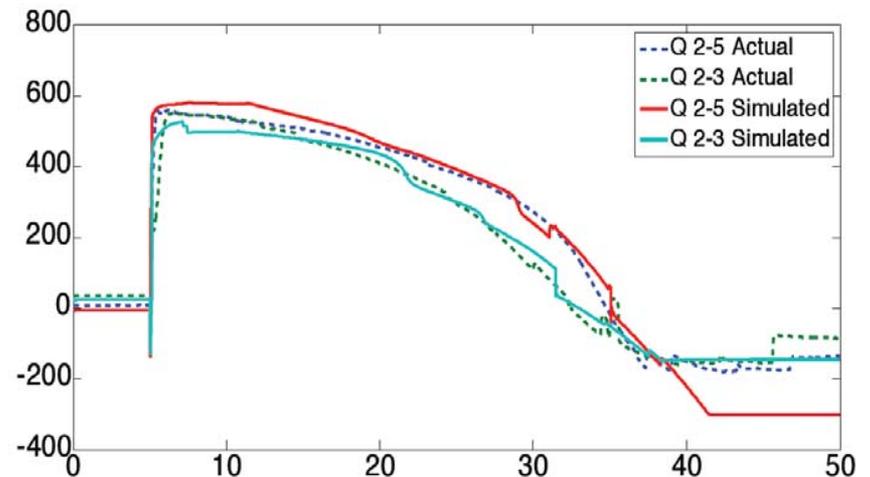
Load Modeling – Setting Expectations

- We can now achieve the great accuracy with generator models:
  o We model physical equipment that is well defined and under our control

- We will never be able to achieve a comparable level of accuracy with load models
  o Yes, we can tune load models to accurately reproduce and explain past events
  o But, Load models is only capable of predicting the future load response only in principle, and not in detail

WECC

Data for Load Model Validation

- Positive sequence data is no longer sufficient

- Loads are connected to individual phases

- Behavior of loads is now dependent on point on wave phenomenon

- CERTS and SCE deployed a number of Power Quality monitors

Data for Load Model Validation