Agenda

**Advanced Modeling for Distribution Planning and Operations Workshop**

April 19, 20, and 21

At Texas A&M University

Sponsor: CenterPoint Energy

# Day 1

# Introduction to OpenDSS

Welcome and Introductions

# Introduction to Distribution Systems

Styles of Distribution Systems

* North American
* European style
* Urban LV Networks
* Radial vs. Networks

# Introduction to the Program

What is OpenDSS and what can it be used for?

User Interfaces Provided

Installation and startup

Models Implemented in OpenDSS

Advanced Data Types

How Does OpenDSS Work?

* Basic equations
* Power Flow Solution Algorithm
* Basic Load models

Circuit Modeling Basics

Scripting Basics

* Simple circuit
* Larger circuits
* IEEE 8500-Node Test Feeder Example

Application Programming Interfaces (API)

* COM Interface
* Direct DLL interface

COM Interface Example

# Day 2

# Review of Day 1

# Simulations

Loadshapes and Quasi-static Time Series Simulations

Built-in Simulation Modes

Using the COM interface

Custom Simulations (with Python, Matlab, etc.)

# Models of Circuit Elements for Advanced Distribution System Analysis

The basic distribution power flow model

Per units or actual values?

Line impedance models

* Symmetrical component models
* Full phase domain models

Source Equivalent

Transformer models

* Winding connections and data requirements

Load Models as a Function of Voltage

Shunt Capacitors and Capacitor Controls

Voltage Regulators and Substation LTC

OpenDSS Generator models

OpenDSS PVSystem model

OpenDSS Energy Storage model

# Use Cases/Examples

Modeling Distributed Generation for Distribution Planning and Protection

PV Modeling

Transformer connection examples

Phase unbalance effects

Grounded-Y/Delta

Fault contribution

Protection coordination studies

Multiple generators backfeed

Transfer trip

Voltage Fluctuations from Solar PV

Grounding of DER for Interconnections

Including Storage in Distribution Planning

Dynamics Analysis for Distribution Planning

# Day 3

# Review of Days 1 and 2 (1 hr)

# Presentations of Texas A&M Projects

Five 30-minute presentations on relevant University research

* + Analysis of short circuit, voltage and load flow conditions with new distributed resources
  + Voltage-sag based high accuracy fault location
  + Community-scale storage with distributed PV to mitigate variability and enable high penetration of PV
  + Impact of interfacing PV inverters, EV charges, battery storage
  + Feeder level PV forecast

Lunch

Luncheon Speaker: Presentation on DFA

# Workshop Wrap-up Session (2 hr)

* More Use Cases
* Q&A
* Demonstrations/ Illustrative cases as needed