ESIG
ENERGY SYSTEMS INTEGRATION GROUP

2020 FALL TECHNICAL WORKSHOP

Session 8

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DER Integration and Demand Response

ELECTRIC POWER ENGINEERS
ENERGY ENGINEERING EXPERTS
GENERATION | TRANSMISSION | DISTRIBUTION
www.epeconsulting.com

KENNETH A. DONOHOO, P.E.
Senior Director of Engineering
kdonohoo@epeconsulting.com
512-886-2123

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www.ener-i.com

GENERATION RESOURCE MIX

- **Undergoing rapid changes**
- **Increasing amounts of renewable on Transmission and Distribution**
  - Wind
  - Solar
  - Battery Energy Storage Systems (BESS)
- **Connected to the grid through power electronics**
  - Inverter-based resources
- **New opportunities in terms of grid control and response**
  - Weak grid, low short circuit strength
- **Assure reliability assessing the impacts in**
  - Planning
  - Real time operations
- **Disturbance analyses has identified several areas of concern**
- **New grid code requirements**

PERFORMANCE SPECIFICATIONS

- **General requirements**
  - Accurate models
  - Dynamic models capture small and large disturbance aspects
  - Model verification
  - Receive dispatch signals
  - Resource operating information
- **Momentary Cessation**
- **Fault Ride-Through and Protection**
- **Active Power-Frequency Control**
- **Reactive Power-Voltage Control**
- **Inverter-Based Resource Protection**
- **Controls Interactions and Controls Instability**
- **Grid Forming Inverters**

WHAT IS CHANGING?

- New technologies and business models are changing the way we produce, manage and use energy
- Distributed Energy Resource (DER) and Demand Response Programs (DRP) provide additional means of producing power, managing electricity demand and providing grid services
- They can decrease net electricity demand either by injecting power locally or by reducing demand
- Transmission and distribution (T&D) planning processes need to consider their potential contributions to the grid
- They can reduce, defer or avoid T&D expansion and cost due to peak load growth
- They can mitigate price spikes and congestion costs
- They can also provide grid resilience, cleaner air, additional competition and customer savings
- Cost effective integration of DER and DRP will benefit consumers

WHAT IS NEXT?

- Speed up analysis using standard models and new software
- Identify high-value locations for concentration of DERs and DRPs
- Identify locations on the (T&D) grid that are highly loaded (above 85%)
- Define the amount and timing of resources needed for each scenario
- Consider non-wires solutions
- Implement cost effective solution whether it is a DER/DRP or grid expansion
- Recognize value in regulatory environment
- Develop coordination terminology
- Develop communications and control guidelines across T&D interface
- Increase the visibility to system operators to maintain reliability
- Recognize BESS as not a load or a resource
    - It is controllable identifiable demand response system

POWER SYSTEM IS CHANGING

Significant activity in:

- *Increased DER adoption*
- *Demand Response Programs*
- *Electrification*
- *Resilience*

We are working together to bring solutions to the many challenges of our future Grid:

- ✓ *Grid Digitization*
- ✓ *Data Management*
- ✓ *Technology Modelling*
- ✓ *Grid Planning*
- ✓ *Load Prediction & Forecast*
- ✓ *Market Animation & D-SCED*
- ✓ *Visibility & control of DER*
- ✓ *Grid Architecture*
- ✓ *Regulatory*
- ✓ *Advanced Networks*
- ✓ *T&D Integration – DSO*
- ✓ *New Generation Software*
- ✓ *AI, Optimization*
- ✓ *D-SCADA*

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