Integrating Renewables in ERCOT

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North American Synchrophasor Initiative

Oncor Electric Delivery
Welcome to Fort Worth!
Oncor at a Glance

- Largest transmission and distribution system operator in Texas

- Operates approximately 117,000 miles of transmission and distribution lines

- Delivers power to approximately 3 million homes and businesses

- Employs over 3,500 people

- Keeps the lights on for more than 7 million Texans

Reliable grid operations through the application of technology
Advanced Metering System (AMS) Initiative

- Supportive regulatory incentives
- More than 1.5 M total meters installed through December 2010
- Complete to 3.2 M customers by 2012
- Industry-first, customer information portal launched in 2010 – [www.smartmetertexas.com](http://www.smartmetertexas.com)
- In-Home Monitor pilot program
Oncor seeks to keep its transmission grid robust and reliable through progressive modernization.

Examples include –

- Transmission management system and control room maintained at state of the art
- System protection upgraded to state of the art microprocessor relays and digital fault recorders
Dynamic line rating capability is being demonstrated on eight circuits under a DOE Demonstration Grant

• The available capacity of a transmission line depends on its operating temperature
• Dynamic line rating technology monitors the tension in a transmission line and correlates it to the average temperature of the conductor
• The available capacity of the line can be obtained in near real time
• Information is provided to Oncor transmission SCADA system for use by grid operators
Static VAR Compensators

Robust advanced technology to provide high speed grid voltage support during electrical disturbances in the North Texas area

- Oncor’s Parkdale SVC is the largest and fastest acting in the world
- 600 MVAr capacitive & 530 MVAr inductive
- Oncor’s second SVC unit began operation in 2010

Reliable grid operations while reducing the need to run local generation
Renewable Energy in ERCOT

- Wind energy reached 8% of energy supplied in ERCOT in 2010
- Installed wind generation capacity is 9,528 MW
- Wind generation set a record on December 11, 2010
  - 7,227 MW
  - 26% of load at the time
- Most wind capacity is located in West Texas, yet most of the load is in the eastern half of the state
  - Moving wind to load centers requires a strong and adaptive grid

As an example of challenges, in a 48 hour period in March 2010, wind surged to 25% of load, then declined to 77MW, less than a percent of load

Energy Supply to ERCOT in 2010

- Wind: 38%
- Coal: 40%
- Natural Gas: 13%
- Nuclear: 8%
- Hydro, Biomass, Other: 1%
CREZ Project Overview

• In 2005 Texas Legislature launched plans for developing transmission infrastructure to meet growing electric demands by tapping Texas wind and solar power

• Competitive Renewable Energy Zones (CREZ) are areas identified with significant renewable resource potential - primarily in West Texas and the Panhandle

• Oncor is one of eight companies currently involved in the development of CREZ transmission lines

• Oncor will invest ~$1.75 billion in CREZ
Competitive Renewable Energy Zones

- 13 of 14 CCNs have been approved
- Construction is well under way, with $316M spent on CREZ through 2010
- 2011 signals major shift in CREZ project as it shifts from procedural applications to actual construction
- in total and $590M in 2011 – largest year in the program
- Essentially complete by year end 2013
Synchrophasors in ERCOT

Capabilities for ERCOT application of synchrophasors are being developed through a collaborative process sponsored by ERCOT & CCET with DOE support.

- RTDMS visualization for ERCOT 3Q 2008
- Oncor PMU data to ERCOT initiated 4Q 2010
- Challenges - Data stream reliability
- Indicative event data already being captured

Wind integration a key use for synchrophasor technology
Goals for the Collaborative Synchrophasor Effort

- Enable ERCOT to *better manage* the transmission grid to accommodate very large quantities of wind generation
- Establish and maintain a *reliable synchrophasor network* to provide real time dynamic information on wind resources and their impact on the transmission grid
- Use synchrophasor measurements to *identify precursor* conditions to undesirable grid performance and behavior
- Identify changes in operating procedures or actions to facilitate integration of intermittent resources, hence *improving grid reliability*
- Utilize synchrophasor measurements to *recalibrate engineering models*

*Wind integration a key use for synchrophasor technology*
February 2nd Issues – The Setup

Extended cold and extreme winds swept through the state

Forced outages at power plants created supply shortages

The Dallas-Fort Worth area spent 102 hours below freezing (Telvent hourly poll of DFW), which is the longest since January 1997.

Source: National Oceanic and Atmospheric Administration (NOAA)