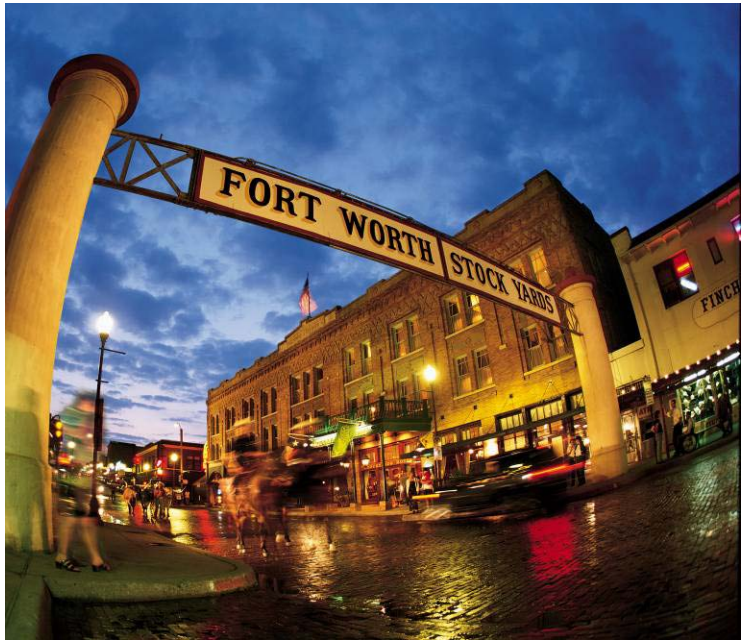
Integrating Renewables in ERCOT

Jim Greer, PE
February 23, 2011
North American Synchrophasor Initiative

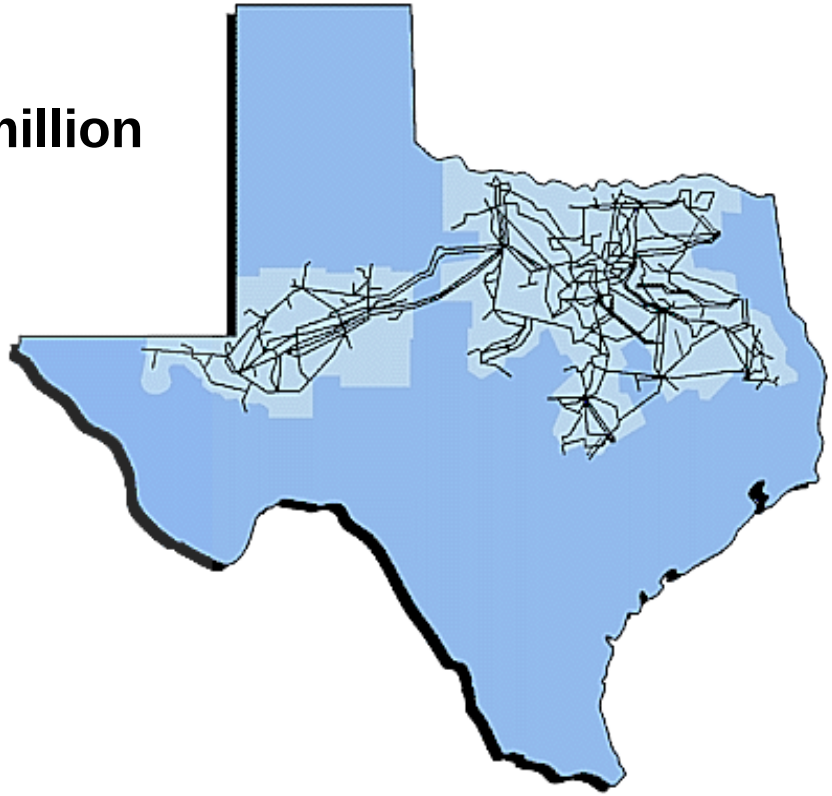
Oncor Electric Delivery

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
- In-Home Monitor pilot program

Modernization of Transmission Capabilities

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**

Transmission Dynamic Line Rating DOE Project

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

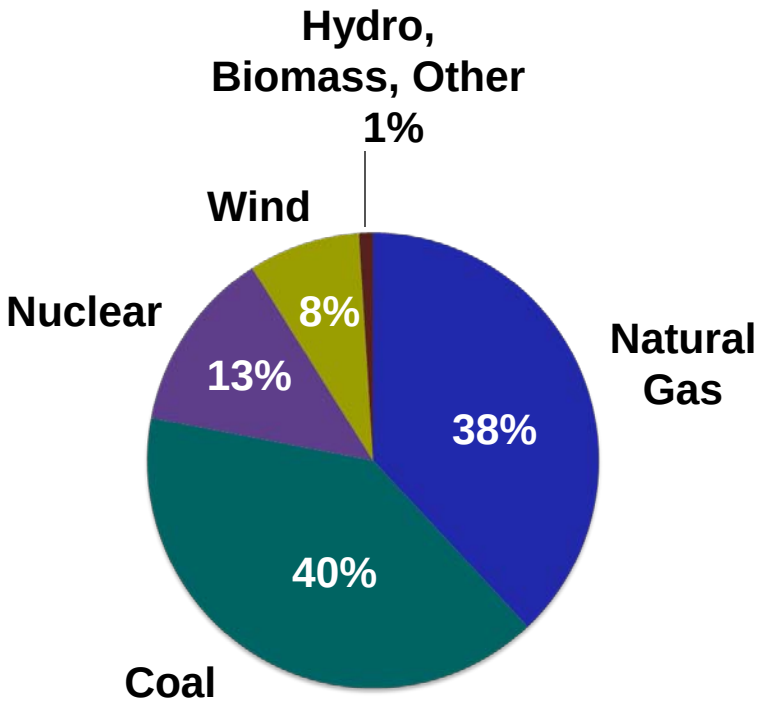
Robust advanced technology to provide high speed grid voltage support during electrical disturbances in the North Texas area

- **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



Energy Supply to ERCOT in 2010

Source: ERCOT Quick Facts, Feb 2011

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

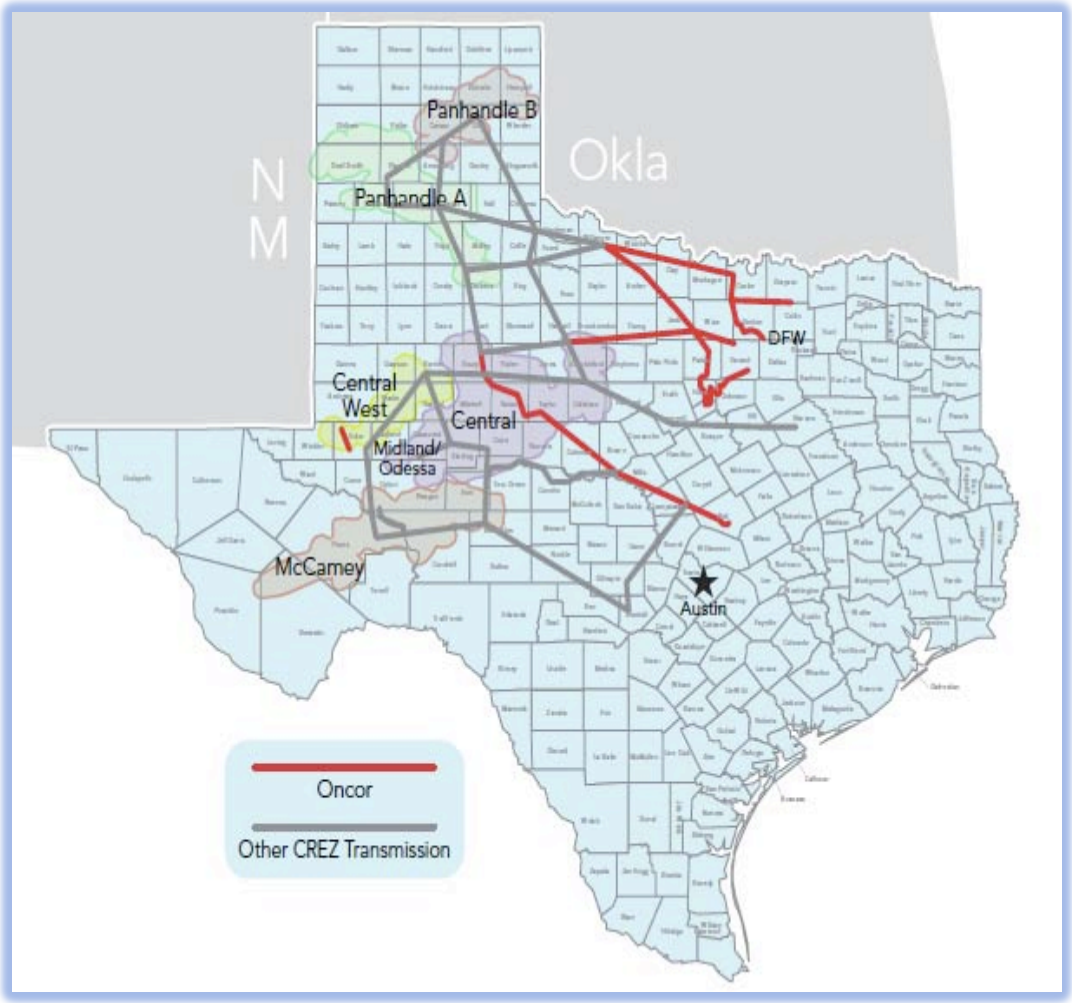
CREZ Project Overview

- **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**



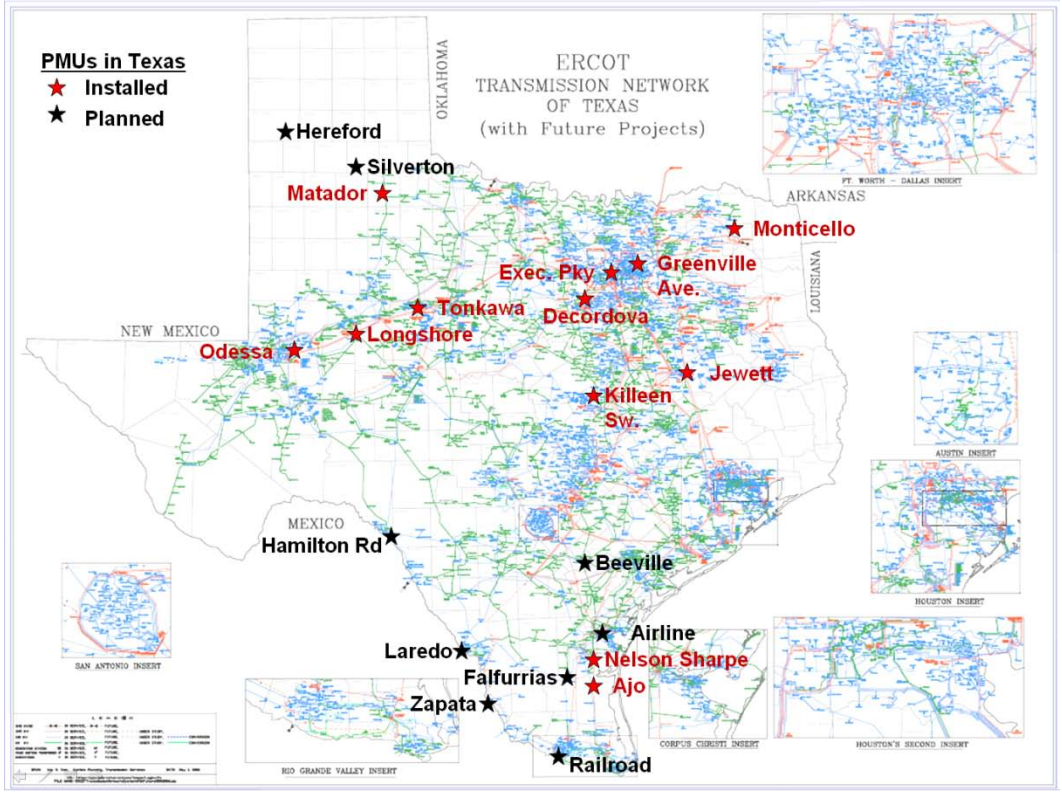
Competitive Renewable Energy Zones

- 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

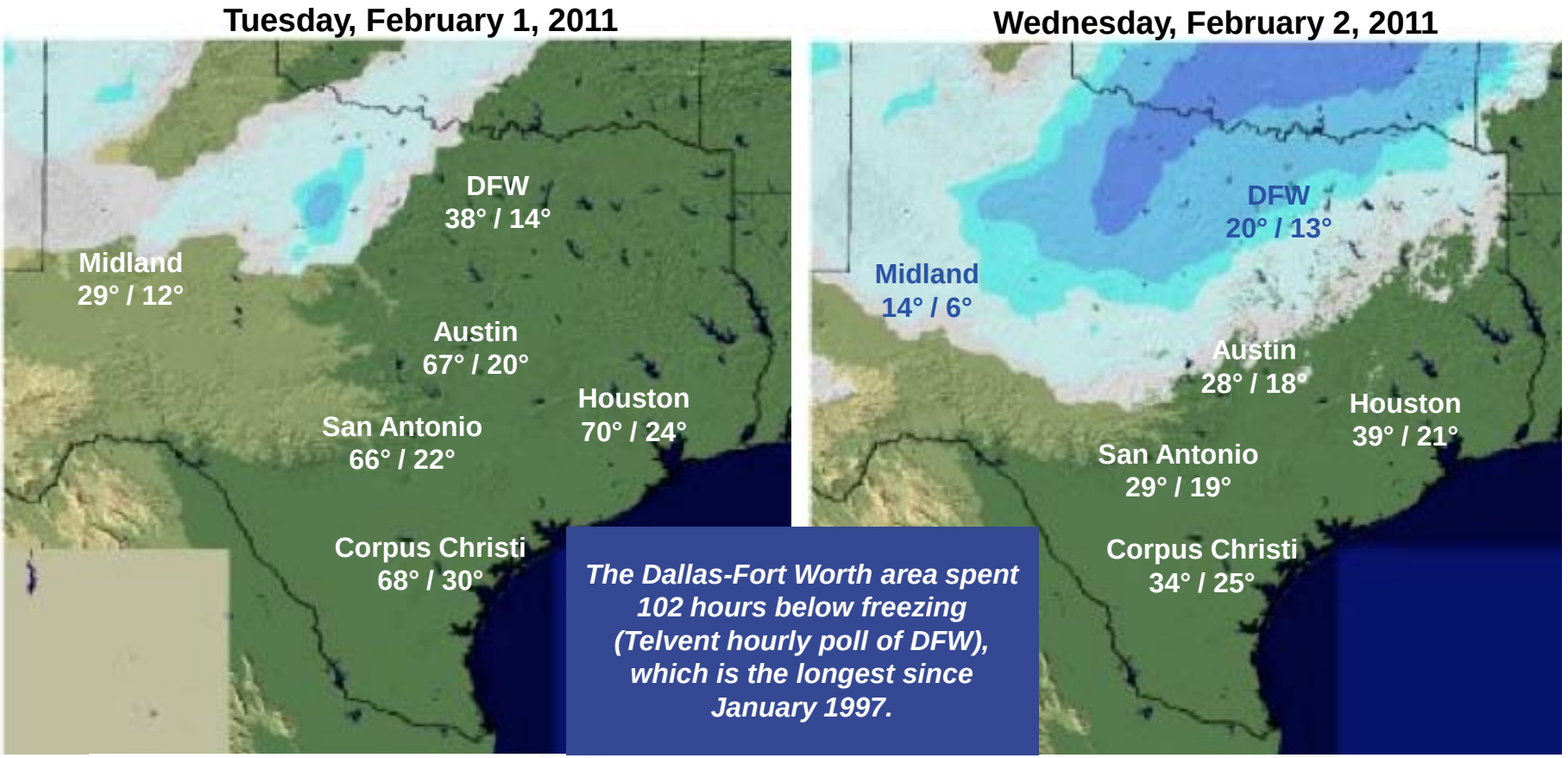
- **Enable ERCOT to *better manage* the transmission grid to accommodate very large quantities of wind generation**
- **Establish and maintain a *reliable synchrophasor network* to provide real time dynamic information on wind resources and their impact on the transmission grid**
- **Use synchrophasor 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)