The Electric Reliability Council of Texas (ERCOT)

Presentation to Legislative and
Sunset Advisory Commission Staff

October 8, 2009

Overview of ERCOT

The Four ERCOTs

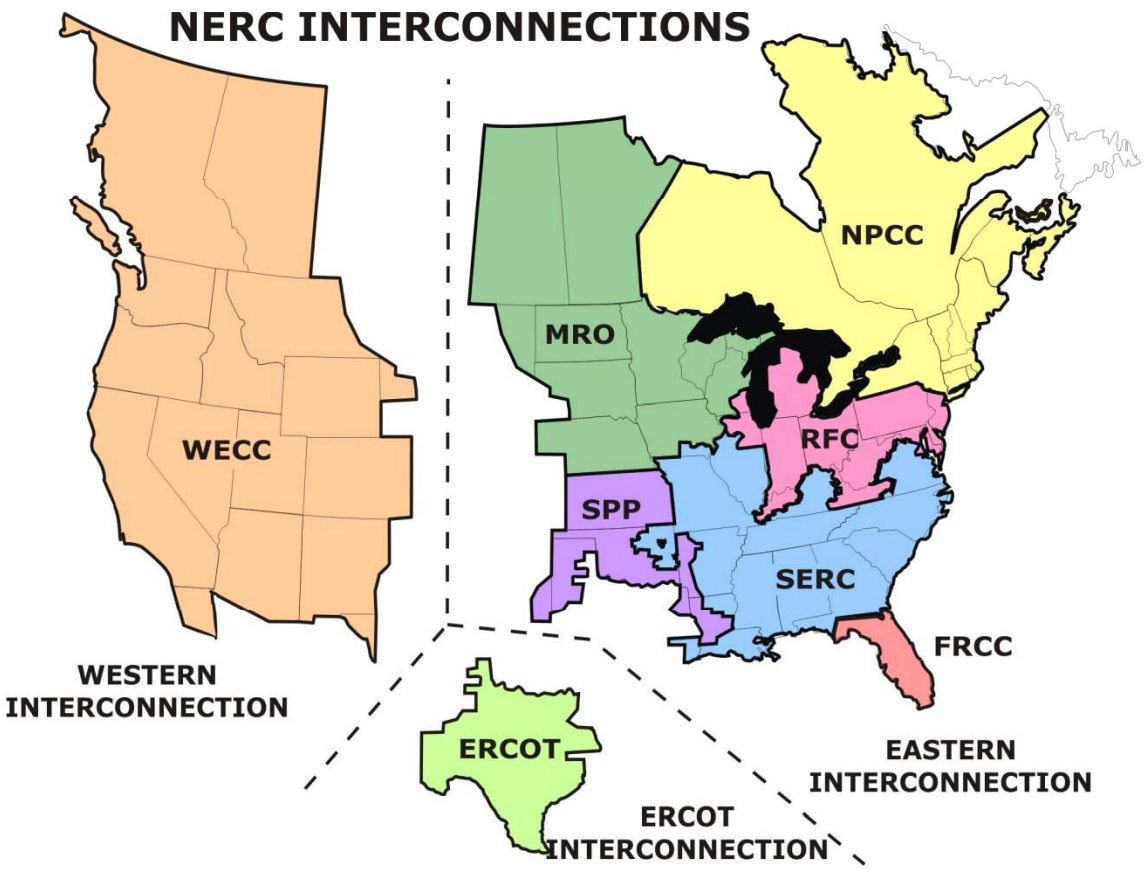
- **ERCOT Region** – Approximately 75% of Texas land area and 85% of Texas load that is served by a grid that is electrically separate from the Western and Eastern Interconnects that serve the rest of the US.

- **ERCOT Board** – The governing body of ERCOT is a 16-member "hybrid" group that includes six representatives from each of the industry segments (investor-owned utilities, municipal-owned utilities, cooperatives, generators, power marketers and retail electric providers), three consumer segment representatives (industrial, commercial and residential), five independent (unaffiliated) directors, the ERCOT CEO, and Texas PUC Chair (non-voting). The Board also oversees Texas RE.

- **ERCOT Stakeholders** – Representatives of the industry segments described above who write the rules of the ERCOT market (subject to Board approval and possible PUC appeal). Each market segment elects representatives to serve on the Board of Directors and stakeholder committees, subcommittees, working groups and task forces. Stakeholder meetings are called and chaired by stakeholders.

- **ERCOT, Inc.** – ERCOT, Inc. was designated the Independent Organization (IO) under PURA in 1996 to be the unbiased entity ensuring fair access and opportunity to ERCOT-region market participants. ERCOT, Inc. is a 501(c)(4) nonprofit that performs statutorily designated duties pursuant to PUC order. Since mid-2007, by FERC Order, it also includes the Texas Regional Entity (Texas RE), an independent division that oversees compliance with both federal and state reliability laws and rules.

What is ERCOT?



- The ERCOT Region is one of 3 North American grid interconnections.

- The ERCOT grid:
  - -75% of Texas land
  - -85% of Texas load
  - -More than 40,000 miles of transmission lines
  - -550+ generation units
  - -Physical assets are owned by transmission providers and generators
  - -63,400 MW peak demand (set summer '09)

- *ERCOT has only direct current (DC) ties to other grids, which are controllable and limited*

ERCOT as an Independent System Operator (ISO)

- ERCOT is one of 10 North American ISOs/RTOs
  - ISOs/RTOs serve 67% of U.S. population
  - Goal: Efficiency and impartiality
    - Means: Security-constrained economic dispatch (SCED)

What does ERCOT do?

- **ERCOT 'directs traffic' on the grid to maintain reliability and ensure supply of electricity:**
  - Coordinates scheduling of power by market participants
  - Analyzes grid conditions continuously in real-time
  - Dispatches generation to ensure power production matches load at all times
  - Secures available generation capacity to meet reliability requirements
  - Coordinates planned outages of generators and transmission lines
  - Relieves transmission system congestion
  - Coordinates emergency actions & recovery
  - Operates markets to meet regional energy & capacity requirements not met through bilateral arrangements
  - Forecasts and coordinates improvements to the transmission grid

Why is ERCOT unique?

Texas is unique in that ERCOT is the only entity of its type in the United States; no other entity performs a similar range of grid, wholesale market and retail market operations.

Because of the separateness of the ERCOT grid, the bulk electric system in the ERCOT market is primarily regulated by the Texas Legislature and the Public Utility Commission of Texas (PUC) as opposed to the Congress and the Federal Energy Regulatory Commission (FERC).

The Public Utility Regulatory Act: ERCOT's primary mandates

- **PURA 39.151**
  - Ensure the reliability and adequacy of the regional electric network
  - Ensure access to the transmission and distribution systems for all buyers and sellers
  - Ensure that information relating to a customer's choice of retail electric providers is conveyed in a timely manner to the persons who need the information
  - Ensure that electricity production and delivery are accounted for among the generators and wholesale buyers and sellers in the region

Organizational overview and funding

- **ERCOT has two facilities, both of which are located in Central Texas.**
  - 608 employees were located in Taylor, Texas facility in FY08
  - 40 employees were located in the Austin facility in FY08
  - Plans are underway to build a secure control and data center in Bastrop County
- **The PUC authorizes all ERCOT fees and reviews and approves the ERCOT "System Administration Fee"**
  - To support the PUC review, ERCOT files a proceeding at the PUC each time a change in the System Administration Fee is requested
  - The review process allows an opportunity for interested parties to participate in the review and to provide information concerning ERCOT fees directly to the PUC for their consideration

ERCOT fees

- The System Administration Fee, which represents approximately 98 percent of ERCOT's total base operating revenue requirement, is assessed on wholesale energy transactions and becomes part of the overall cost of electricity
  - It does not appear on residential bills, but if it were passed directly through to end-use customers, it would average about 42 cents/month or $5/year, based on 1,000 kilowatt-hour usage per month
  - The fee has not increased in the last five years, although future projections show that a significant increase will be needed in the near future
- In addition to the System Administration Fee, ERCOT is presently collecting additional revenues via a special fee designed to provide recovery of the cost necessary to implement a nodal market as mandated by the PUC
  - This special nodal surcharge is assessed to generation resources at a rate of $0.375 per megawatt-hour (effective January 2010), approximately 38 cents per month for an average household using 1,000 kilowatt-hours per month

ERCOT successes

- A highly-reliable bulk electric system
- A successful wholesale market as evidenced by steady generation construction and consistently adequate reserve margins
- An ERCOT-led industry process that has enabled the construction of thousands of miles of transmission over the past ten years
- The most successful and competitive retail market in North America
- The successful integration of the most megawatts of renewable energy in the country
- An electric market that is widely recognized as one of the best in the country and that contributes to the continued economic prosperity of Texas

Key obstacles to continued success

- Staff attraction and retention and creating a pool of resources from which ERCOT can hire continue to be a challenge
- Attention should be focused on the creation of a long-term and comprehensive energy strategy that is agreed to by key constituencies
  - For instance, there is an ongoing need to balance two critical objectives: highly efficient markets and gold-standard reliability
- Federal and state policymaking bodies can have competing goals, which affect ERCOT operations and actions
- A significant learning curve exists as ERCOT learns to manage new energy sources
- Funding issues:
  - Pressure to keep the ERCOT fee low or stable while the organization is asked to implement cutting-edge energy technologies
  - Variability of electric usage (MWh), on which ERCOT fee is based

Opportunities for the future

- ERCOT is evolving from an entity entrusted with overseeing and ensuring a highly-reliable electric grid to an entity that also facilitates a market capable of responding to the pressures and opportunities of 21st century innovation and economic demands

- ERCOT's focus on Smart Grid initiatives such as advanced metering and increased Demand Response technology will benefit Texas consumers by giving them increased control over their electric usage and boost overall reliability

- ERCOT's move from an inefficient Zonal market to an advanced Nodal market will significantly increase market efficiency and contribute to the smarter use of the state's energy resources

- ERCOT's role in expanding energy efficiency and demand response will lead to a more deliberate use of the state's energy resources

- As ERCOT and Texas continue to be the national leaders in the integration of renewable resources, the state will continue to benefit from the introduction of cleaner energy sources, lower emissions and improved air quality

Major Policy Issues for ERCOT, Inc.

What role does ERCOT play in managing the wholesale electricity market, particularly with respect to wholesale prices, and how does this role mesh with ERCOT's duties to ensure that reliability is maintained?

- ERCOT was originally contemplated as an ISO that has the responsibility to maintain reliability but not to take a leadership role in designing wholesale market structures
- The market-design function was instead delegated to the stakeholder process
- An interesting complication is the difficulty in setting bright lines between market issues and reliability issues

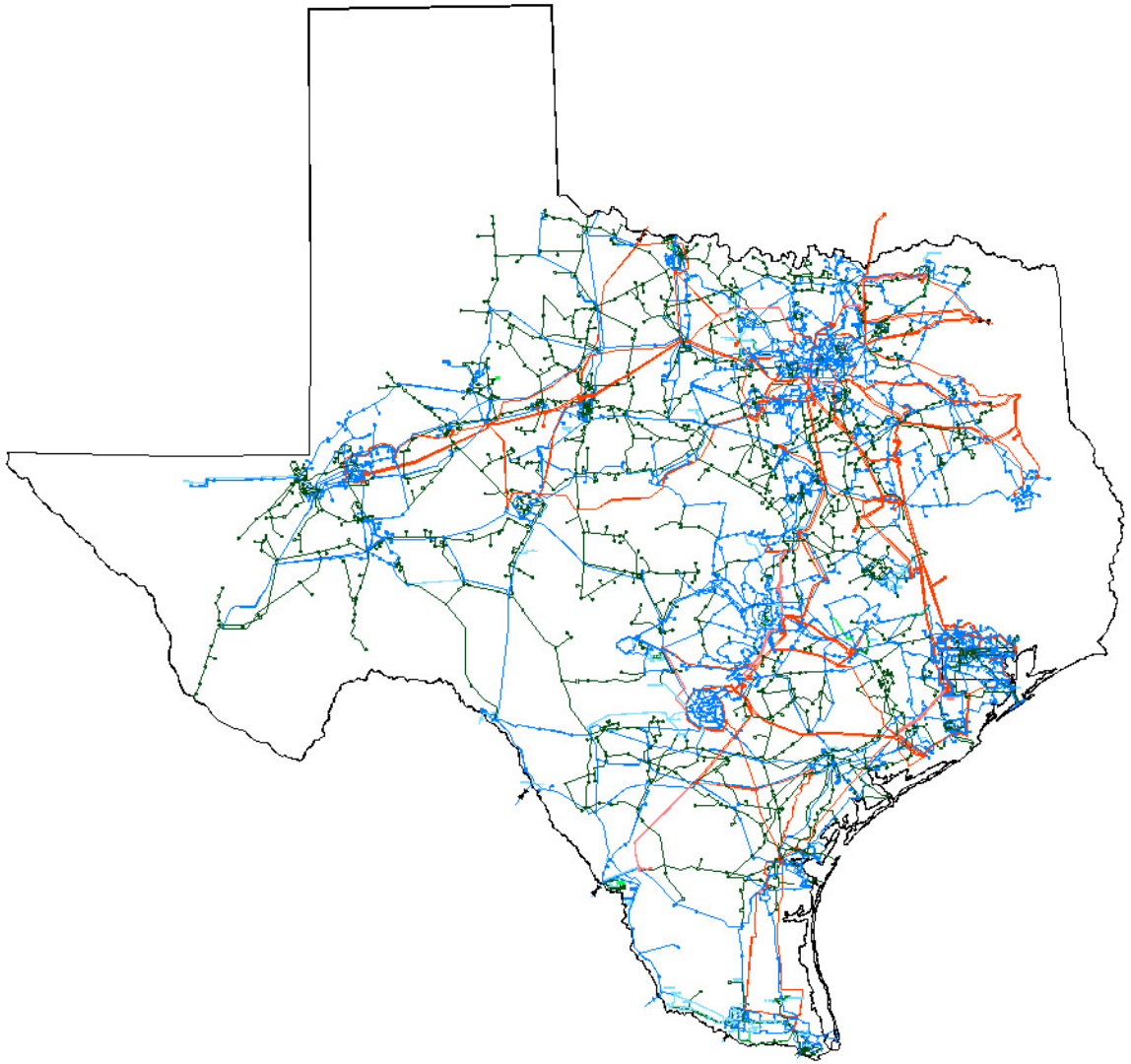
Issues in the ERCOT market

ERCOT market realities

- Growth in electric demand is expected to be minimal over the next two years and then rebound, resulting in an average annual growth of 2%
- Reserve margins appear to be steady
- Transmission construction and investment are still on the way up
- Planned wind generation appears to have slowed while awaiting completion of CREZ lines
- Natural gas prices are down (around $2/MMBtu when SB 7 was passed and hovering around $3-4/MMBtu today—off highs around $12 last year)

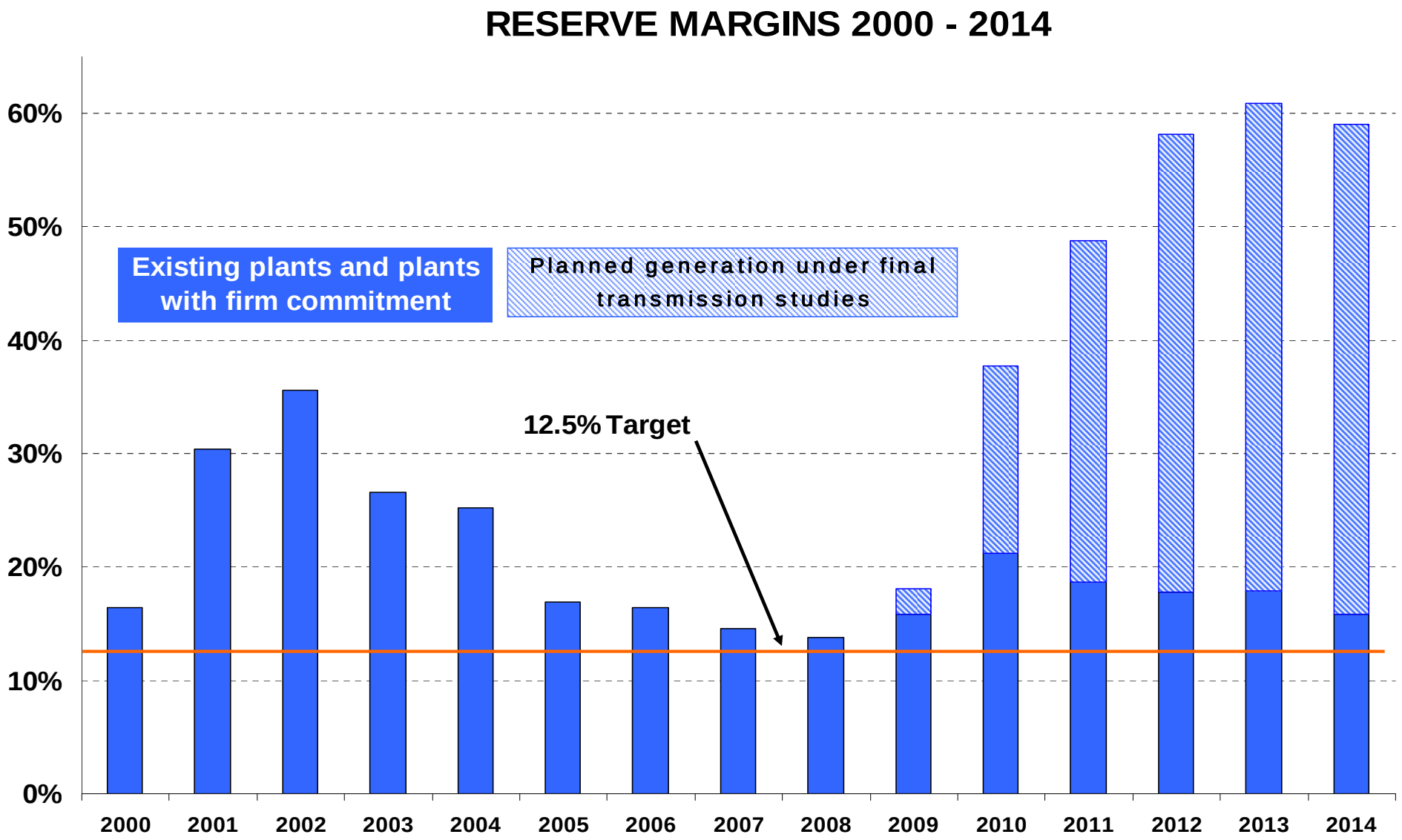
The ERCOT Transmission Grid

There are 40,327 Miles of Transmission Lines in Texas…

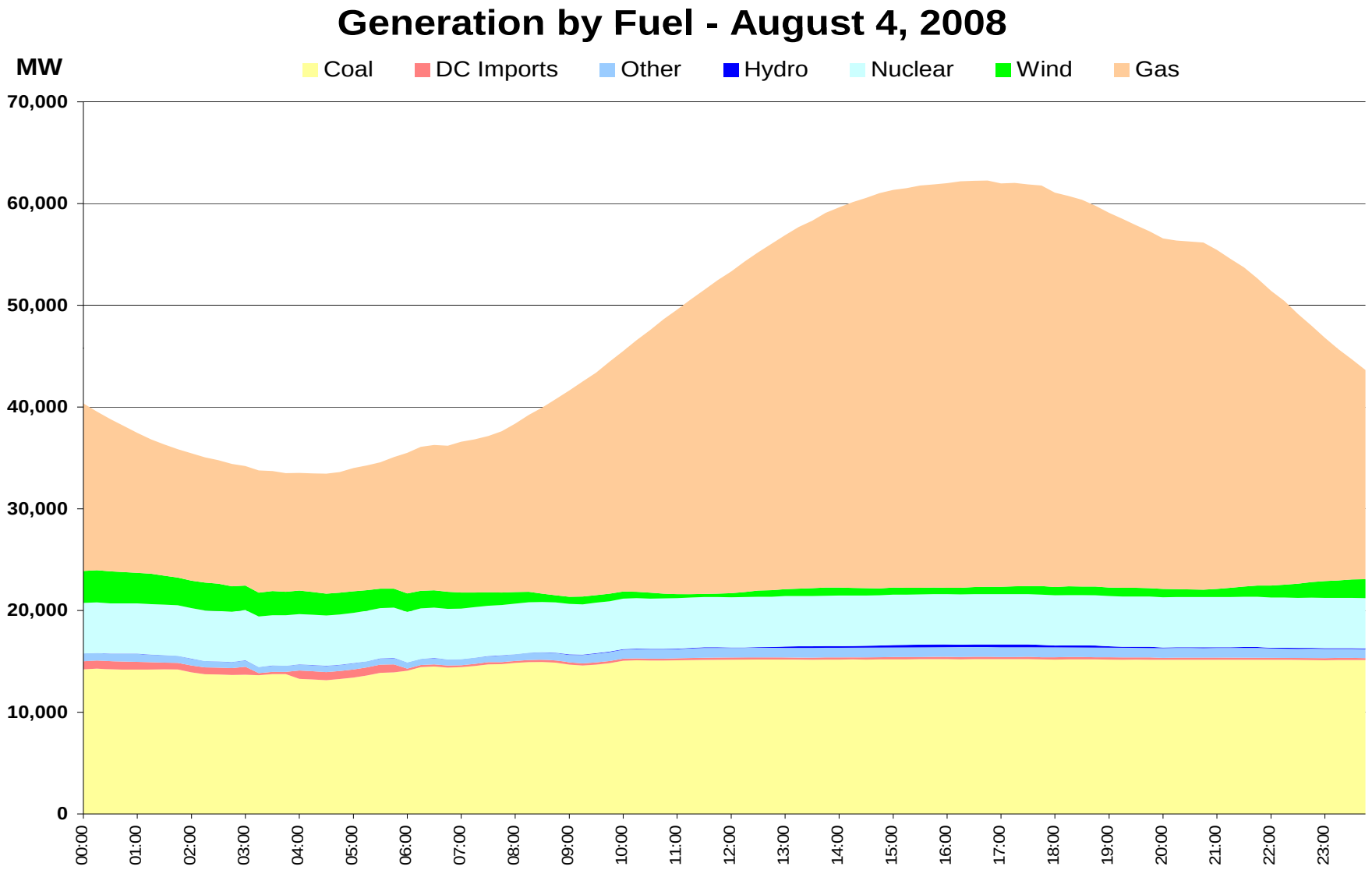


- 8,917 Miles of 345kV Lines
- 19,748 Miles of 138kV Lines
- 6,593 circuit miles of transmission built since 1999
- 2,888 circuit miles of transmission under study
- $4.4 b investment in transmission placed in service since 1999
- $3 b under development (independent of CREZ transmission)

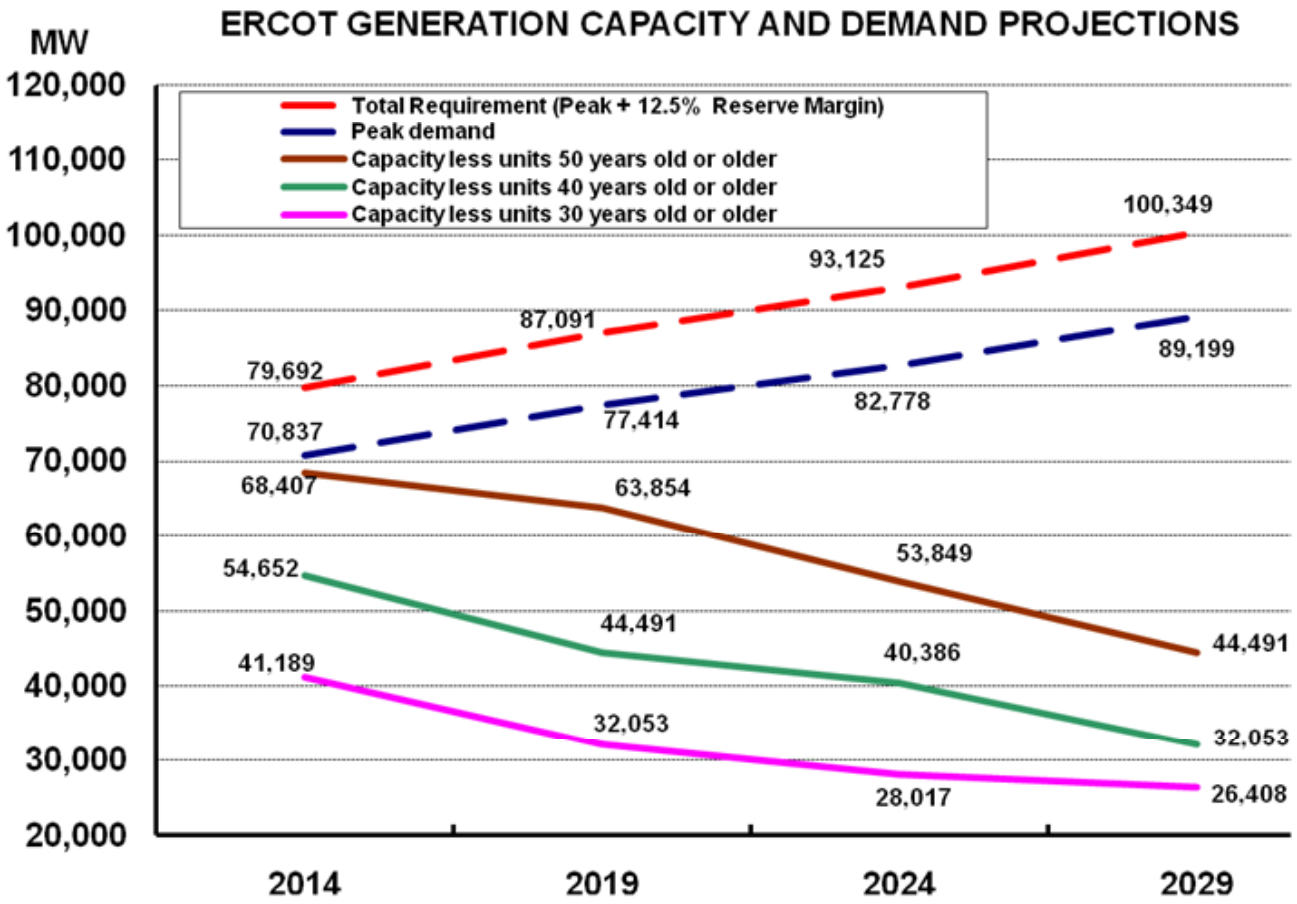
Generation reserves appear adequate through 2014



Summer Day Load Shape with Fuel Mix



Capacity and demand projections



ERCOT is currently tracking 224 active generation interconnection requests totaling over 79,000 MW

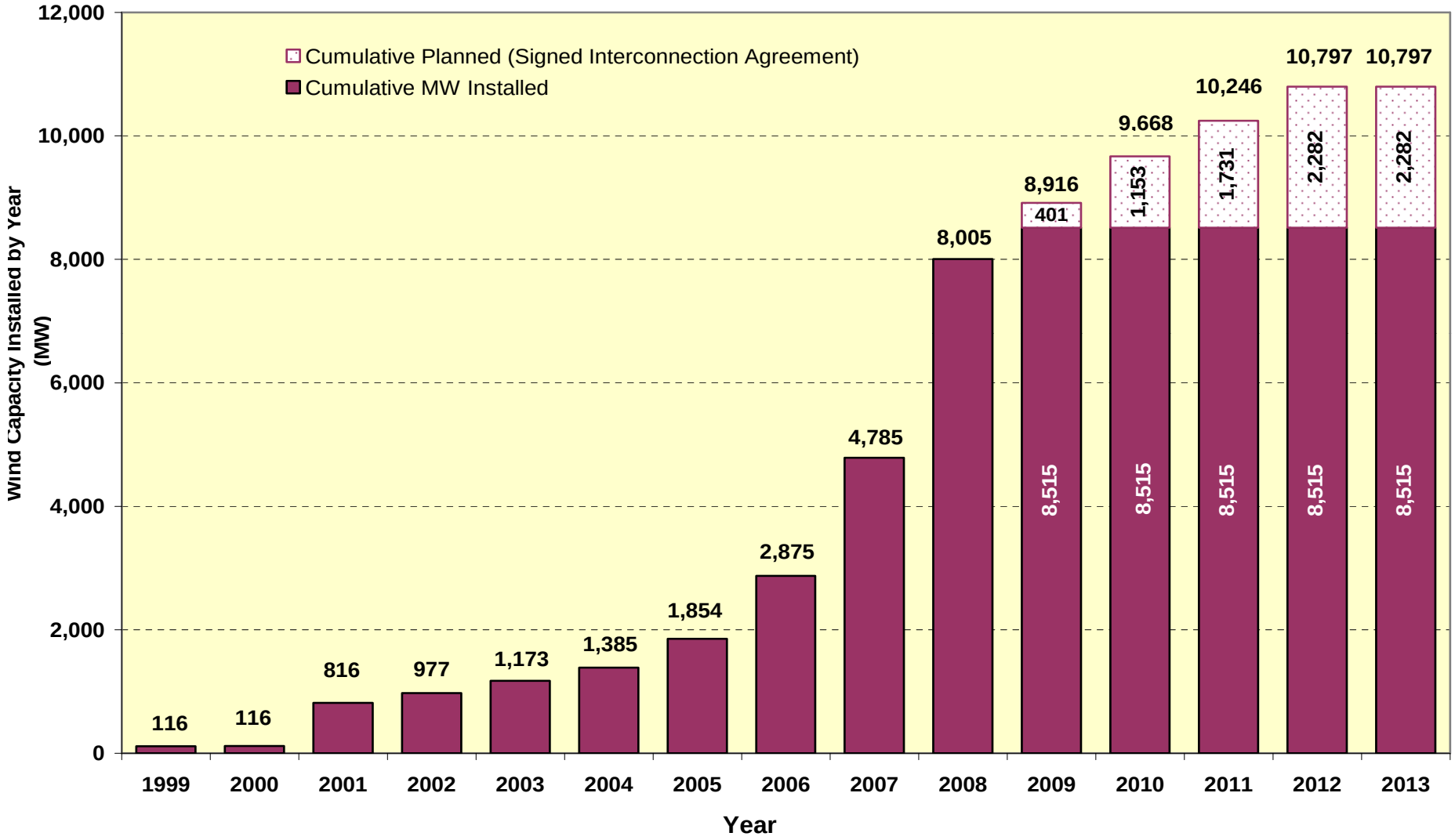
Fuel	Currently Installed (MW)	Under Review (MW)
Natural Gas	52,043	18,154
Nuclear	5,081	5,986
Coal	15,211	6,670
Wind	8,515	44,601
Hydro	442	0
Other	425	3,674
Totals	81,337	79,085

In ERCOT Today…

- **The Current Installed Wind Capacity is ~ 8,515 MW**
  This makes Texas the largest wind power jurisdiction in North America (passing California in 2006)

- **We're studying ~ 44,600 MW in additional wind interconnection development**
  Additional bulk transmission lines are already needed in West Texas (independent of CREZ generation)

ERCOT Renewable Generation – Wind

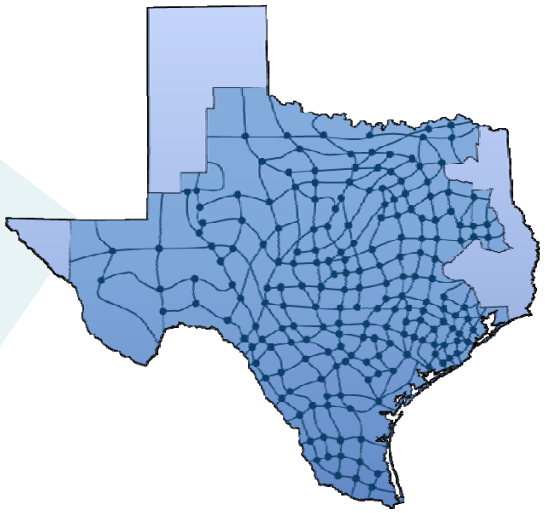


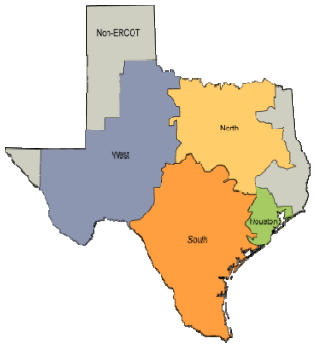
(as of September 30, 2009)

The transition from a Zonal to a Nodal market

Nodal Market

Zonal Market





The transition from a Zonal to a Nodal market

- **In September 2003, the Public Utility Commission (PUC) ordered ERCOT to develop a nodal wholesale market design, with the goal of improving market and operating efficiencies through more granular pricing and scheduling of energy services.**

- **In the nodal market, electric grid congestion and pricing information will be captured at more than 4,000 nodes, replacing the four congestion management zones in the current market. This change will allow ERCOT to:**

  - Directly assign congestion costs
  - Improve transparency of energy prices
  - Enhance reliability and increase market efficiency

Benefits of moving from a Zonal to a Nodal market

- **Improved price signals should encourage additional generation and/or transmission investment and construction in the most efficient locations**
- **More efficient dispatch of electric generation by calling on individual units to be brought online rather than a group of resources (portfolios)**
- **Improved ability to anticipate system conditions to reduce local congestion**
- **Ability to assign local congestion to the resource causing the congestion**

On the Horizon

- Nodal “Go Live”
- Wind integration continues to be a challenge for ERCOT grid operators
- To keep pace with the state’s growth, more than 20,000 MW of new generation may need to be added over the next fifteen years. ERCOT’s duty is to inform policymakers of the need for increased generation resources or increased energy efficiency measures, but it is ultimately up to market participants to put steel in the ground.
- Reducing the ERCOT market’s reliance on natural gas capacity would have positive implications for reliability and price volatility
- Advanced metering implementation

Questions?