Transmission Development in Texas

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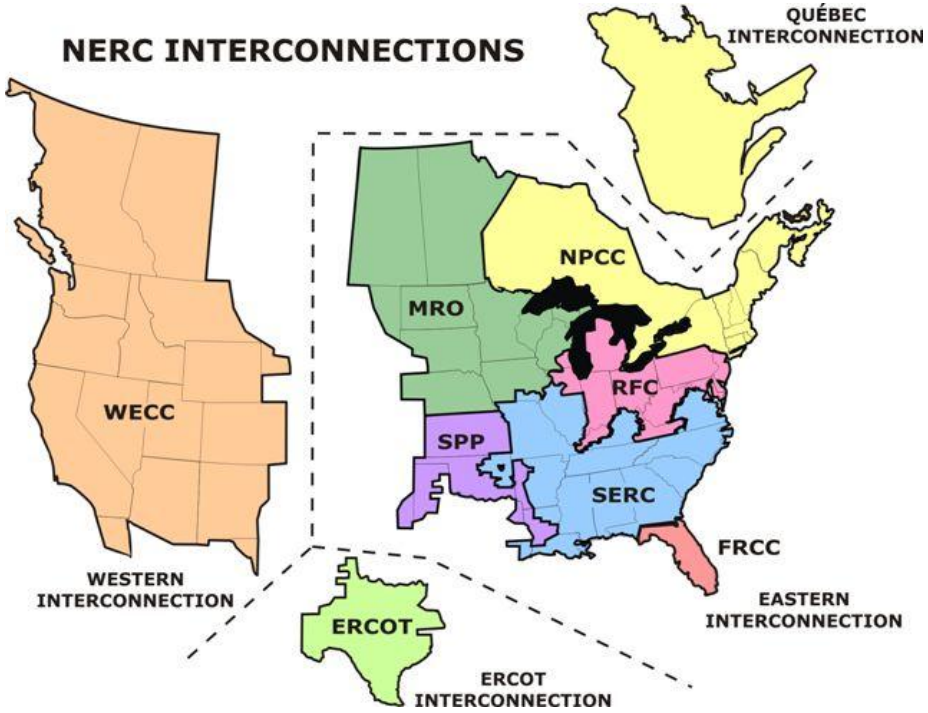
The ERCOT Region

The interconnected electrical system serving most of the state of Texas, which has only Direct Current (DC) limited interconnections to the rest of North America

- 85% of Texas load
- 68,294 MW peak demand (set August 3, 2011)
- More than 40,000 miles of transmission lines
- 2 DC ties with eastern United States; 3 DC ties with Mexico; 1106 MW total
- 550+ generation units



ERCOT Independent System Operator (ISO)

ERCOT Inc.:

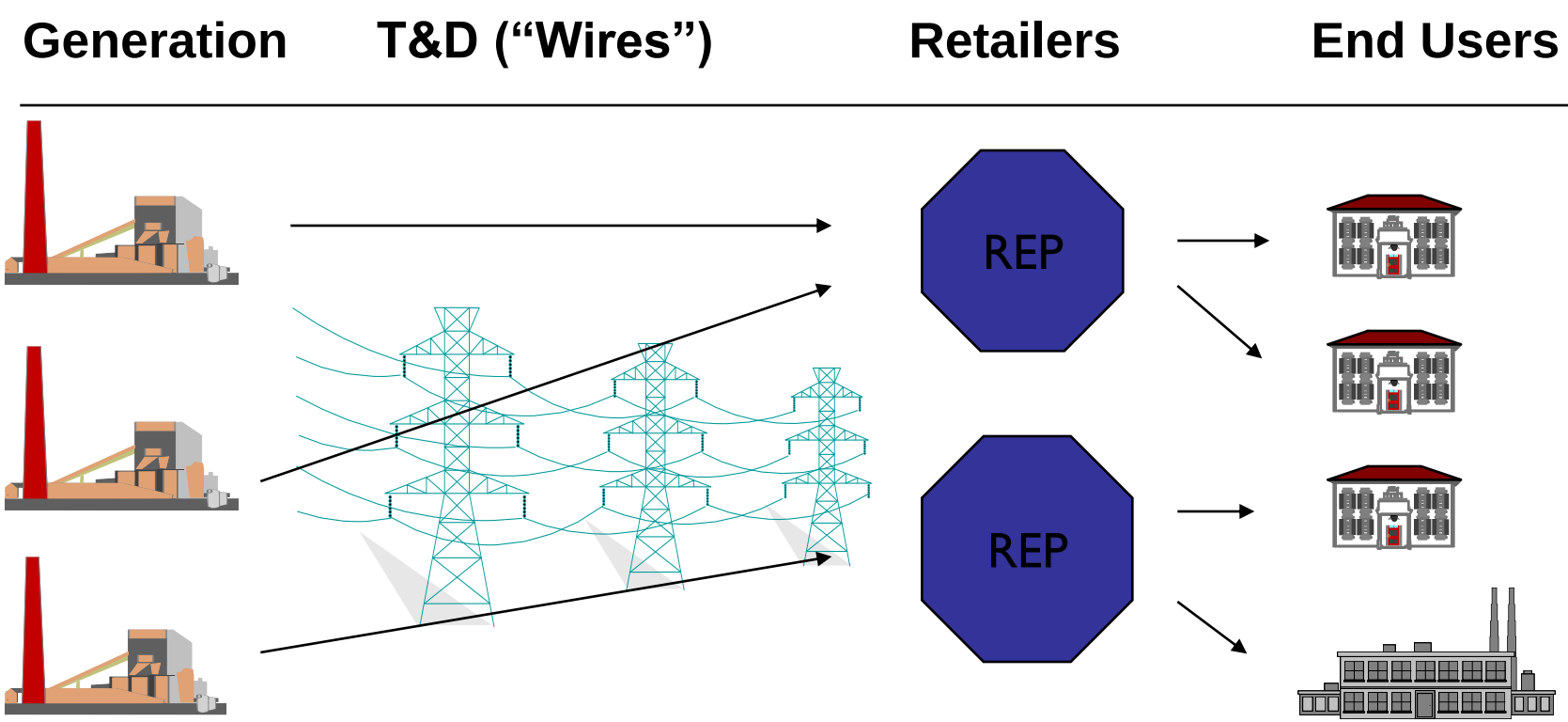
A non-profit corporation designated the "Independent Organization" under state law and assigned these responsibilities [Texas Public Utility Regulatory Act (PURA) 39.151]:

- Maintaining System Reliability
- Ensuring Open Access to Transmission
- Facilitating the Competitive Wholesale Market
- Facilitating the Competitive Retail Market

Regulatory Characteristics:

- ERCOT is regulated by the Texas Public Utility Commission with oversight by the Texas Legislature
- ERCOT is not a market participant and does not own generation or transmission/distribution wires

Texas Competitive Model



Competitive Production

Regulated Open Access

Competitive Sales

ERCOT Markets

Wholesale

- Fully unbundled Wholesale market
  - ERCOT operates a single Balancing Area
  - 5-Minute security constrained economic dispatch with day-ahead and ancillary services markets
  - Generators are paid Locational Marginal Prices (LMPs) at node
  - Load-serving entities pay averaged load-zone prices
- Transmission
  - All transmission costs rolled-in to single postage-stamp rate paid by load
  - Any transmission owner who transmits power for another entity is a regulated utility under state law
  - No transmission service market

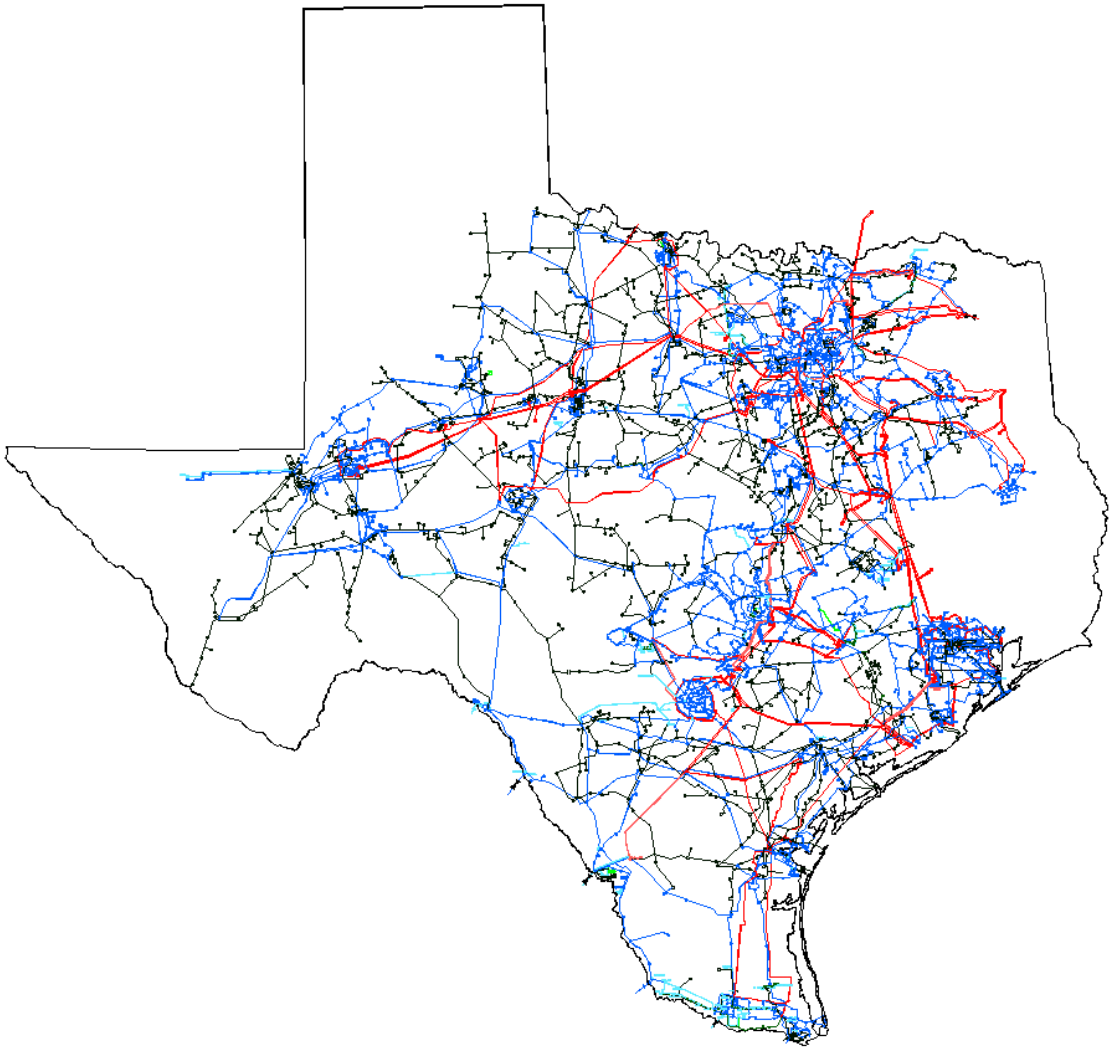
Retail

- Full Retail competition for all customer types
  - Except in municipal and cooperative utility areas
  - Customers choose retail provider and terms of contract
- Smart meters (which measure time of consumption) installed on all customer types – over 6 million meters

“Normal” Transmission Planning and Development

ERCOT Region Continues to Add Significant Transmission

- **40,500 Miles of Transmission Lines in ERCOT**



9,249 miles of 345 kV

19,565 miles of 138 kV

>9,500 circuit miles of transmission (>60kV) built since 1999

~6,700 circuit miles of transmission under study

$7.4 billion investment in transmission placed in service since 1999

~$9 billion under development (including CREZ transmission)

Evolution of Regional Transmission Planning

- **ERCOT has coordinated region-wide planning since ~2001**
- **Regional Planning process has evolved/improved over time**
  - Initially, coordination and communication of Transmission Owner (TO) plans; some joint studies
  - In 2003, formalized Regional Planning process
    - Began ERCOT Independent Reviews and endorsement of proposed projects
  - First major “economics-driven” transmission project endorsed in 2005
  - In 2006, began comprehensive annual plan development and biennial, scenario-based long-term plan assessment

Regional Planning Framework

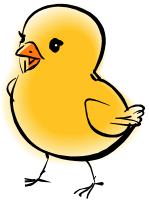
Coordinated 5-Yr. Transmission Plan	Long-Term System Assessment
•Annual study of transmission needs of ERCOT system over next five years •Projects identified by ERCOT in coordination with TOs with comment from stakeholders •Projects included to meet all identified reliability requirements and congestion reduction projects that meet economic criteria •Local and already-Reviewed projects are included without review	•Study of long-term transmission needs of ERCOT system •Includes scenario-based analysis of future resource investment by market participants and resulting transmission system needs •Produced in even years and re-evaluated annually •Provides directional vision to near-term decisions with goal of long-term efficiency in transmission plans
Transmission Owner Plans	**Individual Project Reviews**
• Projects developed by each transmission owner • Generally include projects that are “Local” (<$15M) or “Neutral” • Included in Steady-State Working Group (SSWG) powerflow cases	• Additional projects or studies can be proposed by any Market Participant, Transmission Owner or ERCOT Staff • Individual projects included in 5-Yr. Transm. Plan also reviewed at appropriate time

ERCOT Transmission Development Process

- **Project Need Identified**
  - Either through Five-Year Plan Development Process or Stakeholder Proposal
- **RPG Review of Project**
  - Open RPG(stakeholder) comment period for all non-trivial projects
  - Level of RPG review depends on size of project; Independent Review by ERCOT Staff and ERCOT Board Endorsement for large Projects
  - Rule-based assignment of Project Developer
- **Project Developer responsible for line engineering and routing studies**
- **PUCT determines Need and Routing for lines on new-right of way, through filing by project developer**
  - ERCOT recommendation given “great weight” by PUCT in determining Need
- **Cost recovery through annual transmission rate base adjustment; postage stamp rates paid by loads**

Competitive Renewable Energy Zones Program

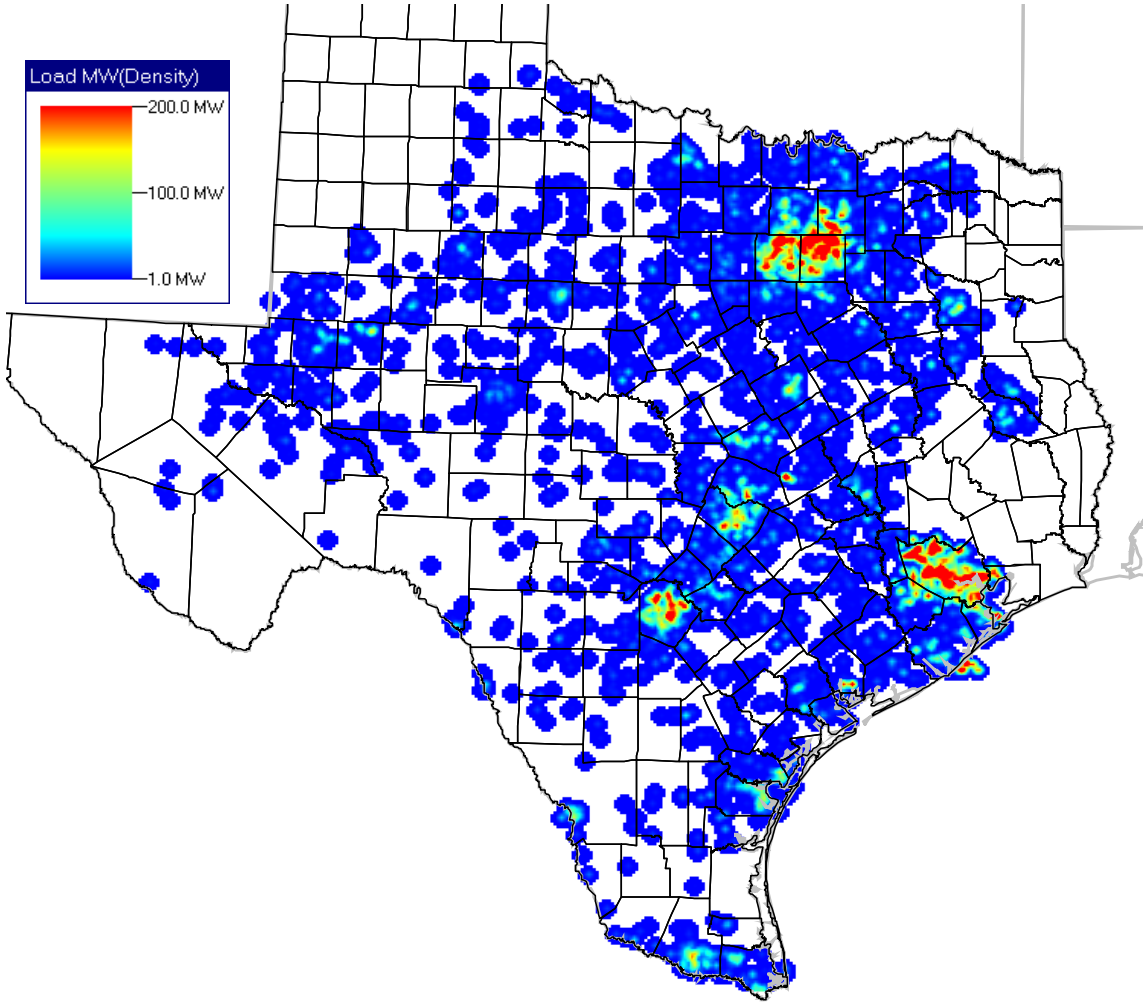
Competitive Renewable Energy Zones Legislation



- **By 2004, had a Chicken versus Egg Problem with wind development and transmission**
  - Transmission Service Providers (TSPs) needed assurance that transmission would be used and useful
  - To develop transmission project and file CCN, TSPs wanted interconnection agreements, backed by security from wind developer
  - Wind developers were unwilling to commit security for 4-7 years needed to complete new transmission with no guarantee

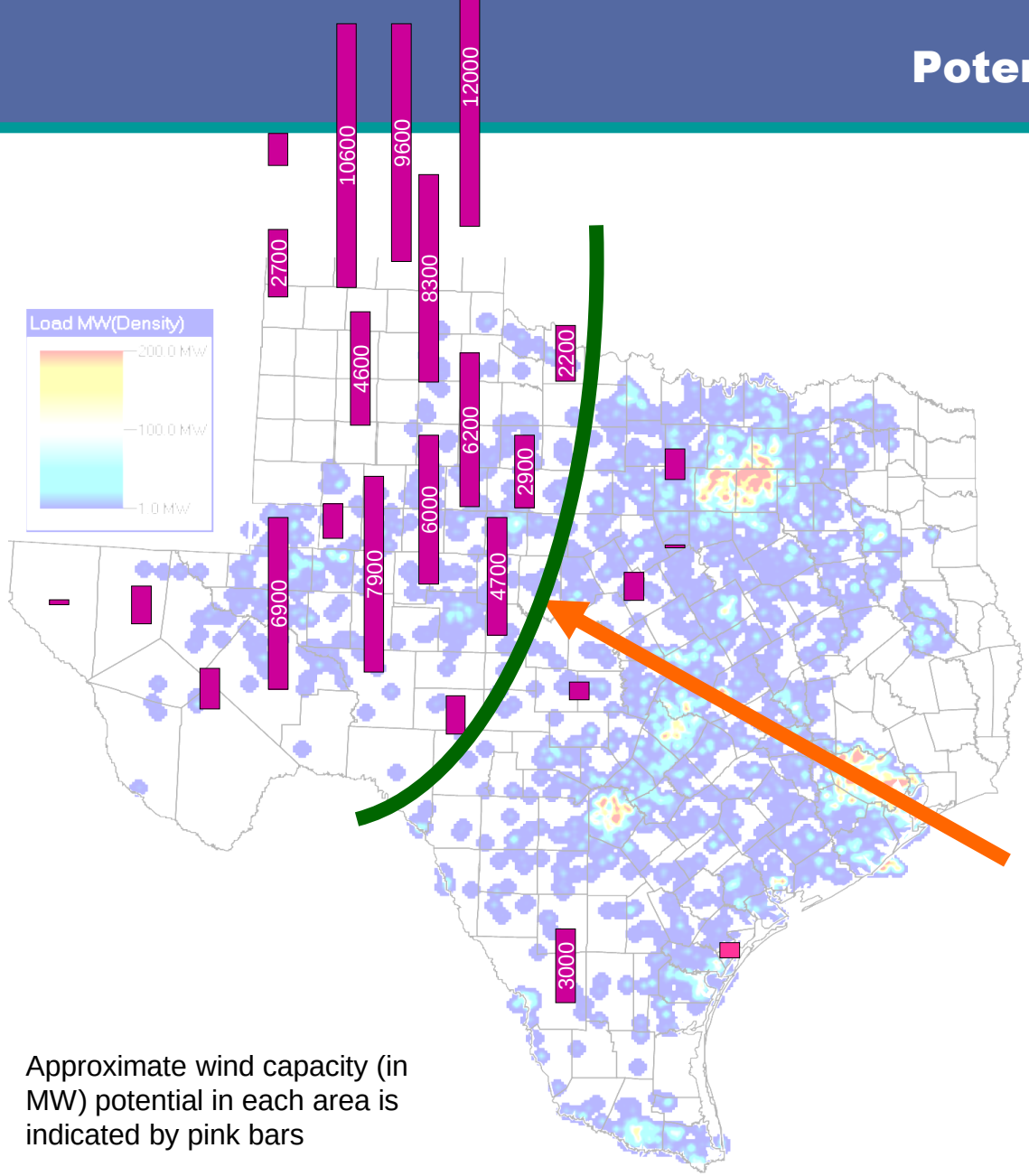
- **In 2005, Texas Legislature directed the Public Utility Commission of Texas (PUCT), after consultation with ERCOT, to:**
  - Designate areas with sufficient renewable resource potential (CREZs)
    - Consider level of financial commitment by developers
  - Develop a plan for transmission to deliver renewable resource to consumers

ERCOT Load



- **~62,000 MW peak demand (2007)**
- **Majority of load is concentrated in eastern half of state**

Potential Wind Resource



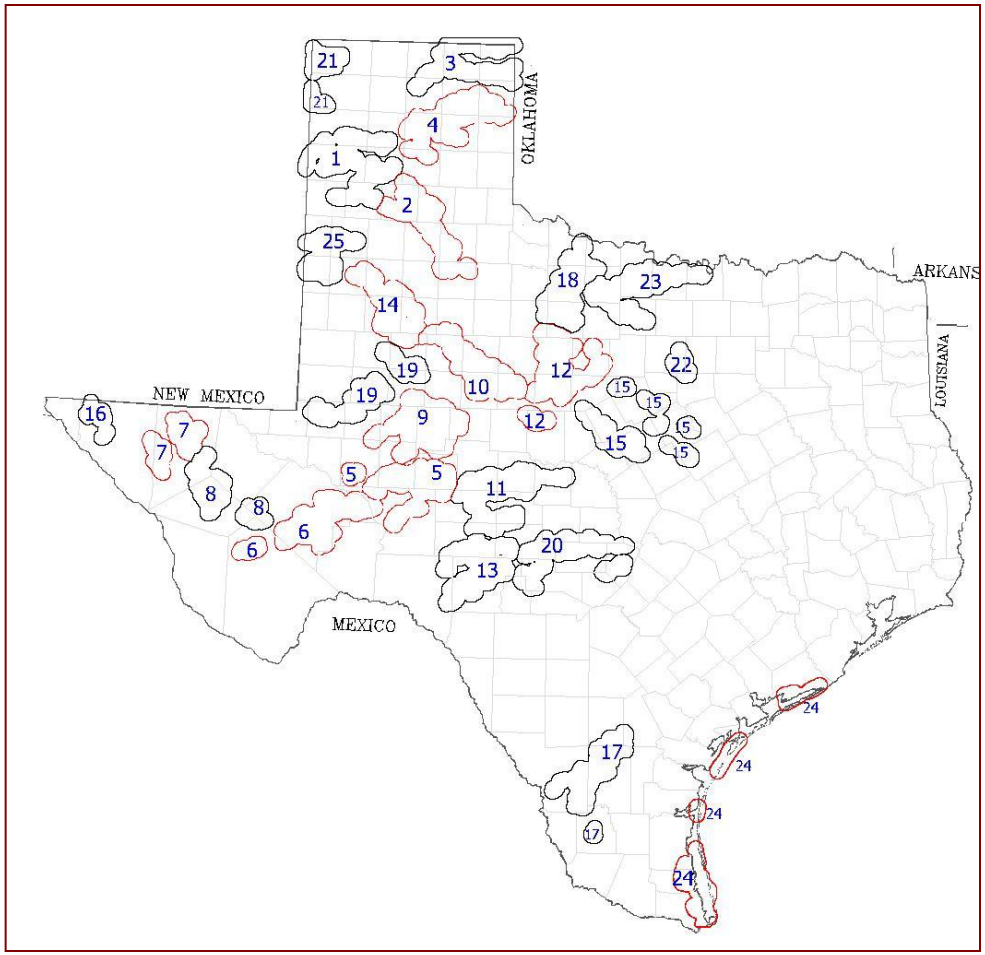
Approximate wind capacity (in MW) potential in each area is indicated by pink bars

- **Nearly 100,000 MW above 35% capacity factor (CF)**
- **Concentrated in western half of state**

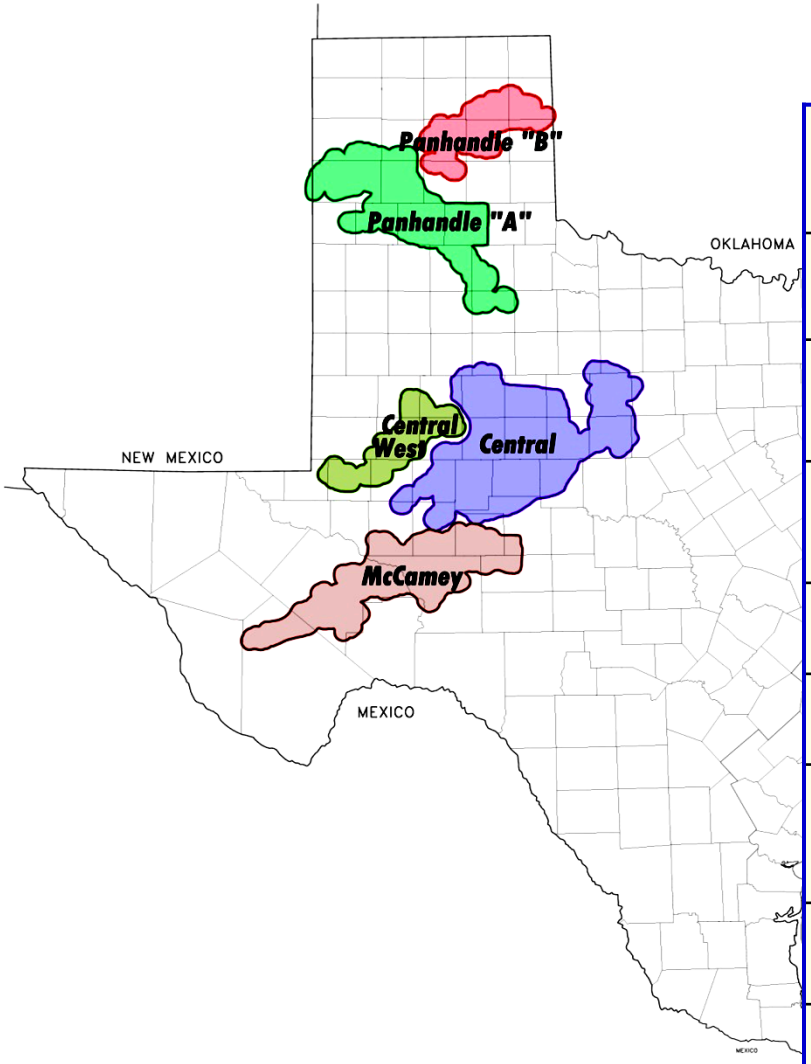
Limited Transmission

ERCOT CREZ Study

- **ERCOT led study during 2006 to support PUCT determination**
  - Hired wind modeling consultant to identify best wind resource sites and provide expected characteristics of wind generation
  - Developed initial transmission plans through open stakeholder process to accommodate many of the potential zones in various combinations
  - Filed results with PUCT in December 2006

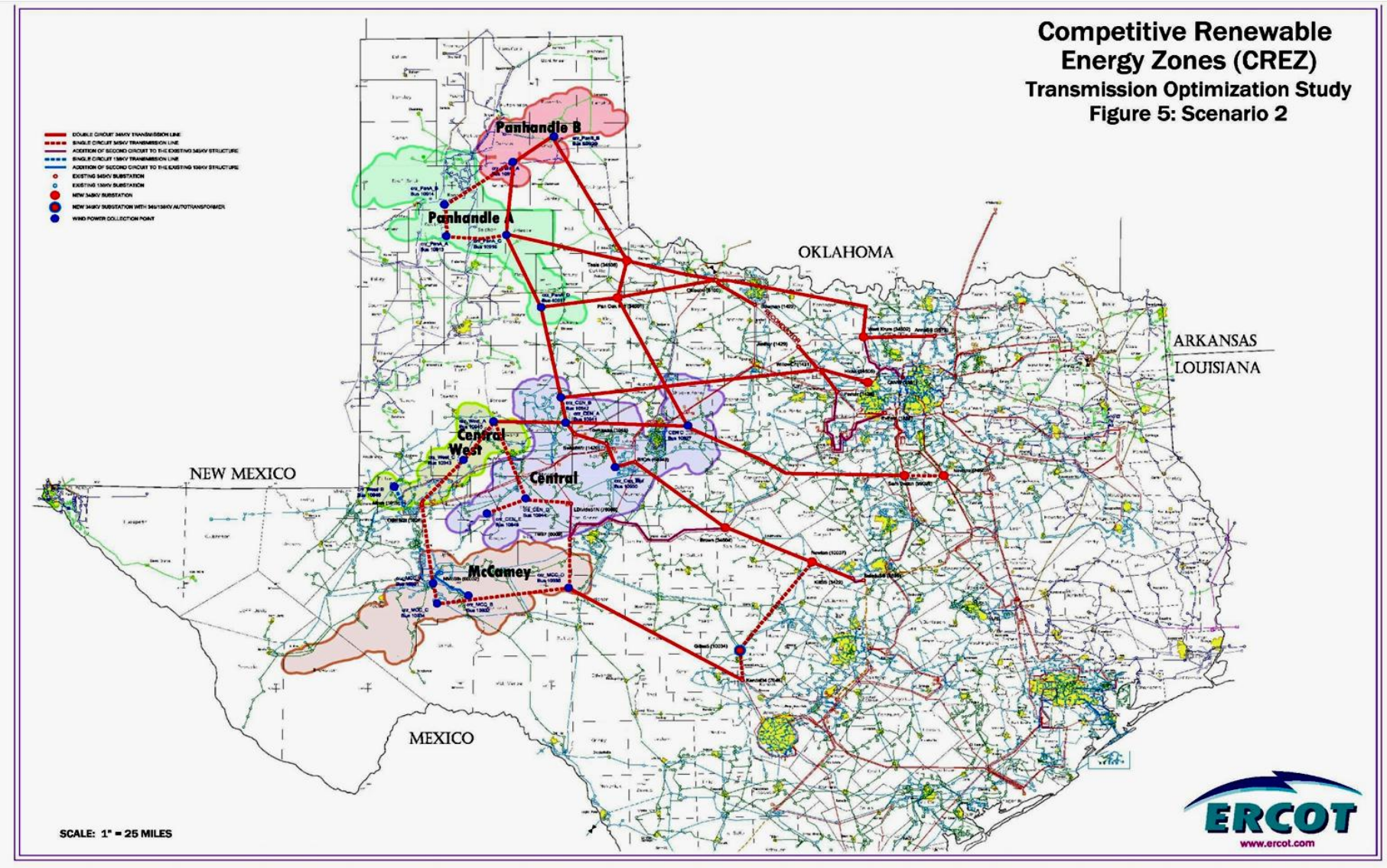


Designated Zones and Scenario Wind Levels



Capacity of New CREZ Wind by Scenario (MW)				
Wind Zone	**Scen. 1**	**Scen. 2**	**Scen. 3**	**Scen. 4**
Panhandle A	**1,422**	**3,191**	**4,960**	**6,660**
Panhandle B	**1,067**	**2,393**	**3,720**	**0**
McCamey	**829**	**1,859**	**2,890**	**3,190**
Central	**1,358**	**3,047**	**4,735**	**5,615**
Central West	**474**	**1,063**	**1,651**	**2,051**
Total*	**12,053**	**18,456**	**24,859**	**24,419**
* Assumes 6,903 MW of existing wind capacity				

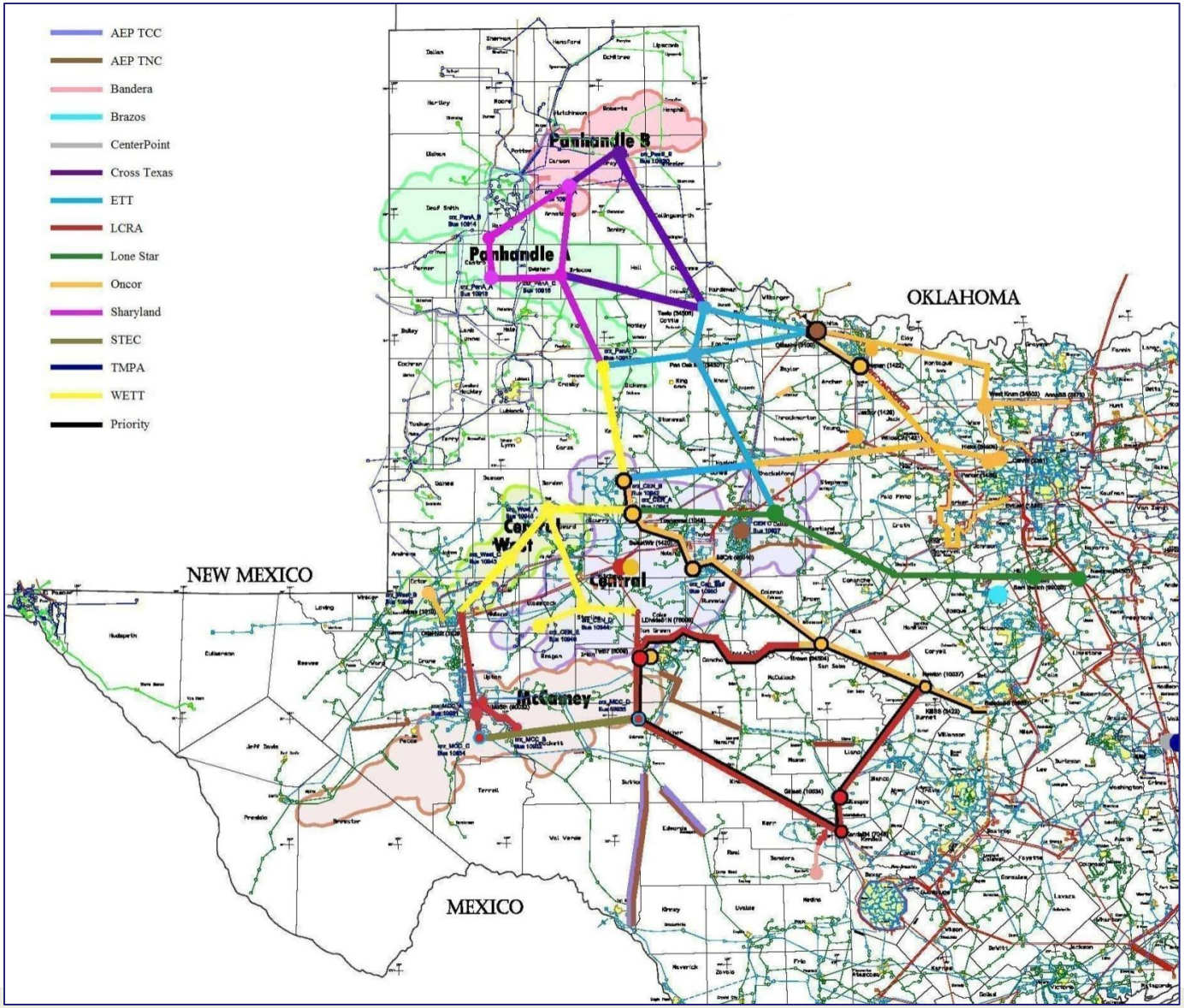
CREZ Transmission Plan



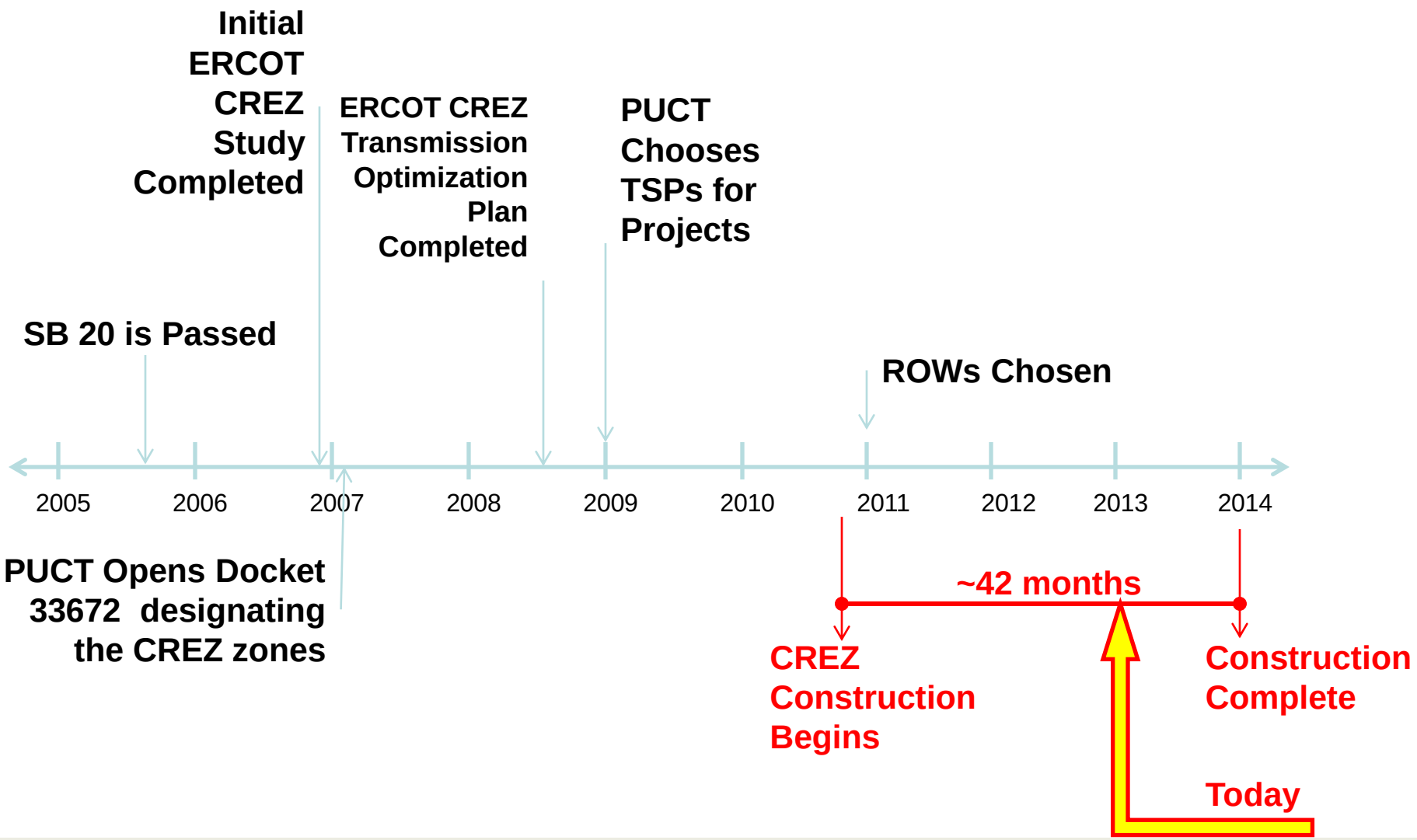
Transmission Provider Selection

- **PUCT solicits transmission developer interest**
  - Portion of the CREZ Plan of interest
  - Financial and Project Management Capabilities
- **Contested case hearings are held by PUCT**
  - All but one of the proposing companies are selected for a portion of the Plan, determined by PUCT
  - Incumbents, existing utilities expanding into new area, new entities
- **Selected transmission developers begin engineering, routing and certification filings**
  - Line Certification filings at PUCT are made according to a schedule established based on expected time to develop projects

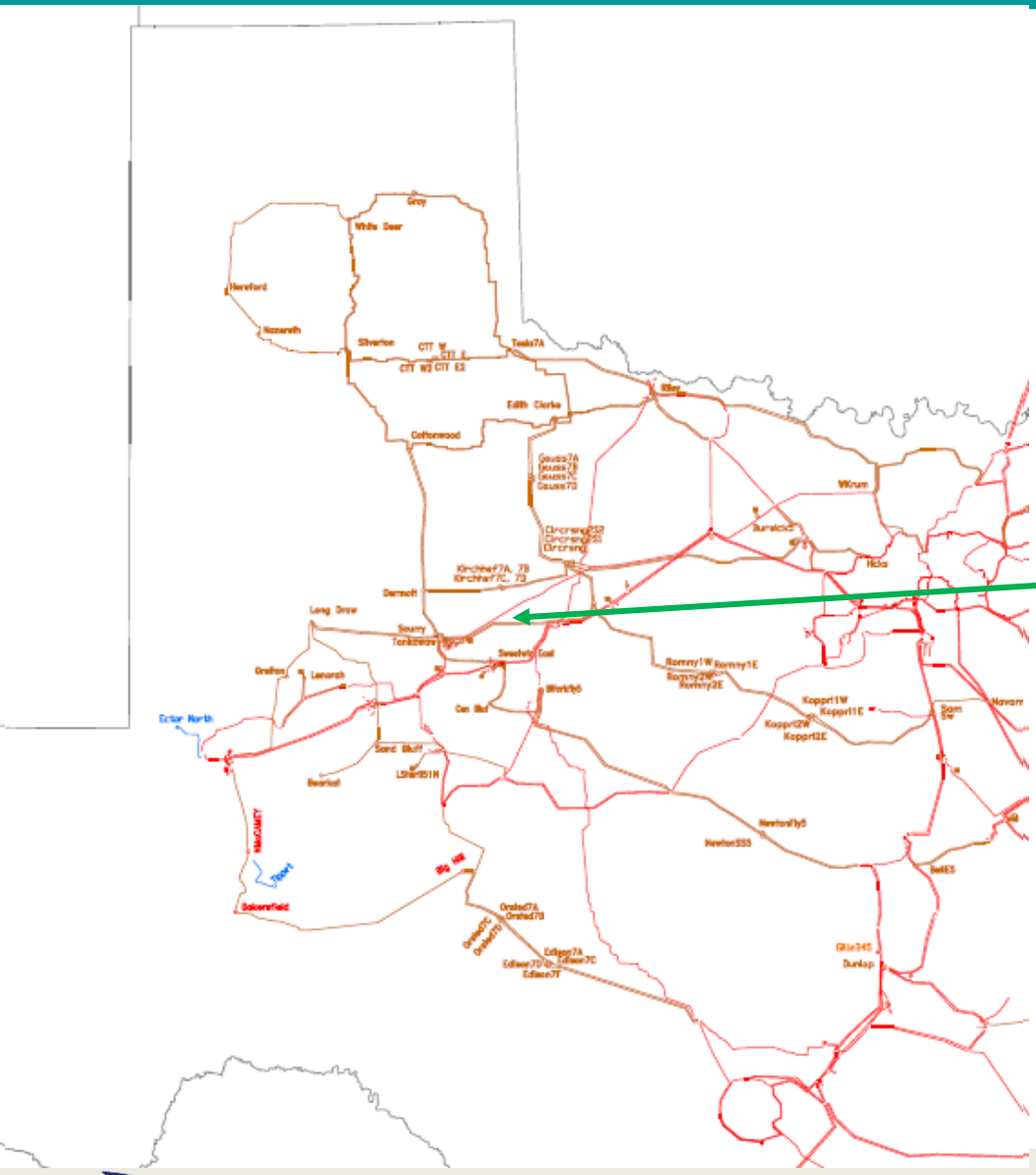
Transmission Developer Selection



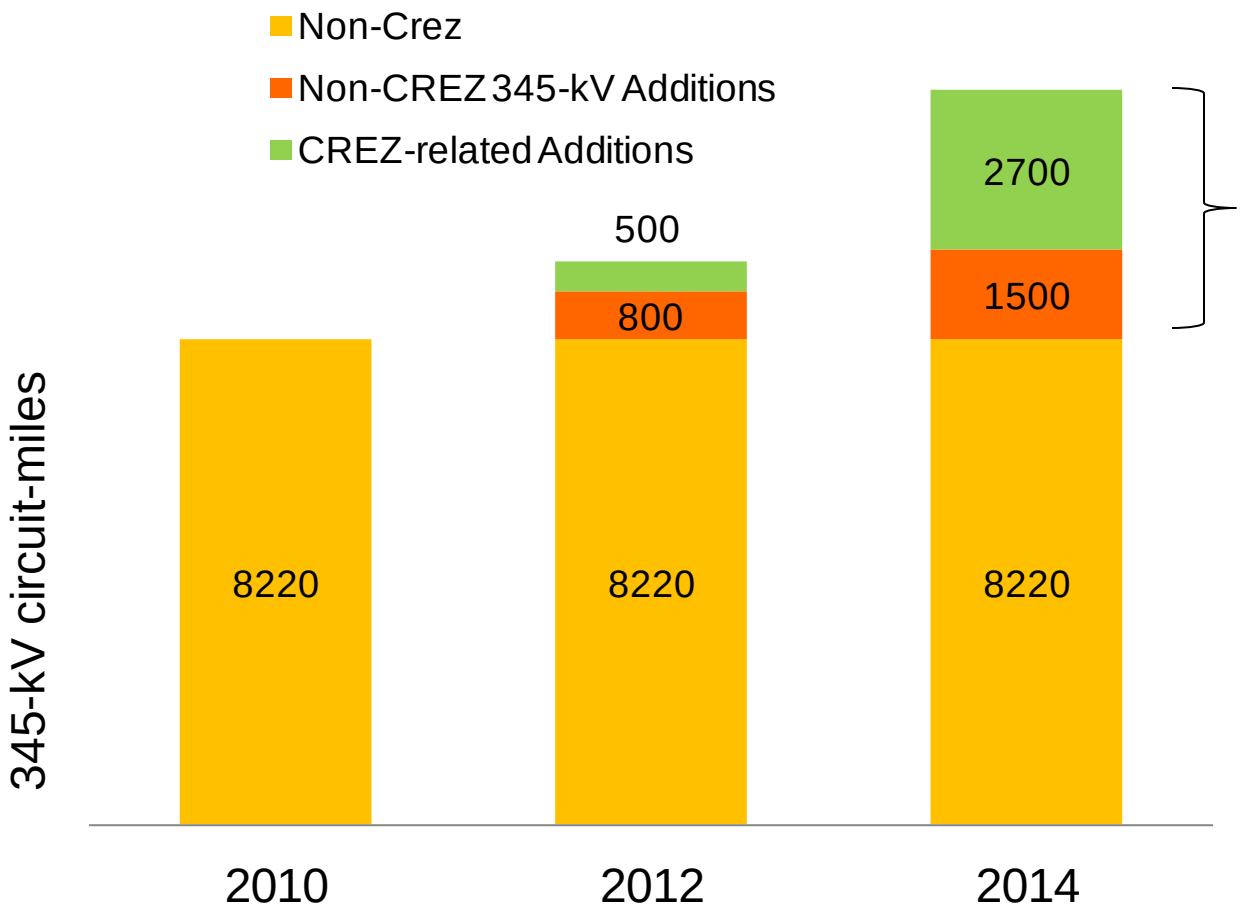
CREZ Timeline



CREZ Transmission

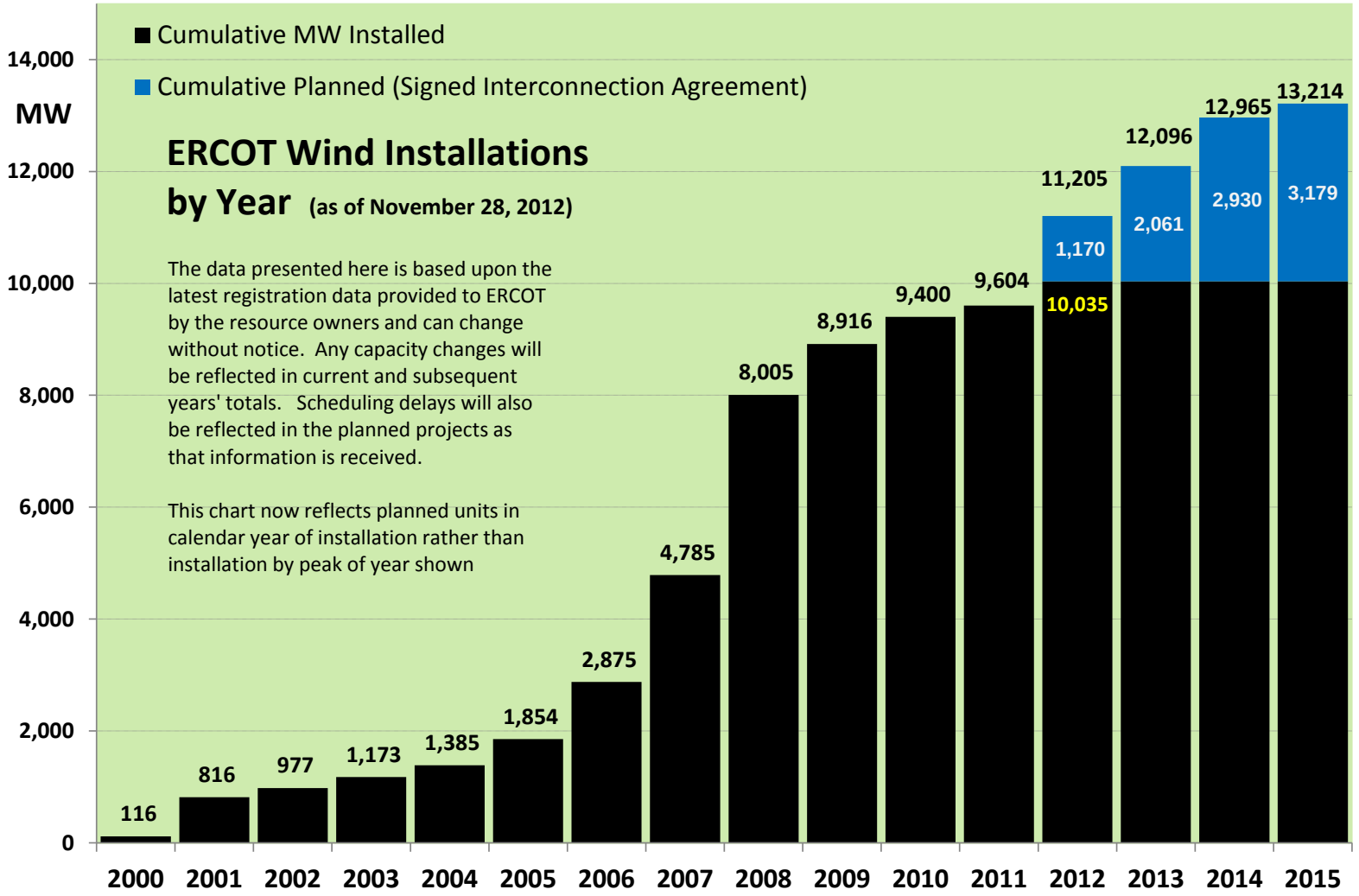


345-kV Circuit Mile Additions

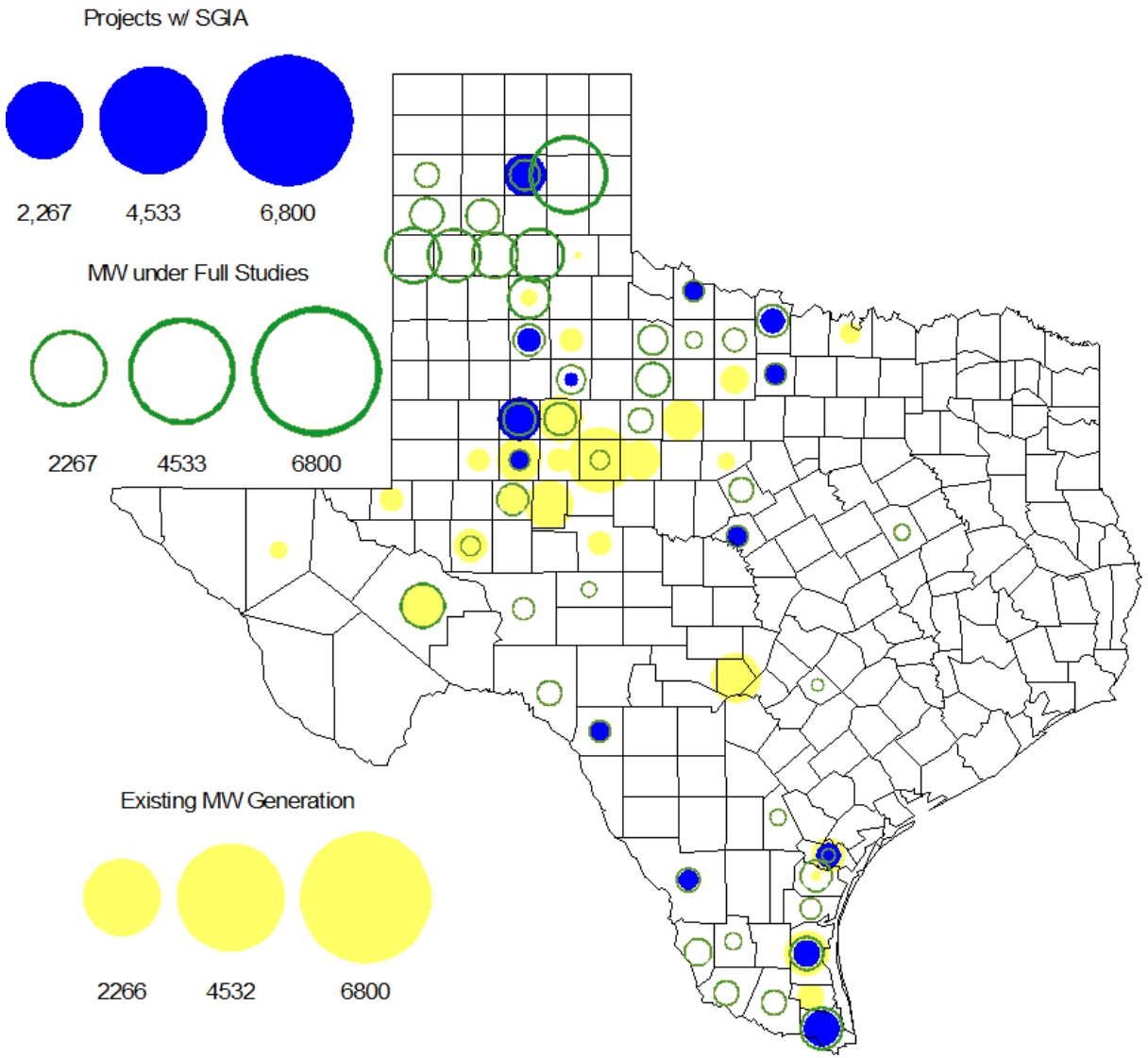


Using 2010 as a base, an increase of 50% by end of this year

Increase in Installed Wind Generation



Location of Interconnection Requests – Dec. 2012



Questions?