

FOCUS POINT

RELIABILITY. EFFICIENCY. INNOVATION.



2013 State of
the Grid Report

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The ERCOT Board of Directors
March 19, 2013

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(independent generator)

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The Electric Reliability Council of Texas (ERCOT) manages the flow of electric power to more than 23 million Texas customers — representing 85 percent of the state's electric load. As the independent system operator for the region, ERCOT schedules power on an electric grid that connects more than 41,500 miles of transmission lines and more than 550 generation units. ERCOT also performs financial settlement for the competitive wholesale bulk-power market and administers retail switching for 6.7 million premises in competitive choice areas. ERCOT is a membership-based 501(c)(4) nonprofit corporation, governed by a board of directors and subject to oversight by the Public Utility Commission of Texas (PUC) and the Texas Legislature. ERCOT's members include consumers, cooperatives, generators, power marketers, retail electric providers, investor-owned electric utilities (transmission and distribution providers), and municipally owned electric utilities.

* as of January 2014

Focus point: A reliable, efficient and innovative power grid

Message from leaders

ERCOT in 2013 continued to operate reliably, keeping electricity flowing through the grid to power the homes and businesses that make up the Texas economy in the region we serve.

That economy continues to perform well, and electric demand and energy use also are growing at a steady rate. With policymakers focused on the larger debate about future resource adequacy, ERCOT continues to evaluate and report on current and future conditions while developing tools to support reliability by balancing energy supply and demand and encouraging appropriate market responses to varying grid conditions. Together with the Public Utility Commission of Texas (PUC), we will continue to evaluate the impacts of future growth and the best approach to keep up with increasing electric demand.

To ensure we have the appropriate framework and are focused on the right priorities, the ERCOT Board of Directors this past year developed a thorough Strategic Plan for the organization, which identifies four pillars that define our success: Operational Reliability, Flexible Market Design, Data Transparency and Access, and Committee Strategic Alignment. Staff and stakeholder committees will use the plan as the basis for their own priorities and action items for 2014.

A notable accomplishment in the ERCOT region this past year was completion of the Competitive Renewable Energy Zones (CREZ) project. The transmission providers that developed this high-voltage transmission network to move wind power — and other generation — from West Texas and the Panhandle to more populated areas of the ERCOT region overcame a number of challenges to complete the project on the schedule identified by the PUC.

In the year ahead, ERCOT will continue to focus on its main point — reliability — while applying innovation to ensure the market operates efficiently for the benefit of all who rely on it.



Trip Doggett,
President and Chief Executive Officer



Craven Crowell,
Chairman, Board of Directors

Focus on reliability

ERCOT's mission begins and ends with electric reliability. More than 23 million Texans — from the southern Panhandle region to the Gulf Coast, the East Texas pines to the West Texas oilfields — depend on the ERCOT grid for reliable power, every hour of every day.

ERCOT is one of three electricity interconnections in North America. For the most part, it operates separately from the Eastern and Western Interconnections, with limited connectivity through direct-current ties that allow small power transfers to and from other U.S. grids and Mexico.

This relative isolation from other power grids means the resources and infrastructure that provide power for most of Texas are developed and managed within this grid.



Looking ahead

“Keeping the lights on” — a common mantra for all independent system operators — begins with careful planning.

ERCOT experts continually evaluate and forecast changes in technology, regulations and other factors that affect the generation, transmission and consumption of electric power, both in the long-term outlook and on a daily — and even hourly — basis.

Because the system must be ready to serve the highest period of consumption, planners continually consider future peak demand needs and evaluate what generation and transmission will be necessary to serve ever-growing demand in Texas cities and other centers of economic activity. The 10- and 20-year outlook can change over time, so long-term planning is an ongoing process.

Transmission planners work with market participants to develop a Long-Term System Assessment every other year. This long-term study evaluates several possible scenarios that could affect future transmission needs at key locations within the ERCOT grid. Each year, an Electric System Constraints and Needs Report provides a five-year outlook for project priorities.

On the generation side, a Capacity, Demand and Reserves (CDR) report provides a 10-year outlook for anticipated peak demand, based on average weather trends, and assesses the anticipated reserve margin from the amount of generation that is expected to be available. A Seasonal Assessment of Resource Adequacy (SARA) considers the seasonal weather forecast and any changes to the generation outlook.

These studies also continue to assess the potential impact of an extended Texas drought on near-term electric power production and long-term impacts of water availability on how and where electricity will be produced.

Meanwhile, daily reliability requires ongoing awareness and flexibility, and daily forecasts are updated hourly to ensure sufficient generation and reserve resources are on-line and ready to send power to the grid as consumer needs fluctuate throughout the day and night.



Focus on reliability

Around-the-clock readiness

The nerve center of day-to-day grid operations is the ERCOT control room. Here, well-trained operators make decisions, around the clock, that are critical to the ongoing balance of electricity supply and demand.

That may mean dispatching additional generation and load resources when a unit trips, redirecting power flows when a transmission line is overloaded, or notifying the public when conservation measures are needed to protect the grid and maintain system frequency. When things are going smoothly, this work is mostly routine and invisible to the outside world. But when reliability is threatened, they are the heroes on the front lines, with the knowledge, skills and authority to make the decisions and take well-defined measures to prevent potential disruptions.

Each operator has a specific role in maintaining reliability. Effective communication and cutting-edge technology help operators coordinate the interaction between the electric market and the grid that carries electricity from power plants and other generation sources to the distribution systems that deliver that power to homes and businesses.

Control room desks

Transmission and Security:	Ensure the transmission system is operating safely and reliably.
Real-Time:	Ensure generation resources are fulfilling obligations, maintain frequency at 60 Hz.
Resource Operator:	Ensure enough generation is flowing into the grid.
Reliability Unit Commitment:	Monitor and adjust generation to protect reliability.
D.C. Tie:	Coordinate power flows on limited ties to the Southwest Power Pool and Mexico.
Shift Engineer:	Develop and engineer solutions to address potential operating concerns.
Shift Supervisor:	Oversee activities and handle external communications in emergencies.





Resource Adequacy: Planning for future reserves to support reliability goals

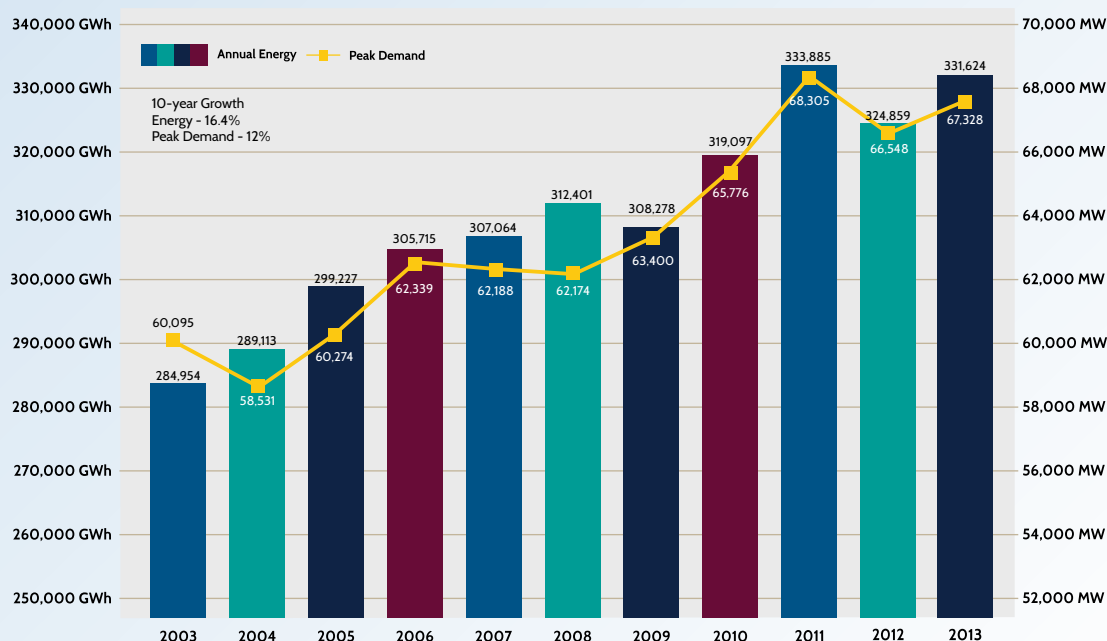
As the Texas economy continues to grow more rapidly than most areas of the country, electric demand during peak periods is increasing.

In recent years, forecasts have indicated that new generation resources are not keeping pace with the growing demand for power, sparking a discussion among planners, market participants, regulators and lawmakers about what steps might be needed now to help ensure there are sufficient electric reserves in the future. Many experts point to low wholesale power prices for slowing investment. Meanwhile, a debate has ensued as to whether ERCOT's energy-only market, which pays generation companies only for the power they provide to the grid and some Ancillary Services, should instead pay generation companies for the capacity they develop, or some combination of the two.

Frequently, the generation units that serve primarily peak demand run only during periods of scarcity, so their revenues are uncertain from year to year. As the larger discussion and related studies continue, ERCOT and the PUC have taken steps to make scarcity prices, the cost of energy when daily operating reserves drop below certain reliability-based triggers, reflect the value of those limited power supplies.

In 2013, the Systemwide Offer Cap for power offers increased to \$5,000 per megawatt-hour (MWh) and is set to increase twice more, to \$9,000 per MWh, by summer 2015.

The ERCOT Board of Directors in 2013 also approved implementation of an Operating Reserve Demand Curve (ORDC), which establishes a price adder to reflect the increasing value of electricity in scarcity conditions as the likelihood of consumer outages increases. The ORDC is scheduled to be in place by summer 2014.



Annual Energy and Peak Demand (2003-2013)

Nodal market creates efficiencies, sheds light on congestion

ERCOT's nodal market is designed to use the most efficient, cost-effective generation resources to serve consumer needs. Every five minutes, ERCOT's Security-Constrained Economic Dispatch (SCED) sends dispatch instructions to generators based on their pricing offers, with a focus on serving load at the lowest possible cost.

Because generation is sold into the market from hundreds of nodes, ERCOT is aware of resource-specific pricing and can see the relationship between each power-generating facility and where electricity is being used on the grid.

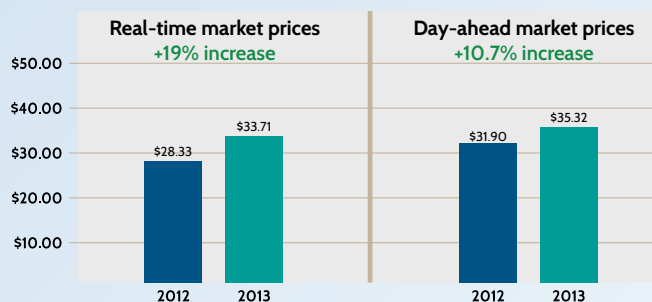
This visibility is important because transmission lines and infrastructure have limited capacity. Congestion occurs when the need for power in a region exceeds the transmission system's capacity to move power into that area. In those cases, ERCOT sometimes must bring less efficient power plants on-line within the affected area or send power where it is needed through less congested circuits. Those units typically cost more to run, which in turn increases the costs to provide power in the affected regions.

ERCOT monitors which transmission facilities present the most significant efficiency and operational challenges to determine where transmission improvements are most critical.

In recent years, the most significant congestion in the ERCOT system resulted from high electric demand associated with oil and gas exploration and production in the Permian Basin, with activity in the Eagle Ford Shale region of South Texas following closely behind.

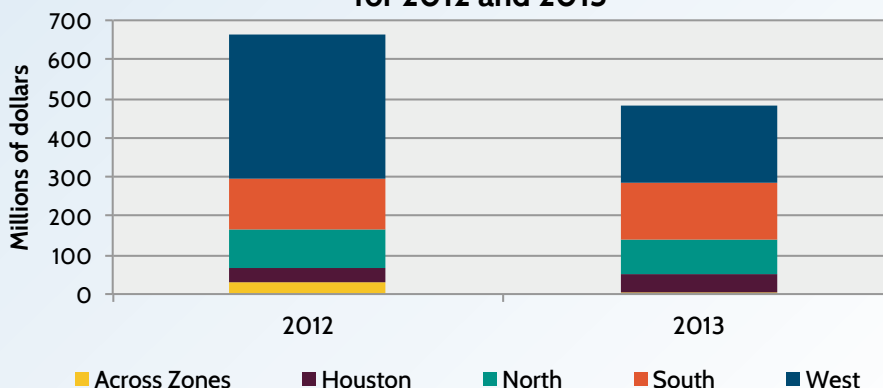
Transmission providers have already implemented many improvements to address these challenges and will continue to do so in the coming years.

Meanwhile, load-serving entities and consumers can help manage their congestion costs by participating in the ERCOT Congestion Revenue Rights (CRR) auction. In 2013, ERCOT made improvements to help the CRR auction operate more efficiently and to assign appropriate credit risks to specific paths.



Source: Potomac Economics (Independent Market Monitor)
Prices reflect load-weighted average settlement point load zone prices in ERCOT real-time and day-ahead markets. Load zone prices include 15-minute wholesale energy prices, including the effects of transmission congestion in affected load zones.

Annual Real-Time Congestion Rent by Zone for 2012 and 2013



Rethinking Ancillary Services

Today's market includes a number of Ancillary Services that ERCOT uses to support reliability and balance the grid when needed.

The electric generation mix has changed since the current market was implemented. Renewable energy, newer gas-fired generation units and demand response are playing increasing roles. These technologies respond differently to changing conditions, compared to the conventional resources for which today's Ancillary Services market was designed.

Following the release of a concept paper in 2013, ERCOT staff and market participants have begun to discuss new approaches to help manage the evolving electric grid more efficiently.

Demand Response

- >2,100 MW in demand response resources, including:
 - Load resources (mostly large industrial) ~1,200 MW
 - Emergency response service (commercial and industrial) ~700 MW
 - Utility load management programs
- Additional economic demand response, voluntary public responses to conservation requests and more

Focus on innovation

Advances in recent years offer consumers more information than ever before about how and where they use electricity. This increasing awareness also expands ERCOT's ability to incorporate tools such as demand response, more renewables and evolving storage technologies into its operations.

Moving pilots to projects and programs

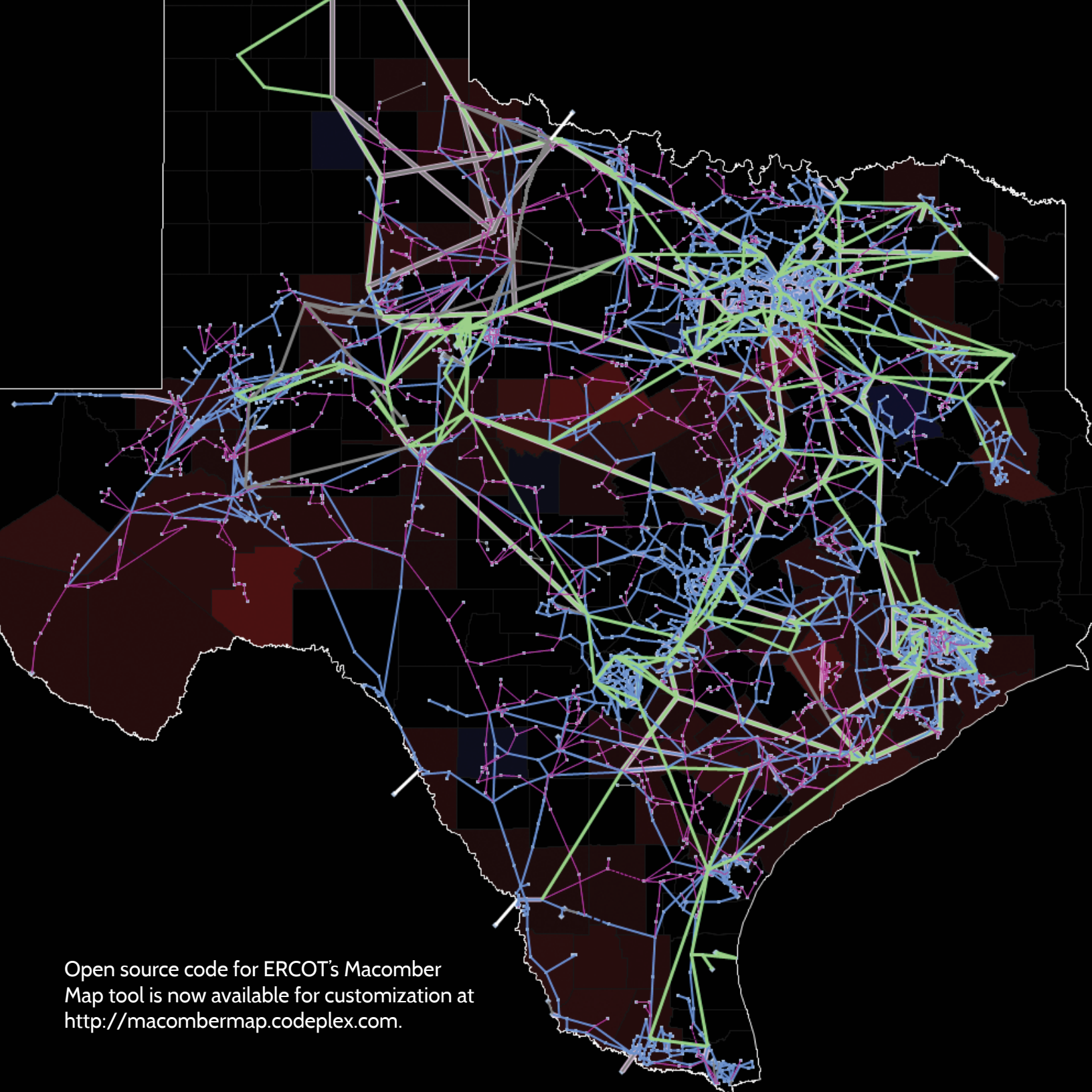
ERCOT completed two pilot projects in 2013 that, by summer 2014, will become programs that broaden its flexibility when generation supplies are tight: 30-minute Emergency Response Service (ERS) and Weather Sensitive ERS.

In the coming year, these programs will offer new opportunities for residential and commercial consumers to participate in paid ERS programs, whether by reducing demand on the grid within 30 minutes of a directive or by allowing their thermostats to be adjusted to immediately reduce strain on the system caused by increased air conditioner demand during the blistering Texas summer.



Another pilot has explored the potential for Fast-Responding Regulation Service. This service would enable resources that can respond instantaneously to a signal, such as new energy storage batteries and electric vehicle charging stations, to offer services into the market that help the grid operator maintain system frequency at or around 60 Hz when generation output or electric consumption suddenly changes. Maintaining this frequency is critical to protect the equipment on the grid.





Open source code for ERCOT's Macomber
Map tool is now available for customization at
<http://macombermap.codeplex.com>.

Putting technology to work

According to the first-ever Grid Modernization Index, released in 2013, Texas tied with California for the top-ranked grid based on its grid modernization policies and activities. Among other criteria, more than 97 percent of retail load in competitive areas is settled using 15-minute interval data from more than 6.6 million “smart” meters.



Information technology plays a key role in all ERCOT operations, and constant improvements and quality control are required to keep up with evolving needs. Cross-functional teams completed numerous projects in 2013 to enhance flexibility and security to support grid reliability and market efficiency.

One project upgraded the ERCOT Energy Saver mobile app, which offers quick access to real-time and hourly system conditions, as well as wholesale prices and various interactive features.

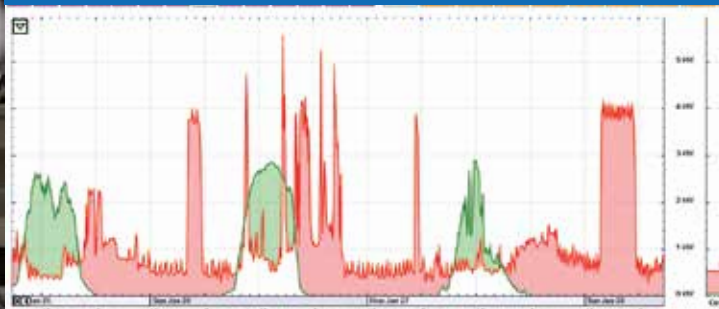
Another project enabled the release of an open-source version of ERCOT’s Macomber Map, a situational awareness visualization tool. ERCOT uses this tool in its control room to bring a variety of operational elements together in one

complete view of system conditions. Now, other entities that can benefit from this heightened level of awareness can access the code and adapt it to their specific needs.



Advanced Meters

- 6.6 million advanced meters
- 97 percent of ERCOT load in competitive areas settled with 15-minute interval data



Some consumers use smart meter data to track their consumption.

Focus on innovation

Bringing sunshine to the grid

Although commercial-scale solar power continues to represent less than 1 percent of the ERCOT generation mix, it is among the fastest-growing generation resources in Texas. Statewide, including some areas outside the ERCOT region, commercial solar energy production nearly tripled from 2011 to 2012. Commercial solar energy produced within the ERCOT region grew by another 21 percent, from about 123,000 MWh in 2012 to more than 149,000 MWh in 2013.

Installed solar capacity grew from about 74 megawatts (MW) in 2012 to 113 MW by January 2014. Another 180 MW is on track to come on-line by 2015, and nearly 2,700 MW is under study.



Leading the nation in wind generation

ERCOT — and Texas overall — continues to lead the nation in wind power integration, with more than 11,000 MW of installed capacity, mainly in West Texas and the Gulf Coast regions. ERCOT experienced a new wind integration record of 9,674 MW during the late afternoon on May 2, 2013, when wind power was serving about 28 percent of the demand.

Wind generation provided 9.9 percent of the total energy used in the ERCOT region in 2013, compared to 9.2 percent in 2012.



FROM THE GROUND UP

Texas Competitive Renewable Energy Zones





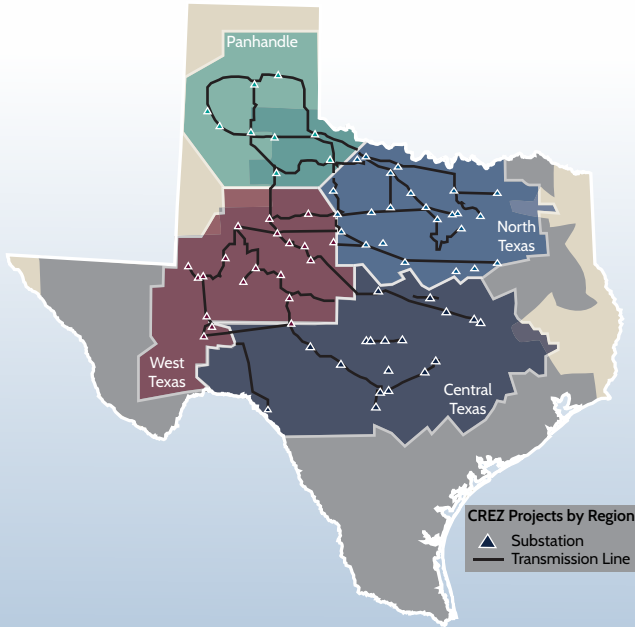
By the end of 2013, a vision for a high-voltage transmission network to transport wind generation from West Texas and the Panhandle to more populated regions on the ERCOT grid had become a reality.

This vision for what has been referred to as a “renewable energy superhighway” began in 2005. That’s when the Texas Legislature passed Senate Bill 20, establishing goals for renewable energy and tasking ERCOT with recommendations to make it work. Although there was considerable interest in harnessing the West Texas wind to help address the state’s growing power needs, generation companies had difficulty sending that energy to the market across limited infrastructure. In fact, transmission constraints between West and North Texas were limiting operations at existing facilities.

Following ERCOT’s studies, the Texas PUC in 2008 established five Competitive Renewable Energy Zones (CREZ) and selected 10 companies to perform the work. They also set a goal to complete the project by the end of 2013, an ambitious timeline for a project of this magnitude.

Today, the participating companies have completed a nearly 3,600-mile network of 345-kilovolt transmission infrastructure that will enable the movement of about 18,500 MW of generation across the power grid. Thanks to the new lines, one of the previous top constraints in the ERCOT region is now virtually nonexistent. Not only will this \$6.8 billion system support growing wind generation in West and North Texas; the open-access lines also will accommodate generation from other sources.

With more than 11,000 MW of installed wind power capacity, the ERCOT region is already well ahead of the renewable power generation targets established in SB 20, and Texas continues to lead the nation in developing and integrating this resource. Now, this first-of-its-kind project will make it possible to move more renewable energy than ever before to the ERCOT market.



Companies participating in the CREZ project:

- Bandera Electric Cooperative
- Brazos Electric Cooperative
- Cross Texas Transmission
- Electric Transmission Texas
- Lone Star Transmission, LLC
- Lower Colorado River Authority Transmission Services Corporation
- Oncor Electric Delivery
- Sharyland Utilities
- South Texas Electric Cooperative
- Wind Energy Transmission Texas, LLC



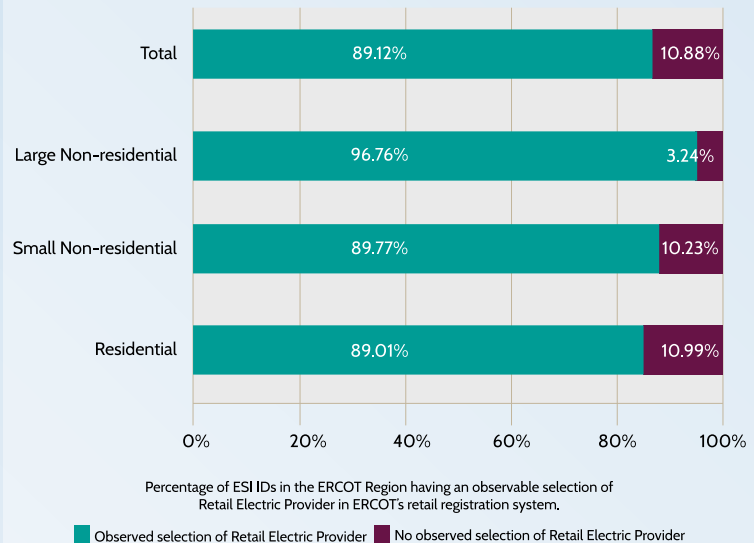
Focus on the big picture: Bringing it all together

Bringing it home: Robust retail competition

Texas has been recognized for seven consecutive years as the leader in competitive retail markets, according to the Annual Baseline Assessment of Choice in Canada and the United States (ABACCUS), an annual report by Distributed Energy Financial Group.

According to ERCOT data, nearly 97 percent of large non-residential, almost 90 percent of small non-residential and more than 89 percent of residential consumers have actively chosen a retail electric provider in the competitive market since it opened in 2002.

Observable Selection of Retail Electric Provider
as of December 31, 2013



Bringing fiscal responsibility: The ERCOT budget

The PUC in November approved a biennial budget for ERCOT that focuses on three priorities:

- Attracting, developing and retaining high-quality staff
- Maintaining and building upon technical infrastructure needed to manage the grid and market effectively
- Implementing market and regulatory initiatives

Funding the \$190.9 million budget for 2014 and \$195 million for 2015 requires the first increase in ERCOT's system administration fee in more than nine years, from 41.7 cents to 46.5 cents per MWh, or about \$6.70 a year for the average residential household using 1,200 kilowatt-hours a month.



Bringing it all together

Bringing ideas to the table: Oversight and strategic alignment

ERCOT market participants provide input into ERCOT rules and operations through established committees and working groups, as well as ad hoc efforts set up to address specific issues, such as new Ancillary Services or the method used to forecast future demand.

Primary forums for stakeholder input include the Technical Advisory Committee, the Commercial Operations Subcommittee, the Protocol Revision Subcommittee, the Reliability and Operations Subcommittee, the Retail Market Subcommittee and the Wholesale Market Subcommittee. A Regional Planning Group and Long-Term Study Task Force work with staff to develop five-year and long-term transmission planning studies, and various working groups address specific topics as needed.

Through the stakeholder process, ERCOT in 2013 completed more than 100 revision requests to its Nodal Protocols and other guidelines to support market and grid operations and incorporate new technologies.

For more information about ERCOT governance and stakeholder committees, visit the ERCOT website at www.ercot.com/committees.

The 2013 Strategic Plan calls for increasing alignment of ERCOT stakeholder groups with ERCOT's overall strategic goals. ERCOT's 16-member Board of Directors includes representatives and alternates from each market sector: retail electric providers, independent generators, independent power marketers, investor-owned utilities, municipal utilities and cooperatives. The board also includes three consumer representatives (one of whom is the Public Counsel appointed by the Governor to head the state's Office of Public Utility Counsel), five unaffiliated members, and two ex officio members: the ERCOT chief executive officer and the chairman of the PUC (non-voting).

As directed by the Texas Legislature, the PUC oversees ERCOT and develops the substantive rules that guide the Texas electric market. The North American Electric Reliability Corporation (NERC), the Texas Reliability Entity and the Federal Energy Regulatory Commission (FERC) regulate federal reliability standards.



Bringing focus to the workplace and surrounding community

ERCOT's continued success depends on the dedication of more than 600 employees, many of whom are widely recognized leaders in their respective fields. There are numerous opportunities for high-quality candidates to join this cutting-edge team, especially in the areas of power system and electrical engineering, information technology, cyber security, accounting and finance, and legal fields.

Employees have many unique opportunities to make a difference, both in the workplace and in the surrounding community, where ERCOT experts are helping to inspire future problem solvers. In 2013, the State Board of Education and Texas Education Agency recognized ERCOT with an Employers for Education Excellence Award. Successes include Taylor High School's Beginners Learning Alternative Designs for Energy team, which is mentored by ERCOT employees and received a \$112,000 grant from the State Energy Conservation to install an educational renewable energy system at Taylor High School.

ERCOT employees also donated \$16,500 to United Way of Williamson County and coordinated numerous other efforts to help their neighbors in need.



Bringing it all together

At a glance

- 85% of Texas load
- >23 million consumers
- Competitive-choice customers: 73% of load
 - 6.7 million electric-service ID's (premises)
- >41,500 circuit miles of high-voltage transmission
- 550 generating units
- >74,000 megawatts (MW) capacity for peak demand
 - One megawatt of electricity can power about 200 Texas homes during periods of peak demand.
- Record peak demand: 68,305 MW (Aug. 3, 2011)
 - New monthly peaks in October, November and December 2013
- Energy used in 2013: 331 billion kilowatt-hours
 - A nearly 2.1 percent increase compared to 2012
- Market participants: >1,100 active entities that generate, move, buy, sell or use wholesale electricity

Transmission Investment and Development

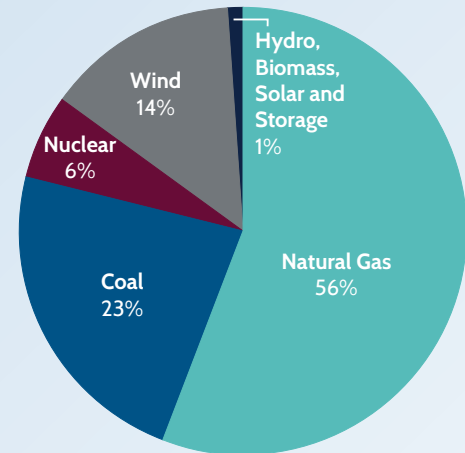
- \$14.3 billion in transmission added since 1999
- 9,141 circuit miles of transmission improvements since 1999
- 2,558 circuit miles of transmission planned
- \$3.7 billion under development in five-year plan

Generation Development

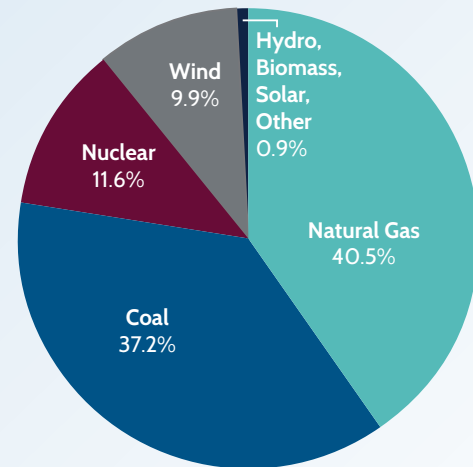
- 48,000 MW new generation added since 1999
 - 137 older units decommissioned
- 12,754 MW generation committed for the future (with transmission contract and air permit)
- 51,100 MW of active generation requests under review, including more than 24,200 MW of wind (December 2013)

Retail Service Switches

- 89% of residential customers (December 2013)
- 90% of small non-residential customers (December 2013)
- 97% of large non-residential customers (December 2013)
- 186 certified competitive retail electric providers



2014 Generation Capacity
effective January 2014



Energy Use 2013*

*Totals >100% due to rounding

Special thanks

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For more information about ERCOT members and membership, please visit our website at www.ercot.com/about/governance/members/2014/index.





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