



Striking a Reliable Balance

2012 State of the Grid Report

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The Electric Reliability Council of Texas (ERCOT) manages the flow of electric power to 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 40,500 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 and the Texas Legislature.





Striking a reliable balance in a growing economy

ERCOT's role as the grid operator for most of Texas requires our operators to balance electricity supply and demand, every minute of every day. From system planning to oversight of one of the world's most successful competitive electric markets, ERCOT must maintain that balance, with a central focus on providing reliable power for more than 23 million Texans.

We are fortunate to serve a region of the United States where the economy continues to thrive and grow. Economic opportunities, along with a wealth of natural resources and a variety of rural and urban lifestyle options, continue to attract new residents, businesses and industries to the ERCOT region of Texas. Our responsibility is to work with our members and the market to power that economy as reliably as we can.

The nodal market, which went live in December 2010, is providing better information than ever before about how our grid operates. We have learned how to incorporate and integrate a variety of technologies effectively and efficiently, and we continue to build on that success.

On a grid where peak demand has grown more quickly than new generation resources are being built to serve it, ERCOT will continue to work with the Public Utility Commission of Texas (PUC), the Texas Legislature and our stakeholders to find better ways to strike a reliable balance. We will embrace opportunities to build on the success of our market, and we will engage consumers in future reliability solutions.

We invite you to learn more about ERCOT and our commitment to strike a balance for reliable power.

A handwritten signature in blue ink that reads "Trip Doggett".

Trip Doggett,
President and Chief Executive Officer

A handwritten signature in blue ink that reads "Craven Crowell".

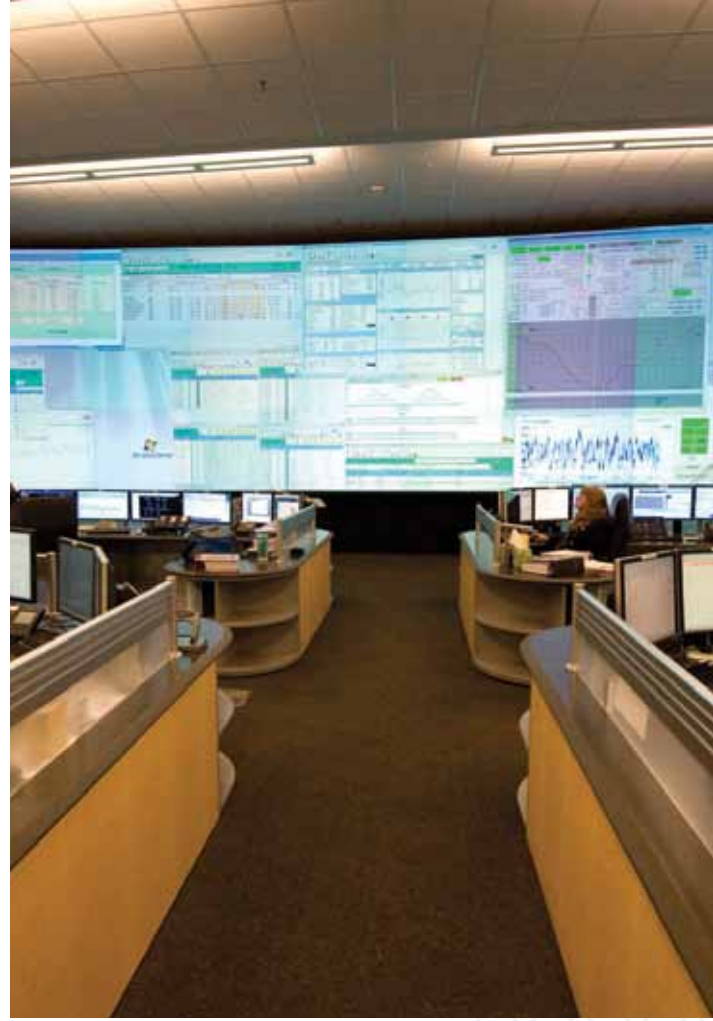
Craven Crowell,
Chairman, Board of Directors

Balance at all levels

As the independent system operator that manages the flow of about 85 percent of the electricity used in Texas, ERCOT is guided by its mission to “serve the public by ensuring a reliable grid, efficient electricity markets, open access and retail choice.”

About 600 ERCOT employees focus each day on fulfilling that mission, whether they sit at central command in its state-of-the-art Control Centers, work with stakeholders to incorporate their input into market rules, or keep policymakers apprised of market conditions.

The ERCOT market provides numerous opportunities for its members and stakeholders to participate in the planning and operations of the market and share information that contributes to the overall strength and effective operation of the grid. The Technical Advisory Committee (TAC), which includes five standing subcommittees and various work groups and task forces, plays a key role in this process.



Leadership and oversight

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, as a non-voting member.

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.



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

Balancing generation supply and demand

Texas adds more than 1,000 people a day, on average, with a large portion of that growth occurring in metropolitan areas within the ERCOT region. As the population and the economy continue to grow, overall energy use and the demand for electricity also have been growing by an average of about 2 percent a year in recent years.

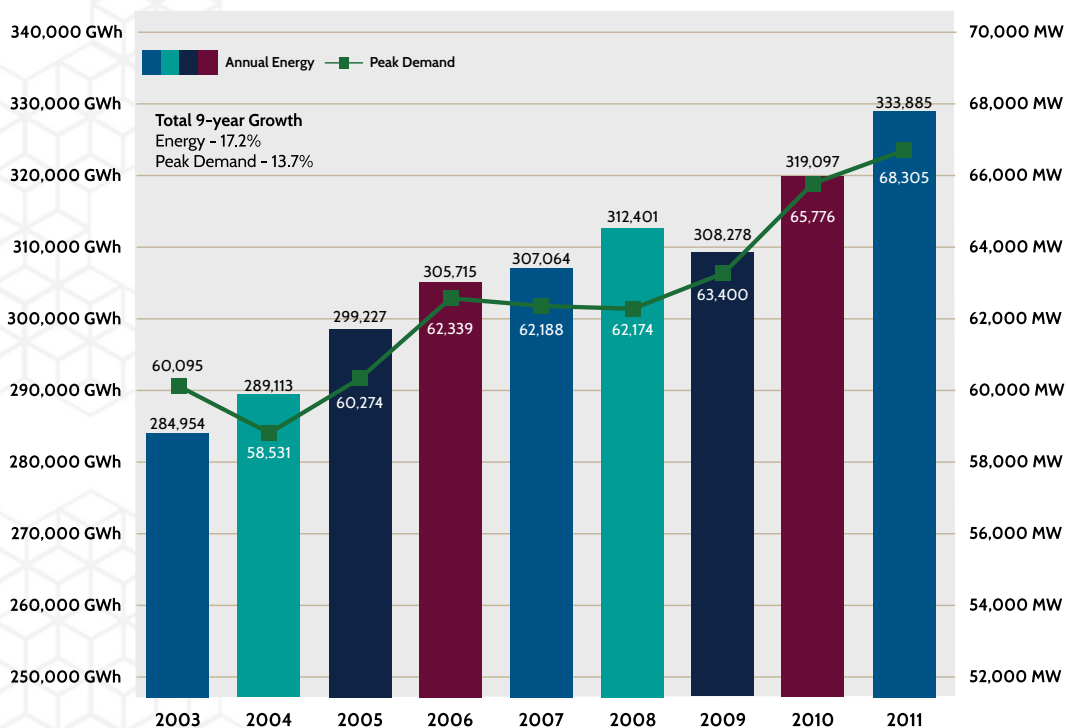
Additionally, record-breaking weather conditions in 2011 contributed to a nearly 5 percent overall increase in energy use, with about 334,000 gigawatt-hours (GWh) used in 2011 compared to about 319,000 GWh in 2010. Sustained record heat and drought conditions in summer 2011 drove hourly demand on Aug. 3, 2011, to a new peak of 68,305 MW. That record held through the less-intense summer of 2012.

As weather has been milder in 2012, ERCOT's overall energy use has declined from the previous year's records, even as monthly demand hit new records during three summer months.

By late 2011, ERCOT reports revealed that development of new generation was not keeping pace with growing demand. Reserves were poised to drop below ERCOT's 13.75 percent target by summer 2012.

A federal court decision on pending federal environmental regulations ultimately enabled some coal-fired units to continue operating. Generators also restarted some mothballed older units, contributing to a successful summer with plenty of operating reserves available. However, planning reserves – the capacity ERCOT plans to have available for situations when temperatures and outages exceed normal conditions – continue to tighten.

Annual Energy & Peak Demand (2003-2011)



Managing demand

Consumer actions to reduce electric demand also help balance the grid when supplies are tight. The combination of load resources providing responsive reserves, Emergency Interruptible Load Service (now Emergency Response Service), and consumer responses to public pleas for conservation all helped ERCOT keep the lights on and air conditioners running during the hottest summer on record.

New PUC rules now allow ERCOT to expand the newly dubbed Emergency Response Service (ERS) program that pays some consumers to reduce load when needed to protect the grid. The PUC also now allows ERCOT to conduct pilot projects, including a 30-minute ERS alternative to expand consumer demand response options for large loads and aggregated smaller loads. To help customers make more informed decisions about price-responsive electric use, ERCOT also now posts projected, nonbinding hourly wholesale prices on its website.



Demand Response

- >1,800 megawatts (MW) in demand response resources, including:
 - Load resources (mostly large industrial) ~1200 MW
 - Emergency response service (commercial and industrial) ~430 MW
 - Utility load management programs
- Additional economic demand response, voluntary public responses to conservation requests and more



While many of those programs appeal mainly to commercial consumers, ERCOT also reaches out in numerous ways to residential consumers, who represent more than half the system demand on extremely hot summer afternoons.

The ERCOT Energy Saver app for iPhones and Android devices can notify about 10,000 users who have downloaded the app so far when conservation is most critical.

ERCOT also worked with the PUC to develop new public service announcements and an updated website to encourage consumers to reduce power during the 3-7 p.m. summer high-demand periods.



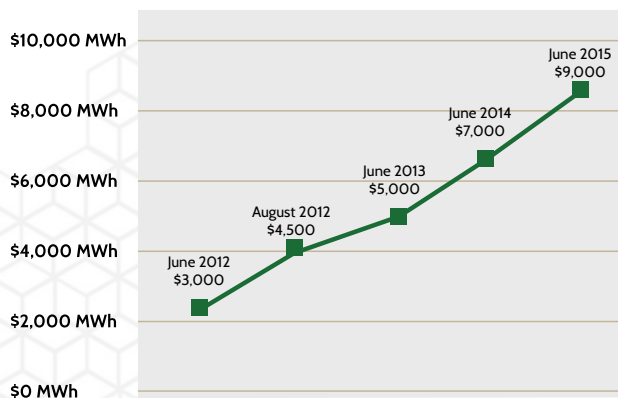
Encouraging supply

Although ERCOT cannot build its own generation, it is working with the PUC to encourage investment in the market. ERCOT has an “energy-only market,” which means power producers are paid only for the energy they provide. In this type of market structure, the ability to receive higher prices for electric power when supplies are scarce encourages generators to provide power to serve peak demand. With that in mind, ERCOT changed how it deploys generation reserves and other emergency reliability resources that can reverse market price increases in some cases when supplies are tight. The PUC also raised the system-wide offer cap, the highest amount at which a supplier can offer power into the wholesale market, to \$4,500 per megawatt-hour (MWh), effective Aug. 1, 2012. In October 2012, Commissioners voted to continue increasing that cap incrementally, up to \$9,000 per MWh by summer 2015.

Revised protocols, the rules that govern market activities, also now include a formalized process ERCOT can use to call mothballed units back into service if they are needed for reliability.



System-wide Offer Cap (2012-2015)



Seeking Solutions

The ERCOT board and staff have taken several steps to ensure a balanced system:

- Ensure that reliability steps taken by ERCOT during times of extremely high demand do not artificially lower prices and discourage new generation investment.
- Expand ERCOT’s toolkit for addressing shortage and emergency conditions through new rules and voluntary demand response alternatives.
- Sponsor and conduct analysis of the ERCOT market, including an independent study by the Brattle Group, to provide policymakers the detailed information needed to assess options.

A study of two summers:

ERCOT operators strive to keep grid reliable, whatever the season demands

Although many Americans consider Labor Day the unofficial end of summer, most Texans' air conditioners work overtime well into September.

That is why ERCOT considers September the last month of the high-demand summer season. In fact, transmission rates within the grid are based on each provider's share of the peak demand in each of the months of June through September the previous year.

A look back: System survives severe summer stress of 2011

In 2011, record high temperatures and extreme drought pervaded most of the state from June through September.

"Every day, we were on pins and needles – it was just so hot for such a long time, we had no breaks," said Jimmy Hartmann, supervisor of System Operations.

Record drought in most of Texas exacerbated the situation by intensifying the high temperatures and evaporating stored water in cooling ponds at a faster rate. By late summer, several plants were derated as water temperatures rose and storage levels appeared likely to drop below the intake equipment for cooling operations at the plants.

So, not only was it hot, Hartmann said, but the prolonged dry, hot conditions also were stressing power plants that had been running hard, without breaks, for months.

Energy emergency alerts on seven occasions, along with two calls for large-scale demand response actions from contracted load resources, helped prevent the need for controlled, rotating outages – widely labeled "rolling blackouts." This action is the last in a series of steps ERCOT can use to prevent an uncontrolled blackout when there is not enough generation available to serve consumers' demand for electricity.

These rare events, when ERCOT has to order transmission providers to reduce electric use throughout their systems to protect the grid, have occurred only three times in its history: December 1989, April 2006 and February 2011 – notably never during summer, when Texas generators typically are most prepared for high system demand.

"Every day we made it past the peak was a good day," said Hartmann, who explained that the companies that had entered contracts to reduce their electric use quickly in emergency situations responded well to emergencies in 2011. Other consumers, including homeowners and small businesses, also responded voluntarily to ERCOT requests to conserve during the peak electric use hours of 3-7 p.m. These actions all helped ERCOT maintain a reliable system, supporting the region's economy, safety and comfort during the hottest summer on record.

"Every consumer who responded to our requests to conserve in 2011 helped ERCOT keep the grid strong during the most trying summer ever," said ERCOT CEO Trip Doggett.

“Every consumer who responded to our requests to conserve in 2011 helped ERCOT keep the grid strong during the most trying summer ever,” said ERCOT CEO Trip Doggett. “We will continue to reach out to those consumers to help them understand how very simple steps at their homes and businesses can make a big difference on the entire grid.”

Summer 2012: Consumer awareness complements conservation efforts

Going into the 2012 summer, ERCOT’s Seasonal Assessment of Resource Adequacy predicted peaks slightly below those of 2011. Rain earlier in the year had replenished cooling ponds, and generators throughout ERCOT had their units – including some older units that previously had been brought out of service – ready to respond.

By the time the summer’s first heat wave hit in late June, bringing with it what turned out to be the 2012 summer peak of 66,548 MW, thousands of consumers downloaded the new ERCOT Energy Saver mobile app to receive notifications if energy emergency alerts became necessary. Users of ERCOT’s social media channels and emergency alerts list increased. Media throughout the region also helped encourage consumers to raise their thermostats during the peak.

The early summer peaks never became grid emergencies. In the control room, it was easier to prepare for high-demand days than it had been the previous year, said Hartmann. When power plants had problems, there were opportunities between the hottest days to fix those problems before they got worse.

Although power demands in the ERCOT grid set new monthly records in June, July and September of 2012, the new all-time record set in August 2011 held at 68,305 MW. Summer 2012 played out very much as predicted: hotter temperatures than the 15-year averages used in long-term planning, but not nearly as brutal as 2011.

“It’s amazing what a little bit of rain does,” said Hartmann.

Future summers: Keeping up with growing needs

Most Texans hope summer 2011 remains in the history books as the worst-case scenario for heat and drought in the ERCOT region. However, regardless of the weather, electric use has continued to rise by almost 2 percent a year as Texas continues to grow.

“As we adapt to new technologies and policies, consumers will have more opportunities to play an important role in balancing electric supply and demand when extreme temperatures or an unusual number of power plant outages challenge the grid,” said Doggett. “While preparing for additional long-term solutions, ERCOT operators will continue to call upon the tools and resources they have available to protect the grid and keep electric power flowing throughout the region.”

Balancing market and infrastructure

Nodal: A close-up view of market operations

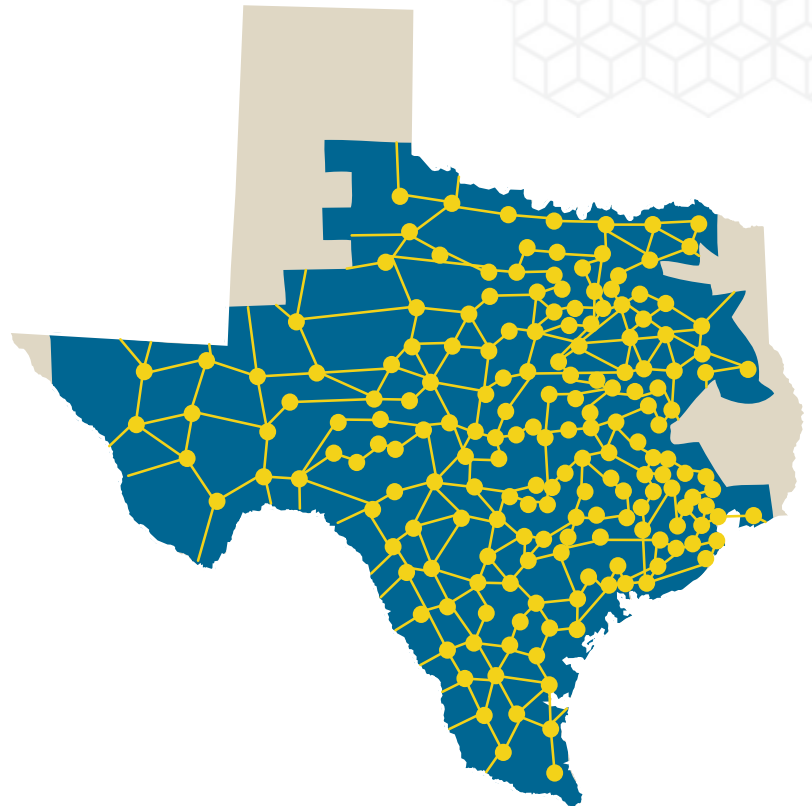
With the implementation of the nodal market in December 2010, ERCOT planners and operators gained a detailed view and more direct control over how individual generation resources within the ERCOT region are used to power the grid.

The nodal market has improved the efficiency and transparency of the market. It also is enabling ERCOT to identify more clearly where grid improvements are needed to serve growing load from the most cost-effective generation resources.

Today, electric output is dispatched and priced from thousands of nodes, enabling ERCOT to send power to the grid from specific resources in five-minute intervals through its Security Constrained Economic Dispatch (SCED) system.

A robust day-ahead market provides market participants opportunities to buy and sell energy prior to the operating day. Most wholesale energy that is bought or sold through the ERCOT market is sold in this centralized, voluntary day-ahead market. The results are factored into ERCOT's operating plans for the following day.

Day-ahead prices in 2011 averaged about \$46 per MWh, compared to \$43 per MWh for real-time prices, reflecting the premium buyers place on reduced volatility. These prices and the difference between them were higher than previous years, due mainly to extreme weather in February and August that drove real-time prices to the system-wide offer cap on several days.





Balancing the market and the grid

Each day, ERCOT develops an operating plan based on generators' schedules and anticipated energy needs. This snapshot is used to plan for reserves and other ancillary service needs. As conditions change, plans are re-evaluated throughout the day in the real-time market.

Through SCED, ERCOT continually balances the system, sending power to the grid from the most cost-effective available resources while maintaining system reliability throughout the day.

Information derived from the nodal market helps identify where generation and transmission infrastructure improvements are needed to ensure the market is functioning for optimum efficiency.

Identifying and addressing congestion

The nodal market design provides clarity regarding transmission congestion within the ERCOT grid, where high loads or insufficient infrastructure can lead to bottlenecks between generation resources and load. In the nodal market, local congestion can be attributed to specific areas within eight load zones.

There were more than 300 active transmission constraints at some point during 2011. To address these issues, ERCOT sometimes dispatches less economical resources to send power where it is needed through less congested circuits. The added costs of running these units affect the "load-zone price" of power in the real-time market, which can affect the delivered cost of power for consumers. Numerous planned and ongoing improvements will help address transmission constraints.



Transmission Investment and Development

- \$7.4 billion in transmission added since 1999
 - 9,500 circuit miles of transmission improvements since 1999
- 6,700 circuit miles of transmission planned
 - \$8.7 billion under development in five-year plan;
~\$5-7 billion to support 18,000 MW of wind

Fortifying the grid

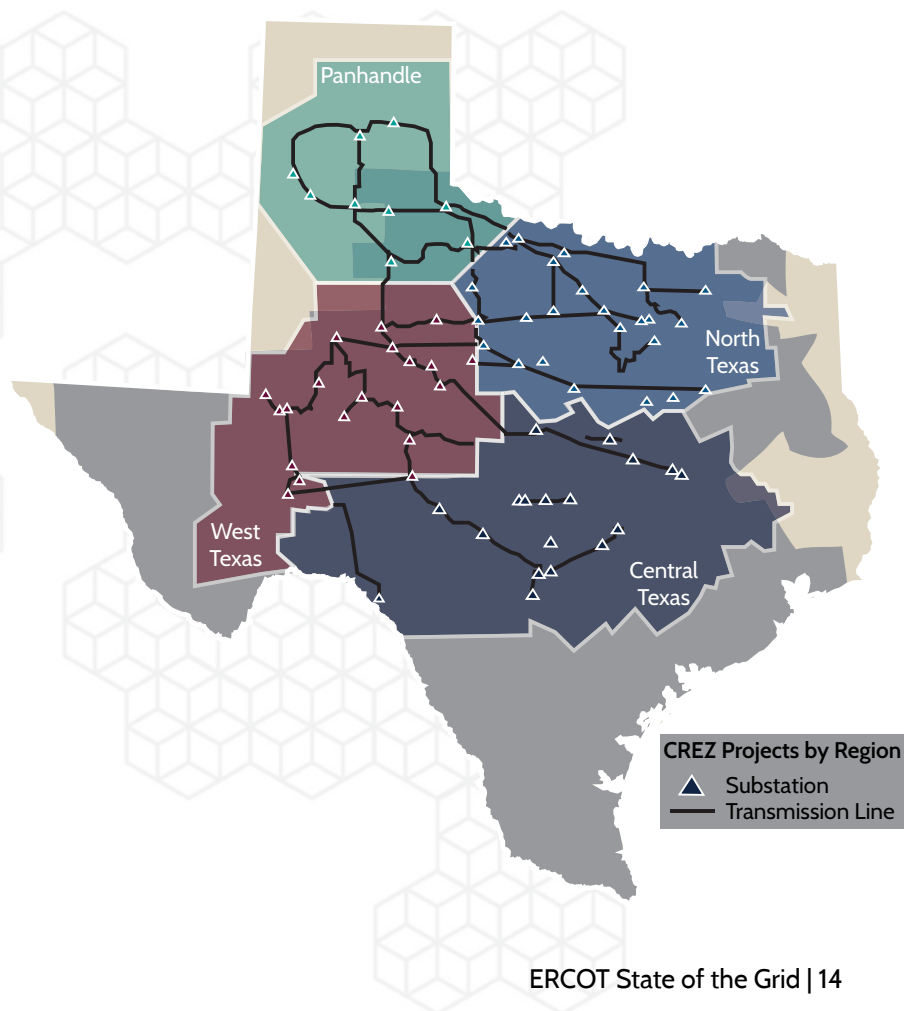
Transmission improvements also are in progress to improve overall capacity and reliability of the grid. ERCOT staff and stakeholders work together to identify needed improvements to the open access transmission system that stretches more than 40,500 miles.

About \$695 million in transmission projects were energized in 2011, and another \$732 million were completed by the end of September 2012. To continue building system capacity and reliability – and to address ongoing congestion concerns – ERCOT endorsed about \$675 million in transmission projects in 2011, and another \$597 million so far in 2012. The PUC will make the final decision on these projects.



More than \$5 billion in projects specifically designed to serve five competitive renewable energy zones (CREZ) identified by the PUC in 2008 are in various stages of completion. The CREZ process began when the Texas Legislature passed Senate Bill 20 in 2005, establishing goals for renewable energy and tasking ERCOT with recommendations to make it work. The 2,400-mile, 345-kilovolt (kV) CREZ system will accommodate about 18,500 MW of wind power and other generation in West and North Texas, about double the system capacity when the project began.

The first CREZ substation interconnection agreement was completed in March 2012, and the entire CREZ system remains on track to be energized by the end of 2013.

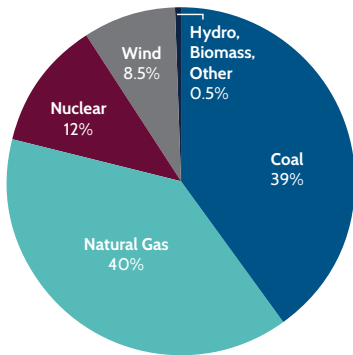


Balancing the generation mix for the future

Texas continues to lead the nation in development of wind power and has begun to incorporate other renewable technologies, such as commercial-scale solar power and biomass, as well.

In 2011, more than 15 million renewable energy credits (RECs) were retired in the voluntary market, 29 percent more than the previous year's record. Competitive retailers retired another 9 million RECs as required by the state's Renewable Portfolio Standard, which set a goal of 10,000 MW of renewable energy capacity by 2025.

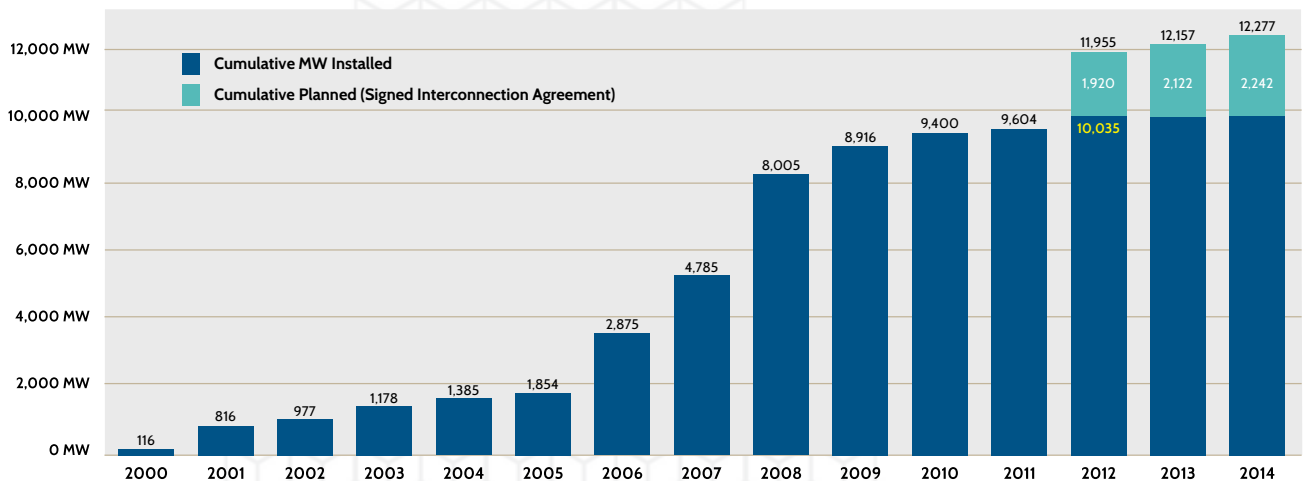
With 10,035 MW of wind power capacity serving the ERCOT region, the state has more than surpassed its goal. On Nov. 10, 2012, ERCOT hit a new record for instantaneous wind power generation, when 8,521 MW was serving nearly 26 percent of the load at 10:21 a.m.



ERCOT Energy Use 2011

As this dynamic generation resource matures, ERCOT planners and operators have learned to forecast wind power patterns and integrate this resource into system planning and grid operations more effectively.

New analytical tools enable improved assessment of grid conditions as wind output varies. For example, the transient stability analysis tool allows operators to continually adjust limits on the line that carries wind power from West Texas to more populated areas of the state where power is needed.



Wind
Generation
by Year
(2000-2014)

Gas-fired combustion turbines, or “quick-start units,” also can help balance the grid as power flows fluctuate.

A new battery storage unit now in development will be able to store small amounts of wind energy produced during off-peak hours so it can be used at other times to support the grid or serve load.

Going into winter 2012, more than 70 MW of commercial-scale solar power also was operating in ERCOT, with hundreds more megawatts in various stages of development. This will make more renewable resources available during summer peaks.



Wind Integration

- Wind Capacity: >10,000 MW
 - Most of any state in the nation
 - Includes >2,000 MW in coastal area
- Wind generation record: 8,521 MW (Nov. 10, 2012)
 - 25.9 percent of load at the time



Balancing current technology and innovation for the future

While the essentials of electric power generation and transmission have operated much the same way for more than a century, the evolution of technology is improving how power use is measured, in turn creating new opportunities for consumers.

By November 2012, ERCOT was receiving 15-minute settlement data from 5.8 million advanced meters within the competitive market. The data these meters provide not only will speed up and improve the accuracy of how power use is measured; over time, they also will support new opportunities for consumers to take control of their energy use. Future demand response initiatives will rely on accurate, timely information to enable consumers and providers to respond to pricing and consumption signals during peak demand periods.

As plug-in electric vehicles grow in popularity, charging stations around the ERCOT region today could serve as demand response resources in the future. ERCOT has installed charging stations at its own facilities and is gathering data to evaluate the potential benefits and impacts of these vehicles to the grid.

Advanced Meters

- >5.8 million in ERCOT competitive choice areas
- 92 percent of ERCOT load settled with 15-minute interval data





On a larger scale, the ERCOT-designed Macomber map continues to evolve. This tool provides operators a single view that combines multiple data sources for each element of the grid. Seeing various inputs on one interactive screen helps operators make better decisions, with a combined view of energy and market data, transmission configurations and constraints, outage information and more. This tool, designed by ERCOT staff, is being used nationally by NERC and FERC.

This growing use of technology makes security increasingly important. ERCOT's security team focuses on protecting all ERCOT assets, from the critical facilities that house its control centers to the computers and data centers that process market transactions and support grid reliability. As the industry relies increasingly on these technologies, ERCOT's cyber security team remains diligent in monitoring and addressing risks and sharing information with its counterparts.

Providing choice and value for consumers



Not only does ERCOT operate the grid and facilitate the competitive wholesale market; it also handles the process of switching suppliers for retail customers who decide to buy electricity from a different company that serves the competitive retail electric market serving their area.

Facilitating consumer choice

The Texas competitive market has been recognized for the past five years as the most successful competitive retail market in North America (according to the Annual Baseline Assessment of Choice in Canada and the United States). A 2012 J.D. Power and Associates report also shows increasingly satisfied customers among residential consumers in Texas competitive markets.

By November 2012, the total number of ERCOT retail transactions supporting consumer choice since the market opened in June 2001 exceeded 48.8 million, including 7.8 million retail switches. Depending on where they live, Texans in competitive regions within ERCOT can choose from up to 179 retail electric providers offering a variety of competitive retail options.

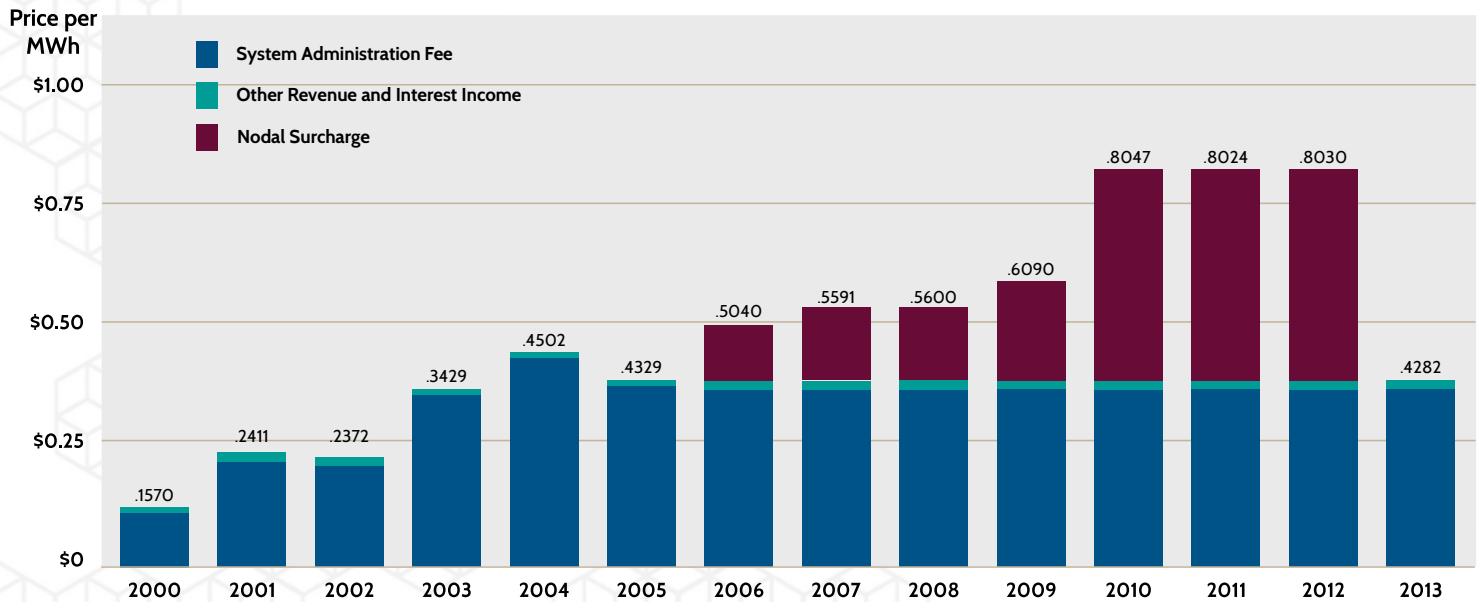
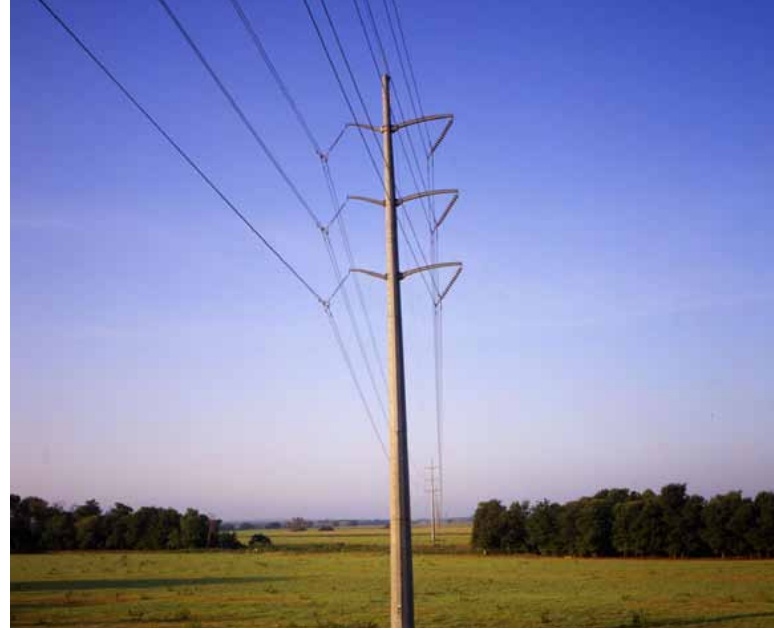


Covering the cost of oversight, operation and market development

Most of ERCOT's budget comes from a system administration fee that is included in wholesale electric bills. The \$00.417-per-MWh fee translates to about \$6 a year for the average residential consumer using about 1,200 kilowatt-hours of electricity monthly. The ERCOT board and PUC recently approved a \$170.7 million budget for 2013, and the fee will not increase.

The fee has remained flat since 2005, but was supplemented beginning in 2006 by a surcharge on generators to cover the \$550 million costs of implementing the nodal market. The surcharge will go away when the debt for implementing the nodal market is paid off by early 2013.

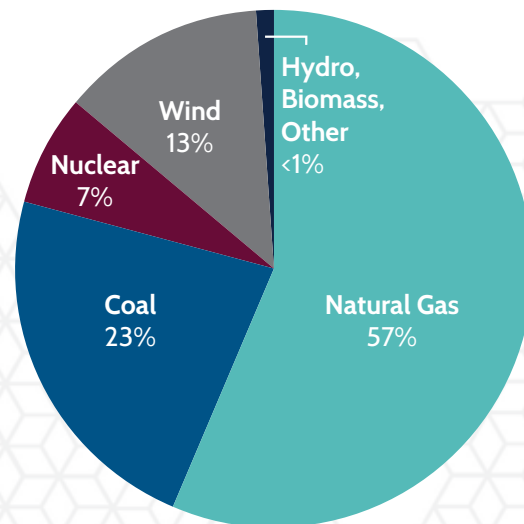
As a nonprofit entity focused on electric reliability, resource adequacy, market efficiency and transparency, ERCOT is committed to providing value to the electric consumers that support its operations.



**Fee Profile Summary
(2000-2013)**

ERCOT at a glance

- **85% of Texas load**
 - 23 million consumers
- **Competitive-choice customers: 73% of load**
 - 6.7 million electric-service ID's (premises)
- **40,530 circuit miles of high-voltage transmission:**
 - 9,249 miles of 345 kV and 19,565 miles of 138 kV
- **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)**
- **Energy used in 2011: 334 billion kilowatt-hours**
 - A 5% increase compared to 2010
- **Market size: ~\$34 billion**
- **Market participants: >1,100 active entities that generate, move, buy, sell or use wholesale electricity**



ERCOT Generation Capacity



Special thanks

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