

Electricity in Texas



By Robert J. Michaels | *February 2007*

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Electricity in Texas

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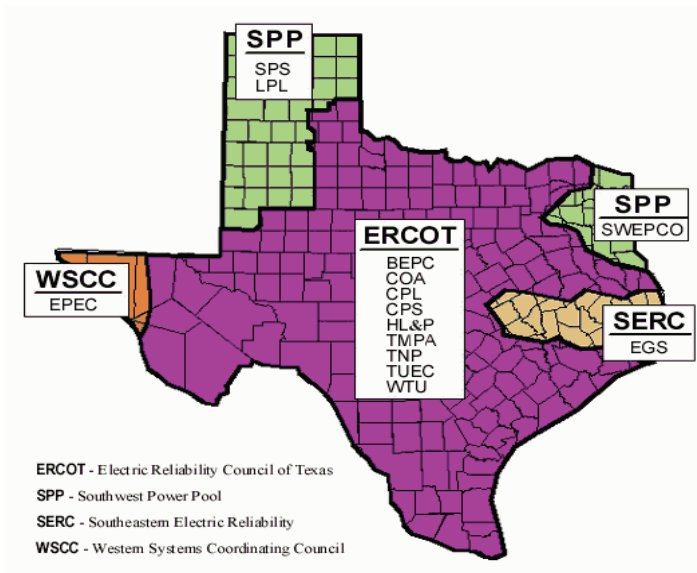
OVERVIEW

The Electric Reliability Council of Texas (ERCOT) is one of eight regional councils that operate under the North American Electric Reliability Council (NERC).¹ ERCOT formulates operating practices and sets technological standards for the area shown in **Figure 2-1**, which has a population of approximately 20 million. **Figure 2-2** helps to explain ERCOT's uniqueness: it is the only U.S. electric grid that—apart from a few interconnections to reach generating plants near state borders—does not cross any state lines. Therefore, ERCOT operates as a separate electrical interconnection from other regional councils and states. Separateness means that its rates for transmission service and wholesale power are exempt from FERC regulation and are instead under the Public Utility Commission of Texas (PUCT). Other ERCOT practices such as purchases from PURPA qualifying facilities are under the same FERC regulations that apply to interconnected transmission grids. Non-ERCOT regions of Texas are fully FERC-regulated. They are not yet open to retail competition, pending the development of regional transmission operators and wholesale energy markets that cover their footprints.²

Figure 2-3 shows the historic division of ERCOT's area among the five utilities whose descendants are our primary interest. Each area was formerly the exclusive territory of a vertically integrated corporate utility. Today each of the companies has been functionally separated into a retail service provider, a generation company, and a transmission-distribution provider. Some of these separated companies still share a common corporate parent; in the Houston area, however, the retail service provider (Reliant), generation company (NRG Texas), and transmission-distribution provider (CenterPoint) are completely independent. Retail service providers compete for business in the colored areas of **Figure 2-3**. The remainder of ERCOT territory is served by municipal utilities and rural co-operatives, which are not open to competition.

Approximately 85 percent of electricity consumed in Texas is consumed in the ERCOT region.³ In summer 2006 the ERCOT region contained 67,692 MW of operational generation capacity.⁴ Its highest peak demand to date, 62,334 MW, occurred on August 17, 2006, was 3.5 percent higher than the previous all-time high of Aug. 23, 2005.⁵ Including mothballed plants, the 76,964 MW of potentially available resources in Summer 2006 were 72.1 percent gas-fired, 20.4 percent coal, 6.3 percent nuclear, with the remainder representing hydroelectric, wind, and others.⁶ The actual energy production is quite different,

FIGURE 2-1
ERCOT and Texas



BEPC: Brazos Electric Power Coop
 COA: City of Austin
 CPL: Central Power and Light Co.
 CPS: City Public Service
 EGS: Entergy Gulf States, Inc.
 EPEC: El Paso Electric Co.

LPL: Lubbock Power Light
 Reliant: Reliant Energy HL&P
 SPS: Southwestern Public Service Co.
 SWEPCO: Southwestern Electric Power Co.

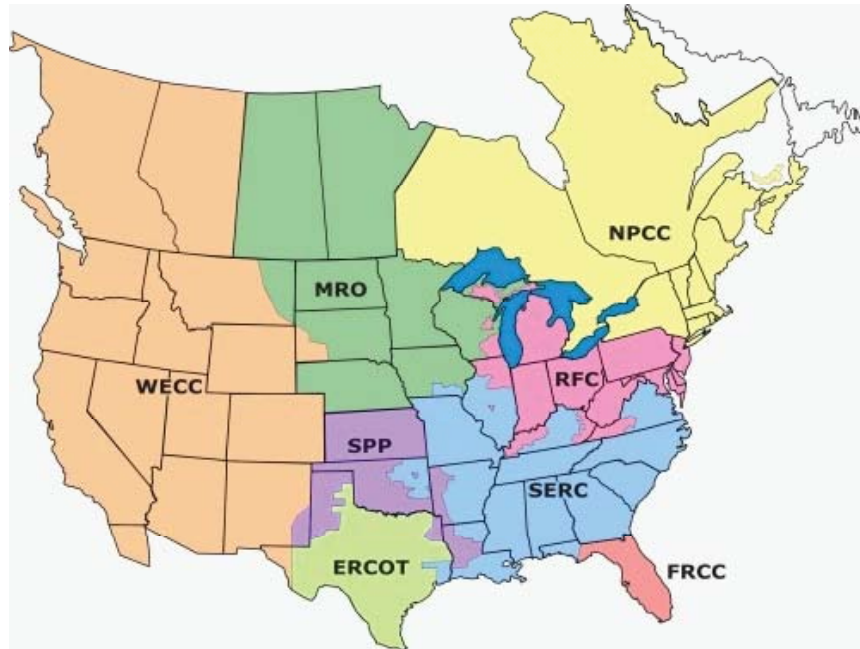
TNP: Texas-New Mexico Power Co.
 TXU: Texas Utility Co.
 WTU: West Texas Utilities

Source: Public Utility Commission of Texas

reflecting the varying costs and availability of each type of resource. Between January and July of 2005, 45 percent of ERCOT power was generated by gas, while 39 percent came from coal, 13 percent from nuclear and 2 percent from renewables, primarily wind.⁷ Since gas is so important a part of the ERCOT region's generation mix, electric rates there are below the national average when its price is low and above when it is high, as shown in **Figure 2-4**.

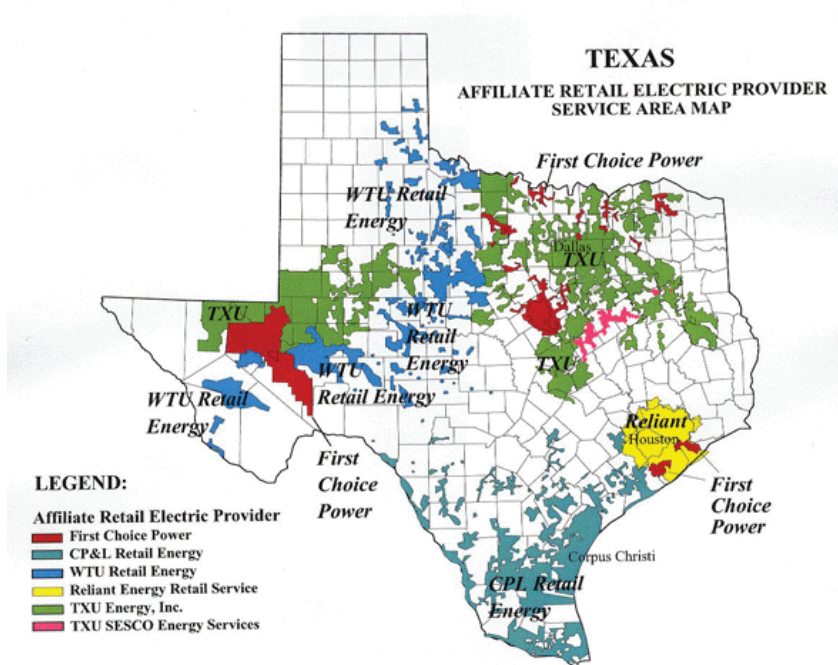
A legislative requirement that 2,880 MW of the state's capacity (both ERCOT and non-ERCOT) be renewables by 2009 will probably be met by early 2007. Texas recently passed California as the state with the largest amount of wind generation capacity. In a 2005 special legislative session the quota was increased to 5,880 MW by 2015.⁸ An estimated \$1 billion investment in new and upgraded transmission will be required to support these increases, most of which will be wind units located far from consuming areas.⁹ Currently ERCOT contains approximately 8,000 miles of 345 kilovolt (kv) transmission and 16,000 miles of 138 kv.¹⁰

FIGURE 2-2
Reliability Councils of North America



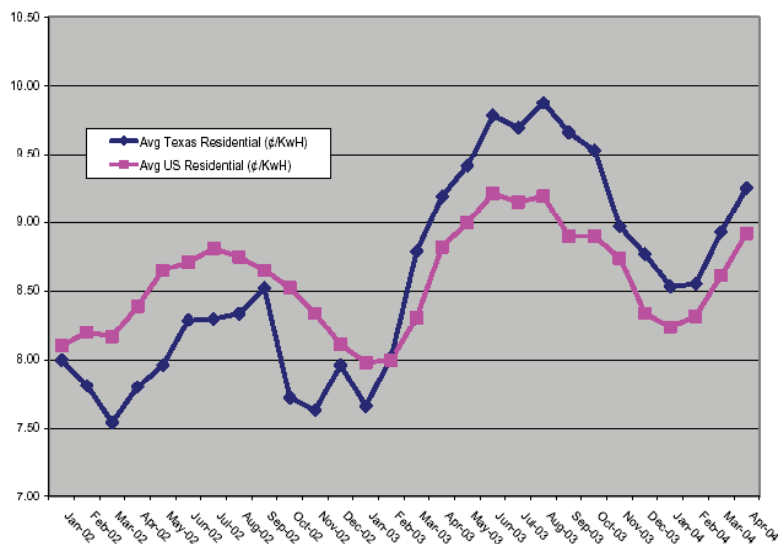
Source: North American Electric Reliability Council, www.nerc.com/regional

FIGURE 2-3
Retail Service Territories in Texas



Source: Public Utility Commission of Texas, www.puc.state.tx.us/electric/maps/map.cfm

FIGURE 2-4
Average Monthly Residential Prices per Kilowatt-Hour, Texas and U.S. Averages



Source: PUCT Report to the 79th Texas Legislature, *Scope of Competition in Electric Markets in Texas*, January 2005 at 57.

THE ROAD TO RETAIL MARKETS

In Texas, a single date separates electricity's past and future. On June 18, 1999 Governor George W. Bush signed Senate Bill (SB) 7 into law.¹¹ SB 7 amended the Public Utility Regulatory Act of 1975 (PURA) to set a timetable for the introduction of competition, stipulating that on January 1, 2002 households and business in most of ERCOT's territory would have rights to choose their suppliers. SB 7 marked the beginning of the end of the era of regulated monopolies (though transmission is still operated by regulated monopolies and municipal- and cooperative-operated utilities are still monopolies). Texas was not the first state to legislate or introduce customer choice, and benefited from studying the approach of other states and countries like the United Kingdom. SB 7 articulated a new understanding of the economics of electricity:

The legislature finds that the production and sale of electricity is not a monopoly warranting regulation of rates, operations, and services and that the public interest in competitive electric markets requires that . . . electric services and their prices should be determined by customer choices and the normal forces of competition.¹²

BEFORE SB7: The 1975 PURA and the PUCT

Prior to the adoption of PURA in 1975, electricity in Texas was regulated largely through municipal franchise agreements. Regulators had the relatively pleasant job of allocating the falling costs of generation between suppliers and consumers. This system became untenable

in the 1970s as gas prices rose in the Texas Intrastate market, exempt from federal price controls. Gas so dominated Texas' generation mix that rising prices created a particularly heavy burden.

PURA established the Public Utility Commission of Texas to regulate electricity and telecommunications. It was the last state commission formed, but its tasks were traditional. The PUCT set rates and terms of service for investor-owned utilities, while municipal systems remained largely exempt from its authority. Its tasks also included the issuance of certificates of public convenience and necessity for new utility-owned plants, as well as oversight of investment in transmission, the distribution of power to final users and compliance with renewable resource requirements.

The PUCT was and is unique in its jurisdiction over activities that are federally regulated elsewhere. The Supreme Court's 1964 decision that put wholesale transactions (i.e. sales intended for resale) between a buyer and seller in the same state under federal jurisdiction only applied to systems interconnected across state lines.¹³ Texas contained five large investor-owned systems that had long been interconnected with one another, but not with outsiders.¹⁴ In 1970 they formed ERCOT.¹⁵ Federal law gives the PUCT authority over wholesale prices and transmission rates in ERCOT, but other wholesale policies like open access to transmission remain under FERC jurisdiction.

ERCOT and PURPA

The utilities that would become ERCOT first interconnected their grids during World War II to supply power to industries in south Texas. Then known as the Texas Interconnected Systems, each would remain connected but maintain its self-sufficiency. Like the other regional reliability councils, ERCOT was founded in 1970 in response to the Northeast blackout of 1965. Through the mid-1990s each ERCOT member operated its own control area while the organization itself coordinated interconnections and operating guides among them. Federal jurisdiction over ERCOT extends to enforcement of the Public Utility Regulatory Policies Act of 1978, which requires that utilities stand ready to purchase power from qualifying facilities at the avoided cost of their own generation. The Energy Policy Act of 1992 further allowed FERC to order the transmission of non-utility power to wholesale buyers.¹⁶ With abundant opportunities for cogeneration and a growing market for independent power, Texas has been among the largest producers of independent and cogenerated power since the early 1980s.¹⁷

PURA95 and Wholesale Markets

ERCOT's role changed and expanded with 1995 revisions to PURA (PURA95) that required all PUCT-regulated transmission owners to provide open access to wholesale buyers and sellers on terms comparable to those enjoyed by their own retail customers.¹⁸ The law's revisions empowered the PUCT to allow market prices ("market-based rates" rather than cost-based regulated rates) for both wholesale and retail services.¹⁹ PURA95 also initiated rulemakings to set transmission rates and to form an independent system operator (ISO) for ERCOT.²⁰ In 1996 ERCOT was designated by the PUCT as the first ISO authorized to manage wholesale markets in its footprint. Those markets began operating on Sept. 1, 1996.

QuickFact:

Texas has been among the largest producers of independent and cogenerated power since the early 1980s.

PURA95 also asked the PUCT to examine the costs and benefits of expanded retail markets, by preparing studies for the Legislature on the potential for competition and the costs to utilities of introducing it. These costs, also known as “stranded” or “transition” costs, were also called ECOM (Excess of Cost over Market) in Texas. The costs included above-market power purchase contracts and generators (most importantly, nuclear) whose capital costs could not be recovered if energy were sold at competitive prices.²¹ In January 1997 the PUCT’s staff estimated ECOM of \$12.8 billion if full retail access began in 1998, and \$7.2 billion if utilities could collect regulated rates until 2000.²² The Commission acknowledged that its figures “greatly overstate[d]” stranded costs, because utility customers would depart slowly rather than all at once.²³ A 1998 recalculation found that fully opening markets in 2001 would entail \$3.4 billion in ECOM, and delay until 2002 would reduce it to a manageable \$2.2 billion.²⁴

QuickFact:

A three-year rate freeze, followed by a 6 percent reduction that would become the “Price to Beat” (PTB), began on Sept. 1, 1999.

SB 7

SB 7 embodied a complex May 1999 legislative bargain on retail competition, stranded costs and environmental issues. Its important provisions included:

- Retail markets would open on Jan. 1, 2002 for customers in ERCOT.²⁵
- A three-year rate freeze, followed by a 6 percent reduction that would become the “Price to Beat” (PTB), would begin on Sept. 1, 1999.²⁶
- During the freeze the investor-owned utilities would be functionally reorganized into Power Generation Companies (“PGCs”), Transmission-Distribution Service Providers (“TDSPs”), and Affiliated Retail Electric Providers (“AREPs”). They could form stand-alone unaffiliated companies, set up new units of a holding company, or directly sell the assets.²⁷
- Starting Jan. 1, 2002, each AREP could charge no more or less than the regulated Price to Beat for two customer classes: residential, and small commercial with billing demands (peak loads) below 1 MW. For each class, an AREP’s PTB would be in effect for either five years (ending December 31, 2006) or until 40 percent of customers, measured by load, had departed. An AREP could petition the PUCT up to twice a year for changes in its PTB to reflect fuel costs.²⁸ (All AREPs have passed the 40 percent threshold for the small-commercial class, and none have for the residential class.)
- The PUCT was to set financial qualifications for competitive Retail Electric Providers, (REPs), customer protection rules, and other requirements (e.g. a data interface with ERCOT).
- To keep initial barriers to entry low, each affiliated Power Generation Company had to auction rights to 15 percent of its capacity to unaffiliated bidders, and continue doing so for 60 months after the opening of retail markets or until non-affiliated REPs served at least 40 percent of the residential and small commercial load.²⁹
- Utilities could apply to the PUCT for permission to securitize some of their ECOM at relatively low rates, since customers would pay them in non-bypassable charges regardless of their choice of REP.³⁰
- Municipalities and cooperatives in ERCOT were not required to allow competition in their service areas, but could choose to “opt-in” to it, a decision that would be irrevocable.³¹

- The PUCT would set procedures to determine a provider of last resort [POLR] in each territory to serve customers on an interim basis in the event that their provider exited the market.³²
- SB 7 required that 2,000 MW of new renewable generation be in place by Jan. 1, 2009, mandated reductions in power plant emissions of nitrogen oxide and sulfur dioxide, and set a quota that at least half of all new utility generation be gas-fired.³³

SB 7 allowed but did not require utilities to unbundle their generation, but a territory would only “qualify” for retail competition if its utility owned less than 20 percent of generation capacity in it. TXU and Reliant complied by forming new affiliates. AEP Central divested all of its generation (including a 25 percent share of the South Texas Nuclear facility), and TNP divested its sole 347 MW unit. After much legislative and regulatory maneuvering, all of the utilities got rights to securitize stranded costs, but in smaller amounts than they had requested.³⁴

TODAY’S ERCOT AND ITS MARKETS

Organization and Governance

ERCOT is a nonprofit organization funded by member dues, transaction fees, and an assessment based on the amount of energy served. Its original governing board consisted of representatives from each of: 1) corporate generation and transmission utilities, 2) generation and transmission (“G&T”) cooperatives, 3) G&T municipals and state authorities, 4) power marketers, 5) independent power producers, and 6) transmission-dependent utilities (small municipal and cooperative retailers). Subsequent reorganization has retained one voting member from each of these groups, added three representatives of residential, commercial and industrial users, five independent members and ERCOT’s CEO.³⁵ A two-third voting majority is required for action.

ERCOT’S Markets

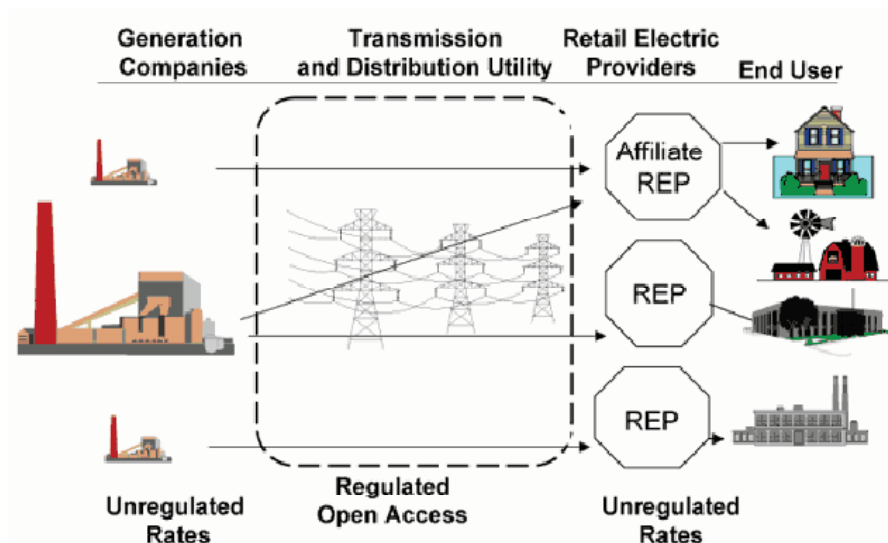
The Commodities. Having begun to operate as an ISO in 1996, ERCOT followed PUCT directives to widen its scope to the operation of wholesale markets.³⁶ The project required design of several markets. In July 2001, five months prior to retail choice, ERCOT’s ten utility control areas became a single centrally dispatched system with operating markets. ERCOT is alone among ISOs in not having a “two-settlement” market system. Such a system contains a day-ahead energy market that takes bids for power to be delivered in each hour of the next day and calculates an hourly market-clearing price. There is also a nearer-term (hourly or shorter) market in which energy that fills any discrepancies between actual demands and supplies is priced. ERCOT currently operates no day-ahead energy market, but will initiate one after reforms that are to be in place by 2009. Its Balancing Energy Market performs some of the near-term market’s functions. Like other ISOs, ERCOT operates a day-ahead market for capacity that will be used to deliver “Ancillary Services” necessary to serve load and maintain reliability. Relative to generation capacity the resources dedicated to ancillary services are almost always under 5 percent of the total. ERCOT, like other ISOs, also administers a complex billing and settlement process.³⁷ In this section we will simplify by treating ERCOT as a single market. The analysis of separated zonal markets awaits a later discussion of transmission congestion.

QuickFact:

ERCOT currently operates no day-ahead energy market, but will initiate one after reforms that are to be in place by 2009.

The basic relationships between ERCOT’s retail and wholesale markets are shown in **Figure 2-5**. Today, all REPs compete to supply power to end-users at unregulated rates. (Affiliated REPs were restricted to only selling at the Price to Beat during the first three years of competition, but since 2005 have been able to offer alternative pricing plans to retain customers at prices lower than the Price to Beat.) The REPs purchase this power from competitive generators on whatever terms they can negotiate. An open-access transmission system delivers this power at regulated rates.

FIGURE 2-5
The Wholesale and Retail Markets



Source: PUCT Report to 78th Texas Legislature, *Scope of Competition in Electric Markets in Texas*, Jan. 2003 at 18.

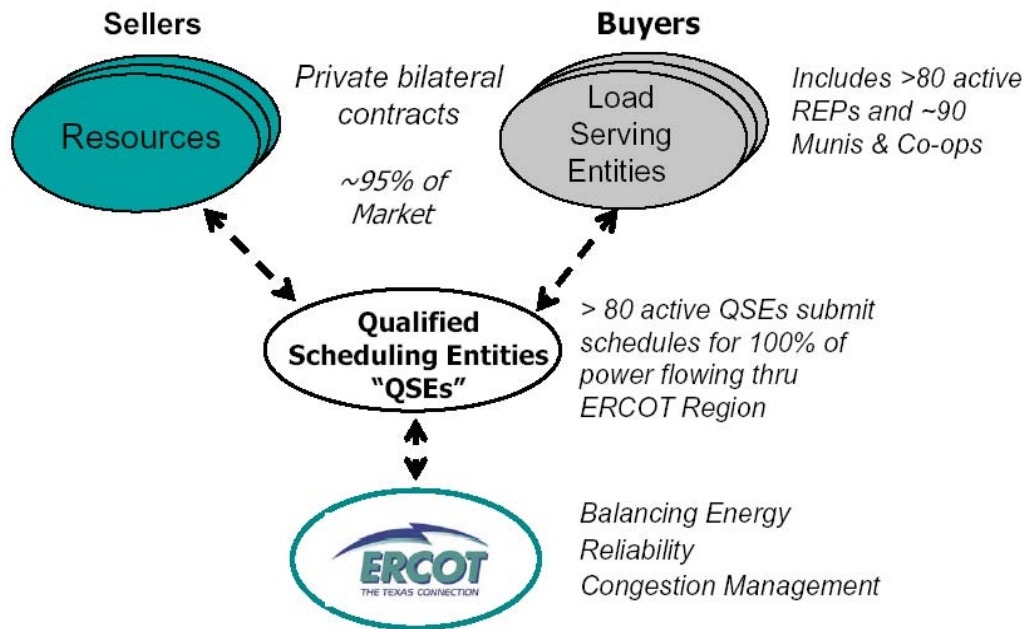
QuickFact:

Balancing Energy is the additional power (possibly a negative amount) that ERCOT determines is necessary for secure operation.

ERCOT’s Wholesale Institutions. **Figure 2-6** portrays the bilateral relationships behind most wholesale power supply transactions in ERCOT. Contracts between generators and load serving entities (REPs and municipal and cooperative systems) that sell to final users account for 95 percent of energy consumed in ERCOT . These arrangements are reported to ERCOT through schedules by Qualified Scheduling Entities [QSEs] that ERCOT has certified to represent wholesale loads and generators.³⁸ A QSE may be a generation owner serving its own load, a REP or other (e.g. municipal) utility that purchases power for resale to its customers, or a marketer who will resell the power to some other wholesale entity. As of late 2005, there were 141 active QSEs.³⁹ The remaining five percent of ERCOT power flows through its short-term Balancing and Ancillary Service markets.

Figure 2-7 shows the timeline of market operations. On the prior day, QSEs submit their load obligations and identify the power sources that will meet them for each 15 minute interval of the next day. They may use their own generation or contract for it. Those who are self-providing Ancillary Services must also indicate the generation being left ready to produce them if necessary. For non-self providers, ERCOT must acquire the resources from

FIGURE 2-6
Structure of the Bilateral Market

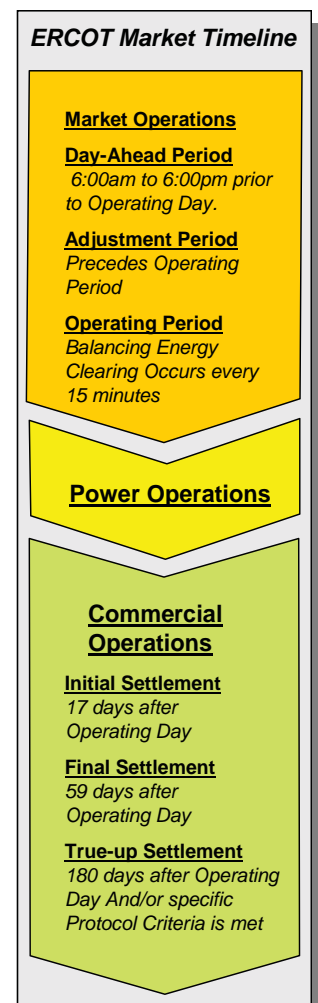


Source: Kent Saathof et al, *Today's ERCOT in Plain English*, Presentation to Gulf Coast Power Association, Austin (Sept. 26, 2005) 72, http://www.ercot.com/news/presentations/2005/Gulf_Coast_Power_Association.pdf.

owners bidding their capacity into these markets and pay them market-clearing prices for the various services. In the Adjustment Period between the close of the Day-Ahead Ancillary Service Market and the hour prior to actual operation, QSEs may modify their schedules and ERCOT may change its Ancillary Services decisions as information about system conditions and weather evolves. During each 15 minute interval of the Operating Period ERCOT schedules Balancing Energy that has been bid in at the start of the hour (see below) and determines a market-clearing price for it. It also dispatches the generation capacity that was committed to produce ancillary services. Settlements and payments that follow the Operating Period are not of interest to us.

The Balancing Market. Balancing Energy is the additional power (possibly a negative amount) that ERCOT determines is necessary for secure operation. Owners of otherwise undedicated generation may bid it into the Balancing Market just prior to the hour of operation. ERCOT has no “must offer” rule requiring them to bid except for negative (or down) balancing energy. It determines a market-clearing price every fifteen minutes which is paid to all generators whose bids are struck in the balancing market. Prior to November 2002 each QSE was responsible for submitting “balanced” schedules showing generation whose energy output would meet all of its expected load. A desire to have some form of “spot” energy A QSE was expected to adhere to its schedule, disposing of any excess or making good any shortfall in the Balancing Market. Concerns about the small volumes being bid into the balancing market led to ERCOT’s 2002 decision allowing QSEs to have “relaxed balanced schedules” and obtain whatever power was necessary to fill their load obligations in the balancing market.

FIGURE 2-7
Market Timeline



Source: ERCOT: *The Market Guide*, Version 2005:1, at 20, www.ercot.com/services/rq/ERCOT_Market_Guide.doc.

Some gambled that they could generally buy Balancing Energy at prices below bilateral contracts. The March 2003 bankruptcy of Texas Commercial Energy and frequent spikes in the Balancing price led ERCOT to institute its current “relaxed balancing” requirement—a QSE can acquire no more than 10 percent of its energy in the balancing market.⁴⁰

Ancillary Services. At the opening of the Day-Ahead Market ERCOT determines each QSE’s Ancillary Services obligation for each hour of the next day, based on the proportion of system load that the QSE has historically served. The QSE may contract bilaterally with a generation owner, leave some of its own resources idle but ready, or purchase the capacity from ERCOT’s day-ahead market.⁴¹ These generators bid prices for each upcoming hour at which ERCOT may use their capacity if needed. A generator called on to operate receives the Balancing Energy price for energy generated from this capacity. Another 1826 MW of industrial loads that can change on short notice (i.e., interrupt them) are qualified as Loads Acting As Resources (LaaR).⁴² In 2005 approximately half of all responsive reserve service was supplied by LaaRs.

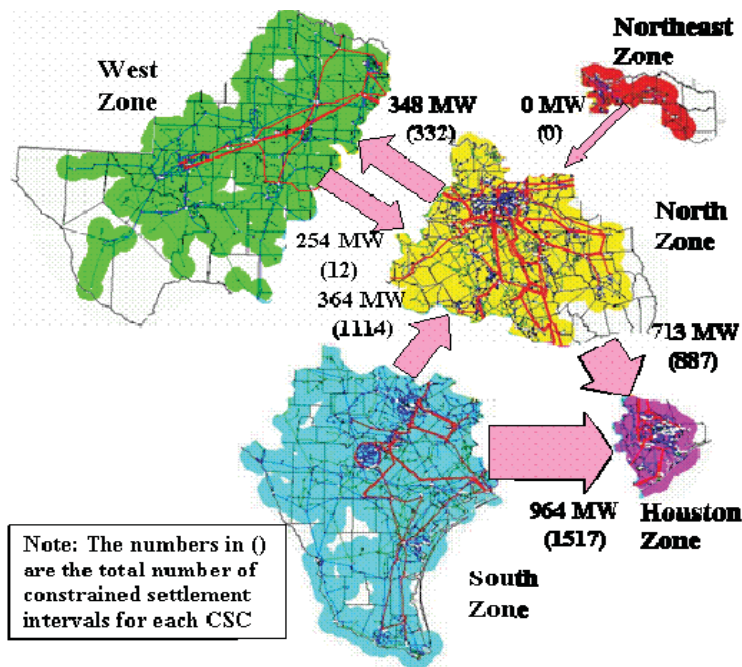
QuickFact:

Ancillary services include both energy and capacity. ERCOT will always be purchasing at least two services.

Ancillary services include both energy and capacity.⁴³ ERCOT will always be purchasing at least two services. First, a generator supplying “regulation reserve” will “follow the load,” increasing or decreasing output to equate supply and demand every second.⁴⁴ When loads are ramping up and down rapidly (6 to 9 AM and early evening) ERCOT may require up to a total of 2,000 MW of generation dedicated to producing up and down regulation, and about 1,500 MW during hours when load is steadier.⁴⁵ Second, generators supplying “Responsive Reserves” (also called spinning reserves) will be operating at low outputs, capable of immediately producing more power to make up for the loss of another generator or a major transmission line, or for weather related needs. Under normal conditions ERCOT has at least 2,300 MW of Responsive Reserve capacity on hand, of which up to 1,150 MW can be LaaRs. If forecasted weather warrants doing so ERCOT will make an administrative decision to purchase 1,250 MW of Non-Spinning Reserves that are available to begin producing within 30 minutes. Finally, ERCOT purchases “Replacement Reserves” a day ahead if its comparison of forecasted load and resources indicates possible shortages in the balancing market or if needed to resolve forecast transmission congestion.⁴⁶ These generators must be ready to produce additional energy in the balancing market as needed. As of October 2005 the markets for all ancillary services, except Replacement Reserves, are being cleared simultaneously rather than separately, as they were earlier. Separate clearing sometimes distorted their prices and unnecessarily affected their costs.⁴⁷

Managing Congestion. If ERCOT had a compact geographical footprint, the bilateral, balancing and ancillary services markets would suffice to provide reliable power within it. Generation, however, is dispersed and often far from consuming areas. Even if an area like Houston were self-sufficient in generation, it could almost always meet its load more cheaply if some power came from a distance. Certain power plants are unsuitable for urban areas, coal-fired plants are better located near mines or rail spurs and away from populated areas, conventional power plants generally must be located in proximity to water for cooling, and wind turbines work best on open plains in west Texas or along the Gulf Coast. Geographical mismatches are aggravated by transmission capacity that has struggled to keep up with the growth of generation and loads. ERCOT is broken into “congestion zones,” of which there can currently be as many as five. Power flowing between zones is limited by six “commercially significant

FIGURE 2-8
Regions and Commercially Significant Constraints



Note: In the figure above, CSC flows are averaged taking the direction into account. For instance, if one hour has a North to West flow of 100 MW, and a second hour has a West to North flow of 200 MW, the average hourly flow would be 50 MW from the West to North. This treats the North to West flows in the first hour as negative for averaging purposes.

Source: 2005 State of the Market Report at 116.

constraints” (CSCs), shown schematically in **Figure 2-8**. Absent these CSCs, all of ERCOT could be served at lower cost. Flow can be constrained in one direction and not the other—it is chronically difficult to move power from southern generators to northern cities (but seldom from north to south), and from anywhere outside of the Houston area into it.

Congestion is a situation akin to shortage, but in this case a shortage of transmission capacity in which the flow of power through a line exceeds its carrying capacity. Reliability requires that congestion be quickly relieved, but different remedies have different costs. If a line linking two regions is congested and loads cannot adjust, generation must be decreased in the exporting region and/or increased in the importing one. In reality there will be many choices, and the system operator must determine an operating configuration that minimizes cost while keeping congestion at an acceptable level. ERCOT does this by splitting its markets so that they clear separately in the zones while the CSCs between them stay within their congestion limits. The total cost of power over the two zones will generally be higher than if there are no constraints on transfers between them. The generators that can most effectively alleviate congestion may be high-cost units that would not otherwise operate. ERCOT will call on such units to run Out of Merit Order (OOME) and allows them to recover their costs even if they would not do so at market prices (merit order means ascending marginal costs, i.e. units with lower marginal cost are dispatched first). There are other high-cost generators that must operate to maintain reliability (perhaps because of their unique locations) even if there is no interzonal congestion. They operate under Reliability Must-Run (RMR) contracts with ERCOT that guarantee cost recovery when market prices are low.⁴⁸

QuickFact:

Even if an area like Houston were self-sufficient in generation, it could almost always meet its load more cheaply if some power came from a distance.

As it remedies congestion ERCOT calculates market-clearing zonal energy prices and derives a “shadow price” of congestion, equal to the difference between marginal costs of generation. It then charges a QSE responsible for increased congestion the shadow price times the change in output necessary to alleviate it. A QSE whose schedules decrease congestion receives that price for the flows it creates. Zonal prices efficiently relieve congestion across a CSC, but this is only a part of total congestion.⁴⁹ ERCOT’s present operating system cannot price congestion within zones (“intrazonal congestion”) to increase the costs of those responsible for it and decrease the costs of those who relieve it. ERCOT redispatches generators to alleviate intrazonal congestion, but its costs are covered by “uplift” charges that all QSEs pay in proportion to their loads. Distant QSEs pay for congestion they did not cause, while those actually responsible pay only a portion of the costs. In 2004 these localized costs were \$271 million, or 1 percent of ERCOT’s \$27 billion market.⁵⁰

TalkingPoint:

Retail choice began with uncertainty over the numbers of REPs that would enter the new markets.

By comparison with wholesale markets, those in which retail suppliers operate appear far less complex.

Retail Markets. Retail choice began with uncertainty over the numbers of REPs that would enter the new markets. There were further questions about the willingness of small customers to leave the REPs affiliated with utilities that had long served them. SB 7 attempted to encourage entry and switchovers by requiring the PUCT to calculate a Price to Beat per kilowatt-hour for each utility-affiliated REP (AREP), with no discounts allowed for the first three years. It would be based on 1999 costs, discounted by 6 percent and utilities could request adjustments for natural gas price increases.⁵¹ Unless 40 percent of a utility’s small customer load had previously departed its PTB would terminate on January 1, 2007. The PTB had a dual function: if competition never materialized it constrained an AREP’s market power, and if it did the PTB was an “umbrella” that ensured that entering REPs would have sufficient headroom during an “incubation” phase. In 2002, ERCOT’s 35 percent reserve margin, when combined with low gas prices and high PTBs, meant that new REPs were likely to find supplies that they could resell at less than the PTB.

By comparison with wholesale markets, those in which retail suppliers operate appear far less complex. A customer compares offers from its AREP to offers from competitive REPs and chooses the most advantageous deal, retaining the freedom to switch to another supplier if its contract allows. ERCOT acts as the “central registration agent” that keeps records of customer switching and informs REPs and QSEs about their loads,⁵² and the PUC’s *www.powertochoose.org* website is a central information clearinghouse for consumers.

Market Monitoring. In all areas of the U.S. outside the ERCOT grid, FERC requires that all Regional Transmission Operators have market monitors to detect and possibly specify remedies for the exercise of wholesale market power, and advise them on the competitive impacts of policy proposals. Some RTOs like the Pennsylvania-New-Jersey-Maryland Interconnection (PJM) rely on employees who can institute their own investigations. Others like California’s have both internal and external monitoring organizations. Market monitors have no powers to change rates, but they can submit their findings to FERC for review. In 2005, the Texas Legislature specified that the PUCT contract with an outside entity “to detect and prevent market manipulation strategies and recommend measures to enhance the efficiency of the wholesale market.”⁵³ Potomac Economics, Inc. was chosen for the job and recently announced the hiring of its Director of Market Monitoring Operations.⁵⁴ Like other wholesale monitors, it has access to data on market organization, prices, settlements and reliability. The Texas competitive market is primarily overseen by the PUCT’s Market Oversight Division (MOD), whose assignments have been quite varied. Between 2003 and

2005 it was responsible for investigations into Balancing Market and Ancillary Services price spikes, most importantly those of February 2003 and July 2004.⁵⁵ It conducted an investigation into claims by bankrupt Texas Commercial Energy that TXU's activities in the Balancing Market had been responsible for TCE's demise. MOD found that TXU could easily affect market price by its own actions, but it could not conclude that the company's strategic decisions were intended to bankrupt TCE, which had chosen to rely more on the Balancing Market than other REPs did.⁵⁶ MOD also reported on attempts to game the congestion management regime, particularly by over-scheduling of wind resources (described in more detail in a later paper).⁵⁷ Finally, in a set of ongoing cases it investigated allegations of criminal activity in ERCOT's management practices, financial controls and security procedures.⁵⁸

SUMMARY

ERCOT existed well before competitive markets, but its public profile only began to rise with the opening of wholesale and retail markets. Early amendments to the Public Utility Regulatory Act had brought some open access and bilateral wholesale contracting to ERCOT, but SB 7 provided a blueprint for the transition to retail competition and the markets that would soon follow. Following applicable FERC directives, ERCOT first became an approved Regional Transmission Operator and then the coordinator of organized markets for balancing energy and ancillary services. It also manages transmission expansion and serves as a registry for records of supplier switching by retail customers.

Relative to other RTOs, ERCOT's current markets are quite uncomplicated. Over 90 percent of energy in ERCOT flows pursuant to bilateral contracts and there is currently no day-ahead energy market. There are, however, day-ahead markets in ancillary services for each hour of the next day. QSEs self-supply or contract for most of their balancing energy and ancillary services, leaving only relatively small amounts to pass through ERCOT's organized markets. Balancing energy eliminates discrepancies between supply and demand on the system, with a price formed every 15 minutes. Ancillary services include those that follow loads, known as "regulation," and those that supply reliability as various types of reserves. Normally, there are ERCOT-wide prices for balancing energy and the various ancillary services. When transmission flows are constrained, however, the system is broken into a set of zonal markets in which the value of congestion is determined and generators are assessed for causing it or rewarded for alleviating it. Intra-zonal congestion is a more complicated problem, and since its costs presently cannot be attributed to specific market participants, the costs are "uplifted" to the whole market.

ERCOT's retail markets began operating on January 1, 2002. They offer customers of all types a choice of suppliers, known as Retail Electricity Providers or REPs. Large customers have operated without any "backstop" prices since their opening, but SB7 ensured small customers of a "Price to Beat" at which it was likely that competitors could profitably enter markets served by utility-affiliated REPs. Customers of all types have found attractively priced power in the new retail markets, and the PTB terminated at the end of 2006. ERCOT's wholesale markets are monitored by an external organization, and its retail markets by a division of the PUCT.

TalkingPoint:

ERCOT existed well before competitive markets, but its public profile only began to rise with the opening of wholesale and retail markets.

ENDNOTES

- ¹ www.ercot.com and www.nerc.com.
- ² See, e.g. PUC Suggests Delaying Customer Choice in Northeast TX until 2011," *Power Market Today* (June 15, 2006) 4.
- ³ Kent Saathof et al, Today's ERCOT in Plain English, (Subsequently Cited as TEPE), Presentation to Gulf Coast Power Association, Austin (Sept. 26, 2005) 3, http://www.ercot.com/news/presentations/2005/Gulf_Coast_Power_Association.pdf.
- ⁴ ERCOT, Report on the Capacity, Demand and Reserves in the ERCOT Region (June 2006) <http://www.ercot.com/news/presentations/2006/ERCOT06CDR06192006.xls>.
- ⁵ Press Release, "ERCOT at a Glance: News Update" (July 20, 2006) http://www.ercot.com/news/press_releases/2006/nr07-20-06.html; and TEPE at 48.
- ⁶ ERCOT, Report on the Capacity, Demand and Reserves in the ERCOT Region (June 2006) Op. Cit., Summer Fuel Types. Note that Texas has installed over 2,000 MW of wind capacity, but planners generally derate the raw figure by as much as 95 percent due to the sporadic nature of wind.
- ⁷ TEPE, 37.
- ⁸ TEPE, 41.
- ⁹ TEPE, 44.
- ¹⁰ TEPE, 48.
- ¹¹ Act of May 27, 1999, 76th Leg., R.S., ch. 405, § 1-67, 1999 Tex. Gen. Laws 2543-2625.
- ¹² TEX. UTIL. CODE ANN. § 39.001(a).
- ¹³ Federal Power Commission v. Southern California Edison Co., 376 U.S. 205 (1964).
- ¹⁴ In reality there are 800 MW of direct current interconnections between ERCOT and the rest of the nation, which has been exempted from federal regulation by special legislative provisions. See Brendan Koerner, "Why Texas Has Its Own Power Grid" (Aug. 2003) <http://www.slate.com/id/2087133/>.
- ¹⁵ ERCOT's history is at <http://www.ercot.com/about/profile/history/index.html>.
- ¹⁶ "FERC Asserts 211 Authority in ERCOT Dispute, but Defers to PUC on Rates," *Electric Utility Week* (Aug. 5, 1996) 12.
- ¹⁷ Data from the U.S. Energy Information Administration (EIA) http://www.eia.doe.gov/cneaf/electricity/epa/epa_sprdshts.html.
- ¹⁸ PURA95, 2.057(a). Marketers including Enron Corporation began transactions very shortly after passage of the law. See "Texas Adopts Hybrid Transmission Rate," *Southeast Power Report* (Jan. 26, 1996) 1.
- ¹⁹ PURA95, 2.053 - 2.054. The Act also formalized a planning process in which all qualified entities could participate in utility solicitations for generation resources and demand management services. (PURA95, §§ 2.051 - 2.052).
- ²⁰ Initially, however, the ERCOT utilities would continue to operate their own control areas, but with an increased amount of coordination.
- ²¹ Utilities claimed that despite a lack of explicit legislative language guaranteeing recovery of these costs, there was an implicit "compact" between them, government and ratepayers that promised it to them and competition could not start until provisions for this had been made. Their critics argued that regulation was just an ordinary legislative bargain that gave utilities rights and obligations, but did not insulate them from risks like competition. In practice, all states that opened up retail competition allowed utilities at least some recovery of the uneconomic costs. For the two sides, see J. Gregory Sidak and Daniel L. Spulber, "Deregulatory Takings and Breach of the Regulatory Contract," *New York University Law Review* 71 (Oct. 1996), 851-962, and Robert J. Michaels, "Unused and Useless: the Strange Economics of Stranded Investment," *The Electricity Journal* 7 (Oct. 1994) 12-22.
- ²² PUCT, Electric Power Industry Scope of Competition and Potentially Strandable Investment Report, report to the 75th Texas Legislature, Vol. 1 (Jan. 1997) 34. (Subsequently cited as Scope of Competition 2005).
- ²³ *Ibid.*, 35.
- ²⁴ PUCT, Potentially Strandable Investment (ECOM) Report: 1998 Update (April 1998) App. A.
- ²⁵ TEX. UTIL. CODE ANN. § 39.001(b)(1).
- ²⁶ *Ibid.*, §§ 39.052 and 39.202.
- ²⁷ TEX. UTIL. CODE ANN. §§ 31.002(10), 31.002(17), 31.002(19), 39.051(b), 39.051(c).
- ²⁸ *Ibid.*, § 39.202.
- ²⁹ TEX. UTIL. CODE ANN. §39.153
- ³⁰ TEX. UTIL. CODE ANN. § 39.252. Texas was ultimately one of the few states to securitize its stranded costs. For a discussion of the costs and benefits, see "Securitized Transition Costs: Rethinking Who Wins and Who Loses," *The Electricity Journal* 11 (June 1998) 58-65.
- ³¹ TEX. UTIL. CODE ANN. §§ 40.051(b) and 40.052(a).
- ³² TEX. UTIL. CODE ANN. §§ 39.106(e) - 39.106(g).
- ³³ TEX. UTIL. CODE ANN. § 39.904(a).
- ³⁴ TXU reached a complex settlement with the PUCT in which it agreed that it had no stranded costs. CenterPoint (an independent distribution company formerly part of Reliant) recovered \$2.3 billion of the \$3.3 billion it was seeking. Texas-New Mexico Power got \$83 million of its requested \$257 million, and AEP Central securitized \$1.7 billion of the \$2.4 billion it had sought. AEP West claimed it had no stranded costs. "Texas Regulators in Far-Reaching Accord with TXU," *Electric Utility Week* (June 24, 2002) 12; "Texas PUC OKs \$1.475 Billion in Stranded Cost Recovery for AEP," *Electric Power Daily* (Feb. 10, 2006); "Last of Texas Stranded-Cost ABS Deals Approved," *Asset Securitization Report* (July 3, 2006).
- ³⁵ TEPE 19 and Thomas Schrader, State of the Market and What's Ahead at ERCOT, presentation (Mar. 23, 2006) 5. The Chair of the PUCT is an ex-officio non-voting member. http://www.ercot.com/news/presentations/2006/TSchrader--GCPA_Houston_032306_FINAL.pdf.

³⁶ The scope of markets actually shrunk during 1996. Earlier ERCOT's nine control areas had been saving \$1 million a month by hourly trading. After the nondiscrimination regulations were in place, however, ERCOT's technology was unable to accommodate all interested bidders and the market was terminated, not to reappear until 1997. "ERCOT to Revive Next-Hour Trading System in Early 1997," Dow-Jones Telerate Energy Service, Oct. 22, 1996.

³⁷ TEPE, 73-94. The settlement process entails an estimated 300 million annual line items at the wholesale level. Retail service providers are responsible for billing final consumers. ERCOT also operates a dispute resolution process for the wholesale markets.

³⁸ QSEs, like most other terms in the text, are defined in lay terms in ERCOT's Glossary, <http://www.ercot.com/glossary/>.

³⁹ ERCOT 2005 Annual Report, 9.

⁴¹ TEPE, 54.

⁴² ERCOT 2005 Annual Report, 8.

⁴³ There are other activities classified by ERCOT as ancillary services. They include black start capability, out of merit-order (OOM) energy and capacity, and Reliability Must-Run (RMR) generation. The first is not provided in a market, and the others will be described in the discussion of congestion below.

⁴⁴ There are actually two separate markets. In the market for "regulation up" ERCOT pays generators (QSEs) to increase their output. In the market for "regulation down," they pay ERCOT to decrease their outputs and use balancing energy to make up for any missing power they must deliver to customers.

⁴⁵ 2004 SOM Report, 34.

⁴⁶ See PUCT, Investigation into the April 17, 2006 Rolling Blackouts in the Electricity Reliability Council of Texas, Preliminary Report (April 24, 2006) 10, http://www.puc.state.tx.us/electric/reports/black/RollBlackouts_April_17_2006_042406.pdf.

⁴⁷ ERCOT, 2005 Annual Report, 8, http://www.ercot.com/news/presentations/2006/2005_Annual_Report.pdf.

⁴⁸ ERCOT can also take bids from users in the receiving region to cut their loads, or notify owners of Loads Acting as Resources that they may be interrupted.

⁴⁹ There are also problems in measuring and modeling the actual flows that take place across CSCs and determining the amount of Transmission Congestion Rights that are consistent with them. See Potomac Economics Ltd., 2005 State of the Market Report for the ERCOT Wholesale Markets (subsequently cited as 2005 SOM Report) 117-124, http://www.puc.state.tx.us/wmo/documents/annual_reports/2005annualreport.pdf.

⁵⁰ See 2005 SOM Report, 134 and TEPE, 102.

⁵¹ PUCT Substantive Rule 25.41(f)(2).

⁵² In reality small customers do not have meters that record hourly variations in their loads for billing purposes. Instead ERCOT constructs their "load profiles" of hourly use from sampled data and uses them to determine what it will bill the QSEs that serve them for their power supplies. See TEPE at 80-83.

⁵³ Texas Utilities Code, § 39.1515.

⁵⁴ PUCT Staff was responsible for the 2002 report. Potomac Economics also serves as monitor for the New York Independent System Operator, ISO New England, and the Midwest ISO. <http://www.potomaceconomics.com/>.

⁵⁵ Scope of Competition 2005, 36.

⁵⁶ PUCT, Staff Inquiry into Allegations Made by Texas Commercial Energy Regarding ERCOT Market Manipulation, Project No. 25937 (Jan. 28, 2004). http://www.puc.state.tx.us/wmo/documents/special/TCE_allegations.pdf.

⁵⁷ Scope of Competition 2005 at 34; PUCT Market Oversight Division, "Comments to Commission's Questions about Congestion Management Issues, Item No. 79-103; Ross Baldick and Hui Niu, "Lessons Learned: The Texas Experience," Unpublished, University of Texas (2003) 43, <http://interchange/puc.state.tx.us/WebApp/Interchange/application/dbapps.htm> and <http://www.ece.utexas.edu/~baldick/papers/lessons.pdf>.

⁵⁸ Scope of Competition 2005, 36.

About this Report

In Texas, a single date separates electricity's past and future. On June 18, 1999 Governor George W. Bush signed Senate Bill (SB) 7 into law. SB 7 amended the Public Utility Regulatory Act of 1975 to set a timetable for the introduction of competition, stipulating that on January 1, 2002 most households and businesses in Texas would have rights to choose their suppliers. SB 7 marked the beginning of the end of the era of regulated monopolies.

This report examines the details of the Texas electric market and its transition to competition. It finds that customers of all types have found attractively priced power in the new retail markets, and the Texas transition to competition has been the nation's most successful.

About the Texas Public Policy Foundation

The Texas Public Policy Foundation is a 501(c)3 non-profit, non-partisan research institute guided by the core principles of individual liberty, personal responsibility, private property rights, free markets, and limited government.

The Foundation's mission is to lead the nation in public policy issues by using Texas as a model for reform. We seek to improve Texas by generating academically sound research and data on state issues, and recommending the findings to policymakers, opinion leaders, the media, and general public.

The work of the Foundation is primarily conducted by staff analysts under the auspices of issue-based policy centers. Their work is supplemented by academics from across Texas and the nation.

Funded by hundreds of individuals, foundations, and corporations, the Foundation does not accept government funds or contributions to influence the outcomes of its research.

The public is demanding a different direction for their government, and the Texas Public Policy Foundation is providing the ideas that enable policymakers to chart that new course.

