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ERCOT Texas's Competitive Power Experience: A View from the Outside Looking In

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Executive Summary

Just under a decade ago, Texas started on a path to restructure its electric industry.[1] Fundamental changes in the state's electric industry have occurred since then. A little over a year ago, Texas completed the transition to a more competitive electric industry structure.

Taking a vantage point in mid 2008 and from outside of the state, this paper examines Texas's electricity market from two lenses: qualitatively, by looking at structural features; and quantitatively, by tracking performance using a range of numbers and metrics.

The first half of the paper describes whether Texas has structural attributes associated with a successful competitive market. These include the presence of: many buyers and many sellers; low barriers to entry (including prices over time that support new entry); non-discriminatory access of market participants to essential facilities necessary to participate in markets; means to mitigate the ability of market participants to exercise market power; informed consumers; transparency of prices and options; and relatively stable and transparent market rules.

Second, the paper also quantitatively evaluates results in the Texas electric industry in terms of the following parameters: reliability and infrastructure investment; the availability of suppliers and product offerings; price; environmental quality; and customer involvement. There are a variety of relevant and informative metrics that shed light on how well Texas's efforts to restructure its electric industry have satisfied the parameters necessary for an efficient competitive electricity market to develop and flourish. These retail and wholesale market metrics focus on: trends in real prices compared to input costs; diversity of retail products and suppliers; market share of incumbent companies; customers' options and choices, and awareness of them; retail consumer protections; entry of (and investment in) generation and transmission; entry of renewable resources; air emissions; and access to transmission.

Measured against all these metrics, Texas has had an overall successful competitive power market experience, having met the various qualitative and quantitative criteria for strong competitive market performance and conditions. How the Texas market has performed on these criteria is discussed below. However, Texas's success to date does not mean that improvements should not continue to be made. In particular, recent events demonstrate a need to improve ERCOT's management of congestion and the market design for the pricing of congestion. Also, technological advances on the customer side

[1] Throughout this paper, when using the term 'Texas,' I am referring primarily to the part of Texas controlled by ERCOT (the Electricity Reliability Council of Texas) – the largest and only region of Texas in which retail competition has been introduced. The reader should assume that I am referring to the ERCOT region of Texas unless the meaning is clearly all of Texas.

of the meter provide the Texas market a great opportunity to modify and reduce residential consumption (and household electricity bills) and the need for new power plants.

Texas's experience relative to various criteria for competitive electricity markets:

1. Retail customers have many options of electricity products from which to choose and offered by a wide array of providers. After a multi-year transition period, electricity customers in Texas's competitive markets are aware that they have options, can take advantage of easily-available information about products and prices, have many opportunities to choose electricity service options that fit their preferences, and are making choices in the retail market.

2. The focus of Texas's market has been on equipping consumers with information and options, and creating an environment in which consumers have the right as well as the responsibility to choose their electricity supplier without the intermediary of the wires company in between the supplier and the consumer. In parallel with development of an active retail market, there are strong customer protections in place, with continuing market oversight provided by state regulators.[2]

3. Texas emerged much more smoothly from its transition period to a fully competitive market than many other states in recent years. This resulted in part from policies that introduced consumers to the changing realities of prices in underlying energy markets as those changes unfolded over the past five years.

4. Significant investment in power plant and transmission infrastructure has taken place in Texas. Compared to other regions of the United States with restructured wholesale markets, ERCOT has experienced particularly strong capacity additions in the past decade. ERCOT's generating capacity additions are high in absolute terms (amounting to over 26,721 megawatts of new generating capacity from 1995 through April 2008). Also, taking into account the relative size of the market (in terms of peak demand levels[3]), ERCOT's cumulative capacity additions are relatively high.

5. Texas has excelled, in particular, in improving the air emissions from its power sector, and in developing its large wind resources for electric power production.

6. The grid has generally operated well, with reliable service delivered to consumers, although events in the spring/summer of 2008 point to a need to better manage and price transmission congestion.

In short, Texas's retail and wholesale markets show strong evidence of many of the basic features of competitive markets: the presence of many buyers and sellers; low barriers to

[2] Customer protection rules are periodically updated to adjust to market innovations and enhance customer protections.

[3] ERCOT had a peak demand of 62,188 megawatts (MW) in 2007, and an all-time record peak demand of 62,339 MW, which occurred August 17, 2006. ERCOT, "2007 Annual Report," June 12, 2008, p. 6, available at http://www.ercot.com/news/presentations/.

entry (including price levels that support (over time) new investment); non-discriminatory access of market participants to essential facilities (such as the wires) and other services necessary to participate in markets; rules in place requiring monitoring of market performance and mitigation of the ability of market participants to exercise market power; informed consumers; and transparent and relatively stable market rules.

Several factors have contributed to Texas's successful restructuring of its electric industry:

1. **Customer Focus**: Texas designed its power market with the customer as its focal point. Customers have been the target of information campaigns and efforts, of systems to ease switching and the provision of service, of relationships with competitive suppliers (rather than with the utility or the generator). Customer choice is considered both a right and a responsibility, in ways more akin to the expectations of customers in other types of markets than in traditional electric service arrangements provided by monopoly utility companies. In fact when commencing new service or changing service locations, customers must select a competitive provider. This selection process fosters the provider-customer relationship and enhances competition as retail electricity providers aggressively compete for new customers. Furthermore, similar to other types of markets, competitive retailers are allowed to manage their relationship with customers, including charging customer deposits and having the ability to issue disconnect orders for nonpayment for the utilities to carry out under guidelines of the Public Utility Commission of Texas.

2. **Design of Retail Default Service:** Texas designed its five-year transition in a way that assisted the state and its electricity customers in actually moving to full competition, rather than temporarily preventing customers from seeing price signals reflecting the realities of today's energy market conditions. The transition allowed for periodic price adjustments to its default price (the "Price to Beat," or "PTB") when underlying fuel and purchased power prices changed. Furthermore, in Texas the default provider is truly a competitive entity and not the incumbent utility. In fact the utility's only role is to provide the wires and poles service, and it cannot compete for customers. These facts allowed a robust retail electricity market to develop and served to *transition* consumers to a new industry model.

3. **Uniform Business Rules and Codes of Conduct:** Entry barriers for prospective retail electricity providers were lowered as a result of the policy to have uniform business rules and to centralize the electricity service registration functions at ERCOT. The 'Code of Conduct for Electric Utilities and Their Affiliates,' established in 1999, was important to ensure that competitive market participants (i.e., retail electricity providers and power generation companies) received non-discriminatory treatment by transmission/distribution utility companies. In addition, the Public Utility Commission of Texas has the authority to monitor market power associated with the generation, transmission, distribution, and sale of electricity in Texas and the responsibility to mitigate market power following a finding that market power abuses or other violations are occurring.

4. **Customer Education**: Aggressive customer education and outreach programs have supported a relatively informed base of retail electricity customers, with nearly universal awareness among "electricity decision makers" of their rights and responsibility to choose their supplier of electric service.

5. **Transmission Expansion Policies**: Texas supported generation investment through its transmission access and cost-allocation policies. In ERCOT's approach, new generation pays for only the direct costs of interconnecting with the transmission network, rather than for more remote transmission system enhancements needed to upgrade the network to accommodate moving power from the resource to demand centers.[4] These other costs are broadly socialized among all end-users. Such a policy has trade-offs, but served to broaden the geographic footprint of the markets, create incentives for generating capacity additions (including remote wind resources distant from loads) during the early years of the market, and provide customers access to remote generation resources. Texas's more recent efforts to identify and endorse Competitive Renewable Energy Zones ("CREZ") and support transmission plans to support them are a recent example of such policies.

6. **Initial Market Power Mitigation Policies**: Texas supported the start of the wholesale and retail markets through its initial policy of requiring affiliate power generation companies (by then separated from their traditional sister utilities) to sell entitlements to 15 percent of the power from its installed capacity in ERCOT. These auctions promoted competition by increasing the amount of generating capacity available to competitive retail electricity providers. Furthermore, a power generation company may not own and control more than 20 percent of installed generation capacity in ERCOT. A generation company that owns and controls more than this amount must take steps such as auctioning off entitlements to its generation capacity to reduce its share to 20 percent.

7. **Strong Policies for Environmental Improvement**: As part of its restructuring legislation, Texas ensured that emissions from electric generating sources would be reduced. Texas has policies that addressed air pollutants from fossil-fuel power plants, as well as development of wind and other renewable resources. Texas has also excelled in developing and constructing wind turbine capacity, not just because of the large wind resource in the state, but because the state's integrated market design, initial renewable energy mandate and transmission policies provided fertile ground for new wind generation.[5]

8. **Strong Alignment of Retail and Wholesale Market Design and Policies**: The Texas electricity wholesale and retail markets were designed at the onset as a unified whole to support the development of efficient markets in each. The state's initiatives enabled the market to develop many important "prerequisite" conditions for a market

[4] Ross Baldick and Hui Niu, "Lessons Learned: The Texas Experience," University of Texas at Austin, undated, p. 39.

[5] Texas does not have any siting or permitting requirements for wind generation. This paper takes no position on whether there should be any siting or permitting for wind generation.

to operate efficiently, including through structural changes; unbundling of the utilities into power generation, transmission/distribution and retail electricity providers; mandatory auctioning of incumbent utilities' entitlements to power for initial periods of the transition; grid operations and certain market-administration functions (e.g., energy balancing, ancillary services, switching registration functions) centrally carried out by ERCOT; market monitoring functions carried out under the oversight of state regulators, with the assistance of a third-party market monitor; establishment of a series of policies to support informed consumers; a bilateral contracting environment among willing buyers and willing sellers; and creation of an environment in which retail customers were the focus of core relationships in the competitive marketplace. Additionally, long-standing policies to support relatively short permitting periods and strong investment in transmission infrastructure facilitated the entry of generation and transmission capacity. Together, these allowed for the conditions necessary for an efficient electricity market.

9. **Stable Regulatory Environment**: Finally, a decade of relatively stable and transparent market rules has helped to send favorable signals to the investment community about prospects in the Texas market. These market rules include tools for the retail electric provider to manage bad debt risk, including the ability to disconnect for non-payment of electric service.

Generally, wholesale power markets currently face some barriers to entry as a result of the high cost of construction, continuing uncertainty over the timing and character of national carbon-control policy, and the topology of the transmission system. Texas's wholesale market is no exception. As the events of March-June 2008 demonstrated, it is important for the state to continue to make improvements in its particular wholesale markets. Examples of enhancements moving forward are continued efforts to: maintain an active and strong market monitor to ensure that market power is not exerted at the wholesale level; develop a vibrant demand response from consumers; determine the appropriate way to manage and price transmission congestion in the absence of a nodal market; proceed with plans for a nodal energy market which will provide improved price transparency and locational price signals; make continued improvements in transmission planning; and manage the impact of renewable generation (especially those with intermittent characteristics) on the grid.

On the customer side, technological advancements behind the meter, in combination with broad deployment of advanced metering systems and other demand-management technologies, will provide residential customers the information and ability to modify their consumption. Such changes should also bring distributed generation applications (such as solar) closer to commercial deployment. To make this a reality, ERCOT will need to charge customers based on their actual electric usage, rather than based on profiles. In combination with its competitive market, this advanced technology will position Texas well for future success.

Introduction

Just under a decade ago, Texas started on a path to restructure its electric industry. Since then, in the parts of Texas where the electric system is controlled by ERCOT, the state's electric industry has undergone fundamental change. The Texas legislature enacted a law overhauling the industry in 1999. Starting in 2002, large and small electricity customers, including residential customers, have had the ability to choose their electricity supplier, and incumbent affiliated generators were required to make power products related to a portion of their generating capacity available to the marketplace. In 2007, Texas completed its transition to a more competitive structure for its electric industry.

During this same period, many other states went through similar changes[6] – with less commitment to continue on a competitive path and less success.[7] Now that the transition period[8] has ended in Texas, the performance of its electricity markets is of interest to a wide variety of stakeholders: large and small consumers, policymakers inside and outside of Texas, power marketers and retailers, merchant generators, investors, and industry groups, among others. Texas's experience merits attention, because it has been a success even in light of external factors since 2002, including rising natural gas prices, the aftermath of the California energy crisis, the fallout from Enron's bankruptcy, and the changing views in some restructured states about the promise of competition in the electric industry.

From the vantage point of mid 2008, this paper examines the state of the restructured electric market in Texas, and evaluates how the market meets both various structural (qualitative) and quantitative criteria necessary for successful performance as a competitive market. The paper points out key market design criteria implemented and reasons underlying the successes in Texas. And it identifies aspects of the market design which warrant continued attention. This paper has attempted to look beyond the surface to explore what, if any, difference it has made that Texas's electric industry is somewhat unique compared to other regions of the U.S. Taking an admittedly outsider's point of view, the paper offers guidance for state policymakers as they consider ways to refine further the retail and wholesale electricity market structures to improve competition.

Assuming that the reader is relatively informed but not necessarily an insider with expert knowledge of the detailed, inner workings of Texas's (or any other) electric industry, the

[6] Examples of states that restructured their electric industries are Arizona, California, Connecticut, Delaware, Illinois, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, and Texas. All told, 14 states and the District of Columbia adopted restructuring laws, regulations or other policies and currently allow retail customers to choose their electricity provider. Energy Information Administration, "Status of Electricity Restructuring by State," April 2007, available at http://www.eia.doe.gov/cneaf/electricity/page/restructuring/restructure_elect.html.

[7] See, for example, the report assessing relative progress by states in implementing competitive retail markets: Nat Treadway (Distributed Energy Financial Group), "ARC's Baseline Assessment of Choice in the United States: An Assessment of Restructured Markets," Paper prepared for the Alliance for Retail Choice, May 30, 2007, available at http://www.allianceforretailchoice.com/ABACUSpublication.pdf.

[8] In Texas, the "transition period" took place during the first five years of competition where the affiliated retail electric provider had to make electricity available to residential and small commercial customers at the price to beat.

paper begins by describing what has happened in Texas and what type of "lens" is suitable for evaluating success and failure in a state's transition towards a competitive industry structure. The paper provides the results of our analysis of progress to date in Texas, based largely on up-to-date information in the public domain. Finally, the paper comments on what lessons might be learned by other states as they consider next steps in the development of their own electric industries in order to assure reliable, efficient and cleaner power supply for customers in their states.

The report is the result of an extensive literature review and data analysis drawn from a variety of sources.[9] The analysis is informed not only on information provided and interpreted by others, but also from the Analysis Group's research and the author's experience in energy industry, both as a former state and federal regulator and as an advisor to government organizations, consumer groups, energy companies, regional transmission organization, non-profit organizations, and others.[10]

[9] These sources include, for example, information provided by the Public Utility Commission of Texas ("PUCT"), ERCOT, industry data providers (public and private), various policy groups, industry trade associations, and industry and academic literature.

[10] The author, Susan F. Tierney, is a Managing Principal at Analysis Group in Boston. An expert on energy policy, regulation and economics, she has had a longtime focus on the electric and gas industries. A consultant for over a dozen years, she previously served as the Assistant Secretary for Policy at the U.S. Department of Energy (appointed by President Bill Clinton), the Secretary for Environmental Affairs in Massachusetts (appointed by Governor Weld), Commissioner at the Massachusetts Department of Public Utilities (appointed by Governor Dukakis), and executive director of the Massachusetts Energy Facilities Siting Council. She taught at the University of California at Irvine, and earned her Ph.D. and Masters degrees in regional planning at Cornell University. In addition to authoring many articles and reports, she has participated as an expert and advisor in regulatory proceedings before state and federal agencies and legislatures, in civil litigation cases, in arbitrations, negotiations, mediations, and in business consulting engagements, for clients in business, industry, government, non-profit and other organizations. She serves on a number of boards of directors and advisory committees, including the National Commission on Energy Policy. She is a director of Renegy Inc. (formerly Catalytica Energy Systems, Inc.); chair of the Board of the Energy Foundation; chair of the Board of Clean Air – Cool Planet (Climate Policy Center); a director of the Northeast States Clean Air Foundation; a member of the Advisory Council of the National Renewable Energy Laboratory, the Massachusetts Renewable Energy Trust Advisory Council, the Environmental Advisory Council of the New York Independent System Operator, and the WIRES' Blue Ribbon Commission on Cost-Allocation Issues for Transmission Investment. She chaired the Massachusetts Ocean Management Task Force, and authored the report on Liquefied Natural Gas to the Massachusetts Legislature's Special LNG Commission. Previously, she served as Director on the board of the Electric Power Research Institute (EPRI) and a member of the ISO-New England's Advisory Council.

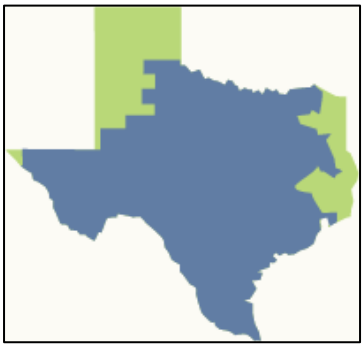
She was assisted in the preparation of this report by Andrea Okie, Katherine Franklin, and Laura Shiers of Analysis Group.

Texas's Electric Industry and its Competitive Structure: The Basics

The Electric Industry in the State of Texas

As Texas embarked on restructuring its electric industry, the industry had a traditional vertically integrated structure, with investor-owned electric utilities[11] providing service to most of the customers in the state under rates regulated by the Public Utility Commission of Texas ("PUCT"). The portion of the electric grid in the State of Texas that is under the administration of "ERCOT" (the Electric Reliability Council of Texas) was – and remains – essentially unconnected to electrical grids in other states and, in the absence of "electricity in interstate commerce," does not fall under federal regulation.[12] ERCOT is responsible for coordinating the reliable operation of the electric system in most of the state of Texas, representing 75 percent of its geographic area and about 85 percent of customer demand for power. (Figure 1 shows the ERCOT area as the dark blue portion of the state.)

Figure 1
Electric Reliability Council of Texas (ERCOT)[13] (shown in dark blue)



Texas has a diverse collection of power plants and transmission facilities in the state. In 1996, generating capacity for the ERCOT and non-ERCOT portions of Texas amounted to 73,360 MW, 88 percent of which was owned by utilities.[14] A decade later in 2006,

[11] At the time, the major utilities in Texas were: Central Power and Light Company ("CP&L"), El Paso Electric Company, Entergy/Gulf States Utilities Company, Houston Lighting & Power Company ("HL&P") which was part of Houston Industries ("HI"), Southwestern Electric Power Company ("SWEPCo"), Southwestern Public Service Company ("SPS"), Texas-New Mexico Power Company ("TNMP"), Texas Utilities Electric Company (also part of "TXU"), and West Texas Utilities ("WTU"). Today, several companies (CP&L, SWEPCo and WTU) are part of American Electric Power (although the retail part of the business for CP&L and WTU is now owned by Direct Energy); HI became Reliant Energy, whose two principal successor companies today are CenterPoint Energy and Reliant Energy (although the generation is now owned by NRG Energy); TXU is now known as TXU Energy, Luminant, and Oncor; TNMP is now owned by Public Service of New Mexico and SPS is now part of Xcel Energy.

[12] The Federal Energy Regulatory Commission ("FERC") regulates the terms and conditions of transmission and power sales in interstate commerce under the Federal Power Act.

[13] ERCOT, "Company Profile," May 15, 2008, available at http://www.ercot.com/about/profile/index.html.

[14] EIA, "State Electricity Profiles," February 1999, Table 4 (for Texas) available at http://tonto.eia.doe.gov/ftproot/electricity/stateprofiles/96st_profiles/statepro.pdf, p 266.

total generating capacity had increased to 100,754 MW, with only 25 percent owned by utilities and a significant amount of new renewable and gas-fired power plants added.[15] ERCOT had a projected reserve margin of 13.8 percent (with a 12.5 percent target) for 2008, and with a transmission system totaling 38,000 miles.[16]

The Design of the Texas Competitive Electricity Market

1999:	**Texas legislature enacts Electric Restructuring Act (SB7).**
2002:	**Texas Choice (retail competition) begins in ERCOT area; affiliate PGCs auction entitlements of 15% of their installed capacity until the earlier of 60 months or the affiliated REP lose 40% of its residential and small commercial load.**
2007:	**Transition period ends, ending "price to beat" ("PTB") rates to electricity customers offered by affiliated retail electricity providers ("REPs").**

After years of debate, the Texas Legislature enacted in 1999 the Texas Electric Restructuring Act (Senate Bill 7, or "SB7"), introducing competition into the Texas retail electricity market beginning on January 1, 2002. The law required Texas's vertically integrated investor-owned utilities to unbundle their business functions into three separate but possibly affiliated companies: a power generation company ("PGC"); a transmission and distribution utility ("TDU"); and a retail electric provider ("REP").

Since other new electric companies were also allowed to enter the market in Texas, the competitive subsidiary companies of the vertically integrated investor-owned utilities (or their successors) were called "affiliated" companies: affiliated PGCs and affiliated REPs. Each affiliated PGC had to sell, at auction, entitlements to at least 15 percent of its installed generation capacity, as long as that affiliated PGC owned 400 MW or more. This obligation would continue until the earlier of January 1, 2007, or the point at which 40 percent or more of the residential and small commercial customers in the TDU's service area were served by non-affiliated REPs.

Beginning January 1, 2002, all customers could leave their affiliated REP and buy power from another REP at a price mutually agreed-upon by the REP and the customer. Customers not choosing another REP continued to be served by the affiliated REP,[17] with "small"-use customers[18] paying the "Price to Beat" ("PTB") for electricity. Affiliated REPs' initial PTB rates were set at 6 percent less than the rates in effect on January 1, 1999, adjusted for changes in fuel prices. The PTB was allowed to be adjusted[19] twice

[15] EIA, "State Electricity Profiles," 2006, Tables 1 and 4 (for Texas) available at http://www.eia.doe.gov/cneaf/electricity/st_profiles/texas.html.

[16] ERCOT, "2007 Annual Report," May 2008, p 2.

[17] PUCT, "Report to the 78th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2003, p. 41; Ross Baldick and Hui Niu, "Lessons Learned: The Texas Experience," University of Texas at Austin, undated, pp. 8-9.

[18] "Small" included residential and commercial customers with a peak demand of one megawatt or less.

[19] Adjustments occurred at the request of the affiliated REP and the approval of the PUCT. PUCT, "Report to the 79th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2005, p. 52.

per year to reflect certain changes in fuel and purchased energy costs.[20] Affiliated REPs had to continue to charge the PTB rates to customers it served in its traditional service area through the earlier of January 1, 2005, or the date on which 40 percent of the power consumed by its residential or small commercial customers was supplied by other REPs. Thereafter, affiliated REPs could offer other rates but had to continue to make the PTB available for small customers until January 1, 2007. The transition period ended on January 1, 2007, at which point affiliated REPs were no longer required to offer service at the PTB.[21] There is a continuing restriction against any PGC owning/controlling more than 20 percent of the installed generation capacity deliverable to ERCOT.[22]

To help support retail competition, SB7 gave the PUCT new authorities, in addition to its traditional responsibilities to regulate utility companies. For example, the PUCT could: establish and enforce rules to protect retail customers from fraudulent, unfair, misleading, deceptive or anticompetitive practices; oversee all providers of electric service and assess administrative and civil penalties for violations; and carry out an extensive customer education program.

ERCOT took on new responsibilities as well. Beyond assuring system reliability, ERCOT's functions now include power scheduling, settlement, administration of a day-ahead ancillary services market,[23] and administration of the retail customer-switching functions. ERCOT serves as the registration agent for all retail transactions, including customer switch, move-in, and move-out requests. Monthly electricity

Highlights of SB7

- **Unbundling of vertically-integrated electric utilities into three separate businesses: generation; regulated transmission and distribution; and retail electric provider.**
- **Limitation (maximum of 20%) on ownership/control of generating capacity in ERCOT.**
- **Emissions reduction from older power plants.**
- **ERCOT (the ISO) has responsibility for coordinating the actions of market participants, ensuring system reliability, administering customer switching functions.**
- **Municipals and cooperatives are not affected by the law, unless they choose to open their territories to competition.**

Highlights of the Texas Choice Program

- **Retail competition started on January 1, 2002.**
- **Mandated 6% reduction from 1999 rates for residential and small commercial consumers (<1 MW), adjusted for changes in fuel prices. This was the "price-to-beat" and was the only price the affiliated REP could offer in its traditional service area to residential and small commercial customers until 2005 or until 40% of its load in a particular customer class was served by competitors.**
- **Companies were allowed to adjust their PTB rates twice a year in light of fluctuations in the price of natural gas and purchased power.**

[20] The permissible adjustments related to changes in natural gas prices or in the market price of purchased power. PUCT, "Report to the 78th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2003, p. 23.

[21] PUCT, "Report to the 78th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2003, p. 22; PUCT, "Price-to-Beat," August 20, 2001, available at http://www.puc.state.tx.us/electric/train/files/pricetobeat.ppt; PUCT, "Substantive Rule. Chapter 25. Electric," October 25, 2001, available at http://www.puc.state.tx.us/rules/subrules/electric/25.41/ 21409pub.pdf, p. 10.

[22] This requirement covered generating capacity located in ERCOT as well as capacity deliverable into ERCOT. PUCT, "Report to the 80th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2007, p. 93.

[23] Market participants are assigned obligations for ancillary services based on their share of demand and can either self-provide these services or procure them through this ancillary services market.

usage data also flows through ERCOT.[24]

While Texas has a predominantly bilateral power market, there are short-term and other transactions which are carried out in the ERCOT-administered spot energy market (i.e., the balancing market). Qualified scheduling entitles[25] submit schedules of generation and load to ERCOT based on bilateral contracts and nominations to the balancing market. Market participants schedule transactions without relying on ERCOT to determine whether there is adequate transmission capacity available to accommodate the scheduled movement of power from the generation resource to the load. Under current rules, if all of the scheduled transactions cannot be accommodated because of transmission constraints, ERCOT avoids overloading lines and clears congestion using a zonal approach (e.g., clearing prices in balancing markets differ by zone when congestion arises). The costs associated with clearing the inter-zonal congestion are directly assigned to market participants, while intra-zonal congestion costs are charged to all retail providers on a load-ratio share basis.[26] The zonal approach is currently scheduled to change in 2009, when ERCOT moves to a nodal market design.[27]

ERCOT's administration of reliability, transmission, market oversight, retail customer-switching, and anticompetitive practices are regulated and overseen by state regulators at the PUCT.[28] The PUCT has created a new Market Oversight Division to address market

[24] PUCT, "Report to the 78th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2003, p. 19.

[25] These Qualified Scheduling Entities ("QSEs") submit schedules on behalf of resource entities or load serving entities such as REPs, and are the primary entities that interface with ERCOT for scheduling power and participating in the energy market administered by ERCOT. QSEs must submit balanced daily schedules for their bilateral transactions with total generation and demand, specified at zonal level, and bid curves for zonal balancing up and balancing down energy. See PUCT, "Report to the 79th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2005, p. 33 and ERCOT, "Qualified Scheduling Entities," available at http://www.ercot.com/services/rq/qse/ index.html, accessed May 9, 2008.

[26] PUCT, "Report to the 78th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2003, pp. 19, 49-50.

[27] In 2006, ERCOT decided to move from a zonal market system to a nodal system beginning in 2008. The grid will consist of more than 4,000 nodes, with central dispatch and locational marginal prices. ERCOT will operate a day-ahead market and a real-time market (replacing the balancing energy market). ERCOT, "Understanding: Texas Nodal Market Implementation," January 23, 2008, available at http://nodal.ercot.com/about/kd/understanding Nodal 012308. In May 2008, ERCOT announced that the nodal market would not open until early 2009, in light of software implementation issues, and the final revised implementation schedule is still in development as of this writing. ERCOT, "ERCOT Announces Delay in Nodal Market Launch Date," Press Release, May 20, 2008, available at http://www.ercot.com/news/ press_releases/2008/nr05-20-08; ERCOT, "Revised Nodal Schedule Pushed to October," Press Release, August 20, 2008, available at http://www.ercot.com/news/press_releases/2008/nr08-20-08.pdf.

[28] SB7 gave the PUCT authority to establish and enforce rules to protect retail customers from fraudulent, unfair, misleading, deceptive or anticompetitive practices, and to protect consumers' options to choose and their ability to be informed of their options. SB7 specifically provided that electricity customers would have: the right to safe, reliable and reasonably priced electricity, including protection against service disconnections in extreme weather emergency or in cases of medical emergency or for nonpayment of unrelated services; bills presented in a clear format and in language readily understandable by customers; information about rights and opportunities in the transition to a competitive electric industry; access to providers of energy efficiency services, on-site distributed generation and providers of energy generated by renewable energy resources; sufficient information to make an informed choice of service provider; protection from unfair, misleading or deceptive practices, including protection from being billed for services that were not authorized or provided; and an impartial and prompt resolution of disputes with retail electric providers and transmission and distribution utilities. SB7 §§ 39.101(a) and (b). Additionally, SB 7 authorized the

design flaws, identify and prevent market power abuses and encourage and facilitate competition in the bulk power, ancillary services and transmission services markets.

Measuring Success and Failure in Texas's Competitive Electric Market

Determining the "success" or "failure" of a restructured electric market is not easy. Inherent data limitations hinder the ability to draw perfect comparisons, either across regions or over time. Also, for obvious reasons, there are substantial limits on our ability to set up a "controlled experiment" or a "counterfactual" condition – something that a researcher might want to do to understand and draw contrasts with what Texas's electric market conditions would have looked like in the absence of the initiatives that began just under a decade ago.

Despite these limitations, one can look at traditional economic measures that are relevant for evaluating a competitive market's performance generally. From a structural point of view, this involves identifying whether key qualitative attributes of a successful competitive market are present: many buyers and many sellers; low barriers to entry (including prices over time that support new entry); non-discriminatory access of market participants to essential facilities necessary to participate in markets; means to mitigate the ability of market participants to exercise market power; informed consumers; transparency of prices and options; and relatively stable and transparent market rules.

This paper also evaluates success in Texas's electric industry by examining quantitative metrics relating to: reliability and infrastructure investment; the availability of suppliers and product offerings; price; environmental emissions; and customer involvement. There are many relevant and informative metrics that shed light on how well Texas's efforts to restructure its electric industry have satisfied the features allowing for an efficient electricity market to develop and flourish. These metrics focus on: trends in real prices compared to input costs; diversity of retail products and suppliers; incumbent market share; customers' options, choices, and awareness; retail customer protections; entry of (and investment in) generation and transmission; entry of renewable resources; air emissions; and access to transmission.

PUCT to oversee all providers of electric service and assess administrative and civil penalties for violations. SB7 §39.101(e), available at http://www.capitol.state.tx.us/tlodocs/76R/billtext/doc/SB00007F.doc.

<table>
<tr><th colspan="3">Measures of Success –
Texas's Electric Restructuring and Wholesale and Retail Power Market</th></tr>
<tr><td rowspan="2"></td><th colspan="2">Practical Metrics</th></tr>
<tr><th>Retail</th><th>Wholesale</th></tr>
<tr><td rowspan="2">Evidence in support of a successful competitive power market structure (retail, wholesale)</td><td>Competitive supply to retail customers with the option to choose their supplier (the "Texas Choice" program), with appropriate consumer protections. The overall package of policies was:
Retail "price to beat" reflecting underlying trends in prices compared to input costs
Diversity of retail product offerings
Diversity of retail suppliers
Customers choosing to be served by a competitive electricity supplier
Ease of switching
Customer awareness
Customer protections
Demand response</td><td>Adequate infrastructure resources
Investment in generating capacity additions
Investment in transmission
Infrastructure for demand response and other demand-side reductions
Non-discriminatory access to transmission and other necessary facilities/services
Renewable resources and the environment
Renewable resource capacity additions and energy output
Reduction in SO_2, NOx
Reduction in rate of CO_2 emissions
Efficient power production
Adoption of an organized market (energy, ancillary services)
ISO with responsibility for transmission, grid operations</td></tr>
<tr><td colspan="2">Regulatory oversight over:
Retail customer safeguards
Wholesale market design and performance
Certification of retail suppliers
Information provision</td></tr>
</table>

In the sections below, the performance of the Texas power market is examined using the qualitative and quantitative measures of success listed above and taking into account the constraints in data that inherently exist at present.

A Qualitative Analysis of the Texas Electricity Market Under Competition

Structural Features Important to a Successful Competitive Power Market

Standard economic theory dictates that a successful competitive electric market would display most, if not all, of the following attributes:

1. *Many Buyers and Sellers* – A successful competitive electric market will be characterized by the presence of many buyers and sellers at the wholesale and retail levels, so that no single market participant alone or acting in consort with others is able to exercise control over electricity prices and products offered in the market. Competition among sellers for customers is a key force in product innovation and efficient product pricing, removing the ability of sellers to earn profits set by market power rather than through the forces of competition. Competition among buyers (along with the ability of some customers to respond to changes in prices) is important for curbing their own ability to control prices and other terms of service.

2. *Low Barriers to Entry (including price levels that support (over time) entry of new investment)* – Establishing a market characterized by many buyers and sellers requires that there be low barriers to entry (i.e., buyers or sellers seeking to enter the market are able to do so without unduly complex, burdensome, time-consuming, or costly obstacles). (Conversely, high barriers to exiting the market also can distort competitive market conditions.) All else equal, the higher (or more difficult) the barriers to entry, the more costly it will be for a potential efficient competitor to compete with existing suppliers and the more likely it is that the latter may be able to exercise market power. In the long run, competitive markets should be expected to produce prices that yield revenues high enough to cover the costs of an efficient new competitor (or new investment from existing market participants) entering the market. Without prices over the long run producing such a signal for new investment, there will be inadequate incentives for efficient new entrants – contributing to likely shortages of supply, with attendant ability of incumbent suppliers to command prices above efficient levels for some period of time.

3. *Non-Discriminatory Access of Market Participants to Essential Facilities and Other Services Necessary to Participate in Markets* – Given the importance of transmission and distribution to link generators' supplies with customers' demands, a successful competitive electric market requires that participants be given non-discriminatory access to the "bottleneck" facilities needed to participate in the market. At the wholesale level, these critical elements include equal access to the delivery infrastructure (the "wires"), grid-operation/reliability services, and other market-administration functions. At the retail level where end-use customers are expected to enjoy options among suppliers of power, this non-discriminatory access includes fair and objective rules for switching, metering and billing, as well as a strong code of conduct that prevents affiliated

REPs from receiving cross subsidies, unfair access to customers, or a higher level of service or reliability from an affiliated TDU.

4. *Means to Mitigate the Ability of Market Participants to Exercise Market Power* – Market power is the ability of a single market participant to exercise control over prices for electricity or the type or number of electric products offered in the market. A participant with market power generally controls a large portion of the electric market, and as such, may be successful in raising electric prices without losing its customers to alternative market participants. In addition to other features (such as entry and exit conditions), competitive electric markets will be supported by structural and behavioral policies and controls in place to mitigate the potential exercise of market power.

5. *Informed Consumers* – A successful competitive electric market depends upon having customers aware of and informed about their choices in the new competitive market. Especially in light of the regulated monopoly conditions existing in the electric industry in most parts of the U.S. historically, having an informed consumer base is critical to the development of a competitive retail power market. Without knowledge that a market even *exists* where one did not exist in the past, consumers are unlikely to exercise their option to choose. Having informed customers increases the participation of many buyers in the marketplace.

6. *Transparency of Prices and Options* – At the retail level, customers must be able to easily identify and understand the electric products, prices, and options available to them. This includes providing customers with a clear means to compare different offerings.

7. *Relatively Stable and Transparent Market Rules* – Attracting new market participants to a competitive electricity market requires that relatively stable and transparent market rules exist. This is important not only to minimizing the cost to market participants – and in turn, to their ultimate customers – of conducting business in the market, but also of minimizing the barriers that potential new competitors face in entering the market. All else equal, stable and relatively transparent market rules thus reduce risk, foster economical operation, and support investment – all contributing to efficient competitive market conditions and price levels.

Sizing It Up: How Texas's Power Markets Fare, Compared to the Structural and Qualitative Attributes of Competitive Markets

Using the structural features listed above and taking into account elements of both wholesale and retail markets, Texas's power markets perform relatively well. Structural changes have enabled the Texas market to develop many important "prerequisite" conditions for a market to operate efficiently. Such structural changes include: unbundling of the utilities into generation, transmission and distribution companies;

divestiture of entitlements to power for initial periods of the transition; grid operations and certain market-administration functions (e.g., energy balancing, ancillary services, switching registration functions) carried out by the ERCOT as the independent system monitor; market monitoring functions carried out under the oversight of the PUCT and with the assistance of a third-party market monitor; establishment of a series of policies to support informed consumers; and a bilateral contracting environment among willing buyers and willing sellers.[29]

Based on information available in the public domain, the electricity market in Texas has many buyers and many sellers; relatively low barriers to entry; policies and practices to ensure non-discriminatory access to essential facilities; relatively effective means to address the potential exercise of market power; relatively informed consumers; relatively transparent prices; infrastructure investment levels indicating long-run prices supporting entry; and relatively stable and transparent market rules.

1. *Many Buyers and Sellers* – Unlike traditional regulated electric industries where retail customers have no choice but to buy electricity from the local utility, Texas's electric industry has many buyers and sellers of power in both the retail and wholesale portions of the industry. On the retail side, the Texas market attracted early and lasting interest among competitive retail electricity providers. Contrasted with pre-competition conditions where the incumbent utility was the only formal seller of power at retail, today there are many retail power sellers. As of August 2008, ERCOT's electricity markets had attracted hundreds of different individual market participants.[30] Texas's REPs have included affiliates of existing ERCOT utility

[29] According to the PUCT, a bilateral market enables REPs to have wide latitude to buy wholesale supply for long and short terms and in different packages to match the expected variances in its customers' demand for power over the next day, week, month, and year. Absent wholesale market power, this variety in contracting choices provides opportunities for REPs (as wholesale power supply buyers) to insulate themselves and their retail customers from price volatility in the power market. Initially, there were concerns among some stakeholders that in the bilateral market, affiliated REPs and their affiliated PGCs had largely contracted with each other, thereby limiting the ability of new generation plants to compete to serve retail customers. In 2003, the PUCT reported its view that this situation would decrease over time as the ties between the affiliated REP and PGC diminished as customers switched to alternate suppliers and increased pressures were placed on the affiliated REPs to procure the least expensive power available. The PUCT also adopted a rule that requires power generators, power marketers, and others who sell power at wholesale in Texas to file quarterly reports concerning their wholesale power transactions in the state. Wholesale market participants need to provide information regarding their bilateral contracts, including price information, to the PUCT, which then discloses the data while protecting the confidentiality of individual buyers and seller. PUCT, "Report to the 78th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2003, pp. 77, 126; and PUCT, "Report to the 79th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2005, pp. 18, 45.

[30] ERCOT's listing of market participants as of August 20, 2008, included: 122 certified competitive retailers, 138 unique qualified scheduling entities, 277 load-serving entities, 231 resource entities; and 150 transmission/distribution service entities including municipals and cooperatives. ERCOT's listing of all market participants does not track power marketers and does not distinguish the active or inactive status of an entity in the market. A single market participant may be operating within multiple TDSPs or under separate company names. ERCOT, "List of Certified Competitive Retailers," http://www.ercot.com/mktparticipants/docs/UpdatedCertifiedCRs%2008192008.xls, updated as of August 19, 2008; ERCOT, "List of Qualifying Scheduling Entities," http://www.ercot.com/mktparticipants/docs/QSEs.xls, updated as of July 23, 2008; ERCOT, "List of Market Participants in ERCOT Region," http://www.ercot.com/mktparticipants/docs/List%20of%20all%20Market%20Participants_0808.xls, updated as of August 8, 2008; as of August 1, 2008, there were 185 registered (active) power marketers in Texas. PUCT, "Market Directories & Utilities: Electric Companies Serving Texas," available at http://www.puc.state.tx.us/electric/directories/pm/pm_list.htm.

companies selling outside of their home territories, affiliates of out-of-state utility holding companies, and many other well-established and newly formed independent energy producers.[31] And the number of distinct ("unique"[32]) REPs (competitive and affiliated) serving residential customers in Texas held steady between 2002 and the start of 2005, with 10 to 12 unique REPS, but more than doubled from 11 at the start of 2005 to 27 at the end of 2007.[33]

2. *Low Barriers to Entry (including price levels that support (over time) entry of new investment)* – The success of Texas in attracting wholesale and retail suppliers to enter the market is indicative of the presence of low barriers to entry. A core feature of Texas's retail market design – i.e., the transition process that permitted adjustments in the price to beat to reflect changes in underlying market costs – gave competitive REPs the ability to enter the market with a fighting chance to compete. This contrasts with the experience of other restructured states which discounted and/or froze retail transition prices over many years, a situation that caused market prices to diverge significantly over time from the default service rate; the chronically below-market "default service" price inhibited entry of new market participants who had no choice but to sell at market prices. Also on the retail side of the market, entry barriers for prospective REPs were lowered as a result of Texas's uniform business rules[34] and the centralizing of electricity service registration functions at ERCOT.[35] On the wholesale side of the market, ERCOT experienced 26,721 megawatts ("MW") of generating capacity additions from 1995 through April 2008, with another 6,438 MW of capacity under construction as of April 2008.[36] For a regional power market with a peak load over 62,000 MW,[37] this is strong evidence of relatively low overall barriers to entry in generation markets. This reflects not only the expectation of long-term price levels supporting new investment, but also a variety of other features in the

[31] Robert J. Michaels, "Competition in Texas Electric Markets: What Texas Did Right & What's Left to Do," Texas Public Policy Foundation, March 2007, p. 11.

[32] This refers to the fact that REPs may end up selling different types of products in the territories of more than one provider of distribution service. The "unique" number of REPs avoids double counting of these separate offerings by individual companies.

[33] See Figure 12 and corresponding text below for a complete discussion.

[34] The PUCT's "Code of Conduct for Electric Utilities and Their Affiliates," established in 1999, was important to ensure that REPs and PGCs were treated equally by transmission distribution companies. The code's stated purpose was to "establish safeguards to govern the interactions between utilities and their affiliates, both during the transition to and after the introduction of competition, to avoid potential market-power abuses and cross-subsidization between regulated and unregulated activities." PUCT, Substantive Rule **§** 25.272, available at http://www.puc.state.tx.us/rules/subrules/electric/25.272/25.272.pdf.

[35] See further discussion below.

[36] Data are through April 2008. Of the amount of new generation added, 25,894 MW are natural gas power plants; 200 MW of nuclear; 388 MW of wind; 147 MW of coal; and 92 MW of other power production capacity. Also as of April 2008, there was 6,438 MW of additional capacity under construction: 1,644 MW of natural gas fired generation; 470 MW of wind; 3,966 MW of coal fired generation. In addition, there was 25,497 MW of announced capacity as of April 2008: 11,463 MW of natural gas; 9,002 MW of nuclear; 470 MW of wind; 3,318 MW of coal; and 1,244 MW of other power production capacity. Based on an analysis of ERCOT Operations and Systems Planning Data (as of October 2007) as reported by the PUCT (in November 2007), and as updated by Energy Velocity Database (as of April 2008).

[37] As of this writing, ERCOT's all-time record peak of 62,339 MW occurred on August 17, 2006. ERCOT, "News Bulletin," August 21, 2007, available at http://www.ercot.com/news/press_releases/2007/nr08-21-07.html.

Texas market including relatively expeditious power plant permitting processes, market-based access to generating supply resources at the outset of the markets, and favorable transmission access policies (see below). Looking ahead, the current high costs to construct and finance electric and other infrastructure,[38] along with the continuing uncertainty relating to the timing and character of U.S. carbon control policies in the years ahead, now create barriers to entry to new coal generation – although these factors are not unique to Texas and do not appear yet to have had a measurable impact in the state.

3. *Non-Discriminatory Access of Market Participants to Essential Facilities and Other Services Necessary to Participate in Markets* – Texas's wholesale market was designed in conjunction with its retail market, with an array of policies put in place to ensure that market participants would have access to systems and facilities needed to participate in the market. Three aspects of the market design – tied to unbundling and divestiture, transmission access and cost-allocation, and market administration – are notable in this regard. First, existing generating capacity was made available to retail electricity providers in the early years of the market. Prior to the opening of Texas Choice, incumbent generation owners were required to sell at auction multi-year entitlements to at least 15 percent of the power from their generation capacity. These auctions promoted competition by increasing the amount of generating capacity available to competitive and affiliated REPs alike.[39] In parallel, growing demand for electricity in Texas and the entry of new REPs needing supplies opened up markets for developers/owners of new generating capacity as well. Second, new generation facilities in Texas pay only for direct costs to interconnect to the transmission system, rather than also paying for "deep" inter-connection costs for any upgrades to the network needed to accommodate moving power from the resource to demand centers.[40] Third, Texas adopted a centralized system for administering the customer "move-in" and "switching" processes needed whenever a retail customer initiated service with a REP or changed service from one REP to another. ERCOT, as the centralized registration agent for the competitive retail market in Texas, has responsibility to receive and manage the transaction orders to assure that customers receive electric service when they move to a new location (or move out of one), start up electric service, arrange for power to be supplied by a REP, and track monthly electricity usage data. This centralized "service registration" function (at ERCOT) in Texas is different than in other states where these functions are carried out by the local distribution utility, which can cause the retail electricity provider to build multiple registration systems for a single state. In Texas, the goal had been to develop a relatively smooth process not only for consumers but also for REPs seeking

[38] Susan F. Tierney, "Decoding Developments in Today's Electricity Industry - 10 Points in the Prism," paper prepared for the Electric Power Supply Association, October 2007, pp. 4, 6.

[39] Affiliates of the incumbent generation company (including affiliated REPs) were prohibited from purchasing the capacity entitlements.

[40] In some other jurisdictions, developers of new generation projects pay upfront for local and system upgrades to the transmission network necessary to deliver their energy to demand. Other costs are broadly socialized among all users. Ross Baldick and Hui Niu, "Lessons Learned: The Texas Experience," University of Texas at Austin, undated, p. 39.

to participate in the Texas market, especially in service areas that would otherwise be small markets.[41] Fourth, competitive REPs in Texas operate in a manner similar to more traditional competitive industries, and differ in key ways from policies and practices in some other states with retail choice. For example, customers initiating service in Texas must select a competitive provider, unlike in other restructured states where a new customer must initiate service in the first instance with a utility and then separately switch to a competitive provider. Texas also has strong codes of conduct and prohibitions on the utility being in the merchant function. Finally, competitive REPs in Texas are allowed to manage directly their credit and collection relationship with customers in a manner similar to more traditional competitive industries; in most other states, these relationships between competitive suppliers and their retail customers must occur with the utility as a middle man. In Texas, competitive REPs can charge deposits and issue disconnect orders to the utilities to implement for non-payment in accordance with PUCT rules. Also, certain social policies regarding low-income customers are addressed in a competitively neutral manner, as described later in this paper.

4. *Means to Mitigate the Ability of Market Participants to Exercise Market Power* – Texas restricted the ability of individual market participants to exercise market power through several methods. SB7 mitigated wholesale market power by limiting a power generation company from owning or controlling more than 20 percent of the installed generation located in, or capable of delivering power into, ERCOT. The initial 15-percent capacity entitlement auctions allowed non-affiliated[42] REPs an opportunity to gain access to power from existing generation capacity. The mandate for vertically integrated investor-owned utilities to unbundle into three separate companies – a PGC, a TDU, and a REP – allowed all REPs and PGCs equal access to service from TDUs. Non-discriminatory access to the grid was further supported through ERCOT's role as the independent grid administrator. Finally, Texas established market monitoring and mitigation functions, which are carried out under the oversight of the PUCT with the assistance of a third-party market monitor.[43]

5. *Informed Consumers* – From even before the opening of its retail market in 2002, Texas adopted a strong consumer education effort. SB7 (1999) established and the PUCT administered – and still operates – an extensive customer education campaign in areas open to retail competition to inform retail customers about their choices in the new retail competitive electricity market. While there is a broad-based effort targeted to all consumers, there are also forms of assistance targeted to low-income and non-English-speaking electricity users. The "Texas Electric Choice" campaign

[41] PUCT, "Report to the 78th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2003, pp. 19, 51.

[42] In Texas, the incumbent REP was not considered to be an affiliated REP in TDU areas outside its incumbent territory.

[43] PURA 39.157 provides the PUCT the authority to monitor market power associated with the generation, transmission, distribution, and sale of electricity in Texas and the ability to require mitigation of market power following a finding that market power abuses or other violations are occurring. PUCT, "Public Utility Regulatory Act" (PURA), September 1, 2007, available at http://www.puc.state.tx.us/rules/statutes/Pura07.pdf.

uses four primary methods to educate Texans about the changes in the electric industry. These are: outreach and public service announcements;[44] a call center to handle questions and answers;[45] educational literature, including brochures, fact sheets and other materials sent via e-mail or distributed; and a "Power to Choose" website to enable customers to compare product offerings across different REPs, and to search for and identify product offerings by various criteria.[46] These various forms of customer education and assistance have been designed to give customers the information they need to understand the new competitive market and to assist them in understanding their options. While the PUCT's services provide assistance, the aim in the end has been to prepare consumers to interact directly with competitive electricity providers in a normal commercial relationship.[47] Indeed, REPs also provide educational material and informational services to consumers. In part as a result of these educational efforts, there is strong indication that in Texas, consumers are aware of the fact that they are in a state with a restructured electric industry. In ERCOT Texas, awareness of "retail choice" is almost universal among individuals responsible for making decisions about their electricity supply: according to consumer polls at the end of 2006, 92.5 percent of electricity "decision-makers" in deregulated areas were aware that they could choose their electric company.[48]

6. *Transparency of Prices and Options* – In Texas's retail power market, price transparency is high. Retail customers have many ways to identify and compare the variety of available electric product offerings. The PUCT's "Power to Choose" website provides consumers with the ability to directly compare product offerings between different REPs, and search for and identify product offerings by various criteria. During the fourth and fifth years of the campaign website there were more than 700,000 unique visitors to the website and more than 13 million total page views. The excerpt shown in Figure 2 below from PowerToChoose.org shows a small portion of the many offers a consumer in one area could compare and contrast, with high price transparency.

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[44] "Outreach and Public Service Announcements" include radio announcements, a network of organizations that distribute literature (reaching 312,440 people during 2006), television outreach events (with 2 million viewers in June 2006), and public-service-announcement program (reaching an audience of almost 3 million in the restructured service areas). These public service announcements allow information to be aired at one-fifth the cost of commercial airtime. The call-in center has a staff in place six days a week, with an automated system with answers available on all days of a week. PUCT, "Report to the 80th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2007, pp. 45-46.

[45] A toll-free bilingual answer center is available to consumers as a way to obtain answers to their questions. PUCT, "Report to the 80th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2007, p. 46.

[46] PUCT's "Power to Choose" website (www.PowerToChoose.org and the Spanish version, www.PoderDe Escoger.org) and PUCT, "Report to the 80th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2007, pp. 45-46.

[47] Power to Choose Website, "Compare Offers Now," May 14, 2008, available at http://www.powertochoose.org/_content/_compare/compare.aspx. PUCT, "Report to the 80th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2007, pp. 45-46.

[48] This poll focused on those individuals responsible for making decisions about their electricity providers (e.g., the person who pays the electricity bill). The 92.5 percent awareness as of December 2006 was up from 84.1 percent in December 2004, and from 66.8 percent in August 2002 "Texas Directions Poll," Conducted by the Ampersand Agency on behalf of Sherry Matthews Advocacy Marketing, January 2007.

Figure 2

Retail Electric Provider	Avg. Price/kWh (1,000 kWh)	Cost per 1,000 kWh	Rate Type	Renewable Energy Content	Term (Mo.) Cancellation Fee
YEP *Guaranteed Savings & No Long Term Commitment E-Plan* Terms of Service | Facts Label Sign Up | Special Terms	14.8¢	$148.00	Variable	0%	1 Variable
Cirro Energy *Smart Pass 12* Terms of Service | Facts Label Sign Up | Special Terms	14.6¢	$146.00	Variable	2%	12 One month's average usage
Gexa Energy *Gexa Green 6* Terms of Service | Facts Label Sign Up | Special Terms	13.8¢	$138.00	Fixed	100%	6 $150.00
Amigo Energy *Online 12-month Commitment Program* Terms of Service | Facts Label Sign Up | Special Terms	14.1¢	$141.00	Fixed	0%	12 $69.95

Source: Power to Choose Website, "Compare Offers Now," October 20, 2008, available at http://www.powertochoose.org/_content/_compare/compare.aspx.

Third-party information providers have also emerged in Texas. For example, a number of on-line energy marketing firms have emerged in the past few years to assist customers in shopping among the services of competitive suppliers. These sites list rates and different plan types for residential and commercial customers, make recommendations about various suppliers based on the particular selection criteria identified by customers, and provide links to competitive REPs' own websites for registration and sign-up.[49] Akin to the on-line marketing services that have developed in other industries (e.g., hotels, airline fares), these third-party marketing agents assist REPs and facilitate comparison shopping by consumers, sometimes even

[49] See, for example, http://www.saveonenergy.com; http://www.chooseenergy.com; http://www.electricitytexas.com/; http://www.texaselectricrate.com/; http://www.texaselectricservice.com/; http://www.electricitybid.com/texas-electric-company.html, and http://www.whitefence.com. See also, Restructuring Today, "SaveOnEnergy's New Shopping Website Debuts in Texas," September 5, 2007.

offering inducements (like gift cards or other perks) for choosing to buy electricity from a particular competitive REP.[50]

7. *Relatively Stable and Transparent Market Rules* – In Texas, a decade of relatively stable and transparent market rules has helped to send favorable signals to the investment community about prospects in the Texas market. While other states have begun to analyze whether to continue to pursue a competitive approach, Texas regulators have maintained support for the competitive structure in place in ERCOT Texas, with recent regulatory actions aimed at assuring improvements in the market's performance.[51]

A Quantitative Analysis of the Texas Electricity Market Under Competition

Reliability and Infrastructure Investment:

What Has Happened in Texas?

Assuring reliable electric service to customers involves a number of elements, some of which relate to the adequacy of the physical infrastructure of power plants, transmission lines, local distribution lines, and some of which relate to operations and maintenance practices related to this physical infrastructure, with others tied more to the overall character of the operators of the grid.

An important metric for evaluating the success of Texas's system, therefore, is whether there is "enough" or "adequate" amounts of infrastructure – generating stations, transmission lines, demand-side response technology and resources – to assure that the system can operate reliably, consistent with the standards adopted in the electric industry to avoid unacceptably high levels of outages caused by inadequate infrastructure. Several metrics are useful for analyzing resource adequacy – investment in generating capacity,

[50] Restructuring Today, "Energy Shoppers Get Big Rewards at SaveOnEnergy.com," July 24, 2007; "SaveOnEnergy.com's Retail Exchange Portal Offers Texas Companies a Convenient Way to Shop for Lower Electric Rates; Fast and Simple Process Well-Received by Texas Businesses," *PR Newswire*, February 19, 2008.

[51] See, for example, Potomac Economics (ERCOT Independent Market Monitor), "2006 State of the Market Report for the ERCOT Wholesale Electricity Markets," August 2007, generally and p. xxxi. Recent statements from current PUCT commissioners indicate their support for the way that Texas has met the challenges in the electric industry, including through stable policies and implementation of SB7. See, for example, Barry T. Smitherman, Chairman, PUCT, "Theory is Clean; Life is Messy – Continuing Developments in the ERCOT Market," Remarks to the Gulf Coast Power Association Fall 2007 Conference, October 3 and 4, 2007, available at http://www.puc.state.tx.us /about/commissioners/smitherman/present/pp/GCPA_100307.pdf; Julie Caruthers Parsley, Commissioner, PUCT, "What Have You Done For Me Lately? A Look at the Texas Competitive Electricity Market," April 2008, available at http://www.puc.state.tx.us/about/commissioners/parsley/present/epp/CompetitiveElectricMarketUpdate-Apr2008.pdf; Paul Hudson, [then] Chairman, PUCT, "State of the Electric Market," Remarks to the Senate Business & Commerce Committee, February 20th, 2007, available at http://www.puc.state.tx.us/about/commissioners/hudson/present/pp/SBC_022007.pdf; Paul Hudson, [then] Chairman, PUCT, Remarks to the Gulf Coast Power Association, October 4, 2006, available at http://www.puc.state.tx.us/about/ commissioners/hudson/present/pp/GCPA_100406.pdf.

capacity or reserve margins, investment in transmission system additions, and investment in infrastructure needed to provide demand response.

Investment in New Generation: Texas has experienced substantial investment in clean, new generation under restructuring. Because the generation market is restructured, the actual amount of total dollars invested in generating resources is not publicly available. The PUCT has estimated the investment at approximately $20 billion, for new generation added in the past decade.[52] Changes in capacity additions in the past decade, however, indicate a high level of investment interest in the state's power market. Between January 1996 and April 2008, ERCOT added 26,721 MW of new capacity.[53] With this new generating capacity, and netting out 9,548 MW of retired and mothballed capacity, ERCOT has a wholesale market with 72,820 MW of generating capacity within ERCOT to meet the 62,339 megawatts system peak demand in ERCOT.[54]

Figures 3 and 4 further indicate investors' interest in entering the ERCOT Texas market over the period in which restructuring has taken place. Prior to the post-2000 rise in natural gas prices, most of the new power plant additions were gas-fired power plants. More recently, a mix of types of capacity (including coal, nuclear, natural gas and wind) has been newly proposed each year and is still reported as being in development.[55] In particular, since the start of 2002, significant wind resources have been added – total *summer installed* capacity of 1,990 MW between 2002 and 2006, with another 1,489 added in 2007 alone.[56] Development interest in wind generation shows strong interest (with 1,229 MW of new development announced as of the end of 2007) (see Figure 4).

Compared to other regions of the United States with restructured wholesale markets, ERCOT has particularly strong capacity additions in the past decade. Figure 5 compares

[52] Julie Caruthers Parsley, Commissioner, PUCT, "What Have You Done For Me Lately? A Look at the Texas Competitive Electricity Market," April 2008, p. 16, available at http://www.puc.state.tx.us/about/commissioners/parsley/present/epp/CompetitiveElectricMarketUpdate-Apr2008.pdf. This $20 billion estimate is roughly consistent with an approach I used previously in another white paper, to calculate the dollar level of investment in new generation capacity in recent years in the U.S. Susan F. Tierney, "Decoding Developments in Today's Electricity Industry - 10 Points in the Prism," paper prepared for the Electric Power Supply Association, October 2007, footnote 10, in which I assumed a capital cost of approximately $550/kW for combined cycle natural gas power plants based on RDI's Outlook for Power in North America 1999, Annual Addition (2000). (More recent estimates of capacity costs are much higher.)

[53] Based on an analysis of ERCOT Operations and Systems Planning Data (as of October 2007), as reported by the PUCT (in November, 2007), and as updated by Energy Velocity Database (as of April 2008).

[54] All time peak in August 2006. ERCOT, "2007 Annual Report," May 2008, p. 2.

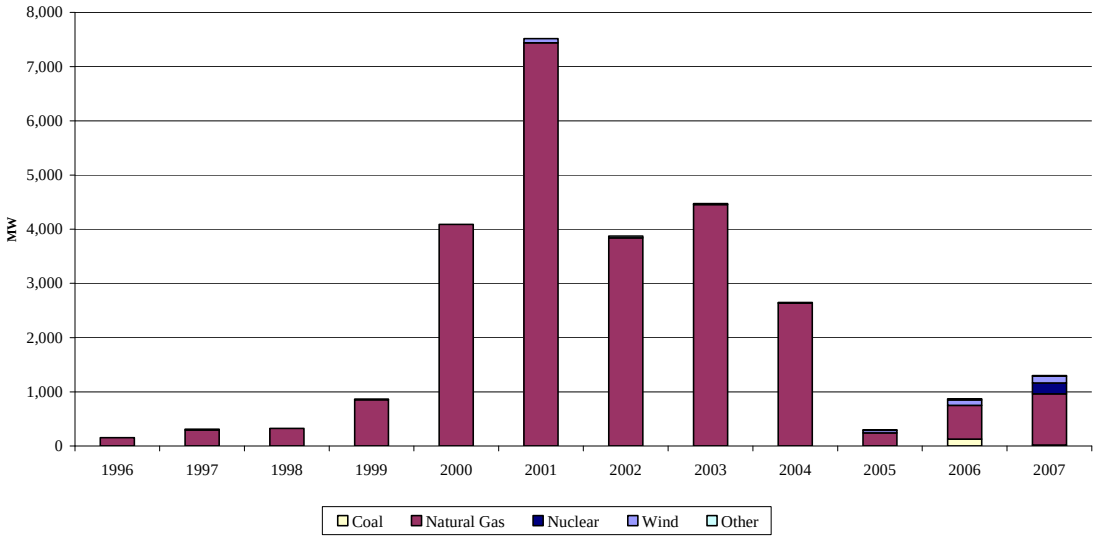
[55] Figure 4 shows the year in which each new project was announced, for projects that were still active in January 2008. Announced projects that were cancelled prior to January 2008 have been excluded as have projects in early stages of development whose status has not been publicly disclosed, where voluntary.

[56] Note that the capacity shown in Figure 3 suggests a lower amount of wind capacity has been added in ERCOT than is indicated in this sentence, which reports summer installed capacity value of wind turbines. The capacity amounts in Figure 3 (and in subsequent Figure 6, later in this report), reflect the *capacity value* of generating units as counted by ERCOT for resource adequacy analyses (i.e., reserve margin planning purposes). For those purposes, ERCOT discounts the capacity of wind units to 8.7 percent of nameplate capacity value, to reflect the amount that can be relied upon in the peak hour for capability planning purposes. The nameplate values are relevant here for indicating the significant amount of development of wind resources, which are capable of providing power in other periods besides the peak hour.

cumulative power plant capacity additions in ERCOT with those in California (the "CAISO," or California ISO region), New York (the "NYISO" region), New England (the "ISO-NE" region), and the PJM region (in the Mid-Atlantic and portions of the Midwest area). As shown, ERCOT's generating capacity additions are high in absolute terms, but also in terms of its relationship to its 2007 summer peak demand. Taking into account the relative size of the market (in terms of peak demand levels), ERCOT's cumulative capacity additions are higher than in the other regions (except New England).

Figure 3

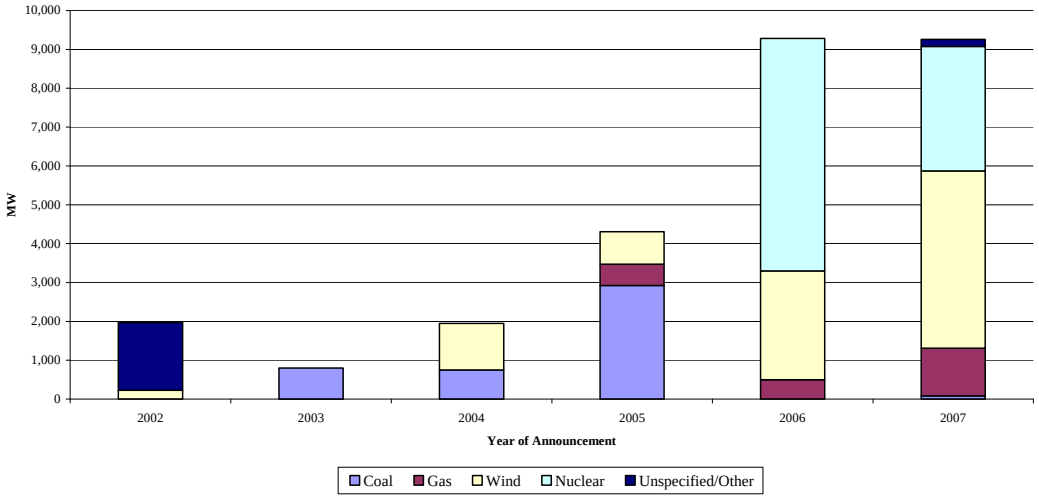
ERCOT Summer Capacity of Plants Added
by Fuel Type (MW)
January 1996 - November 2007



Notes:
1. Wind generation is discounted to 8.7% of summer capacity to reflect ERCOT's treatment of wind generation in its reserve margin analysis.
2. Capacity resources do not include DC Ties.
Source: Analysis of ERCOT Operations and Systems Planning Data as reported by the PUCT and Energy Velocity Database and ERCOT, "Report on the Capacity, Demand, and Reserves in the ERCOT Region," May 2008.

Figure 4

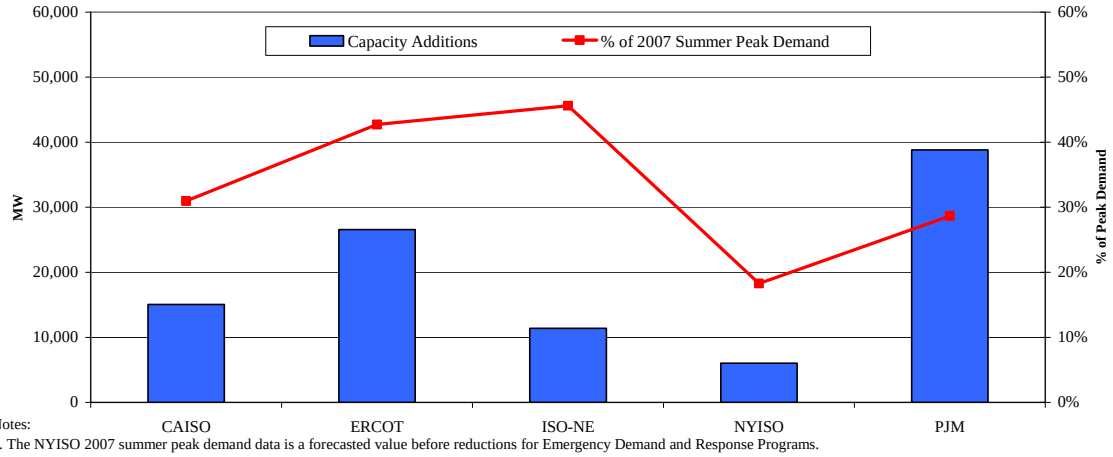
**ERCOT Capacity of Plants Currently Under Development
by Fuel Type (MW) and Year of Announcement
July 2002 - December 2007**



Notes:
1. Data for new plants under development are based on "Date of Application for Interconnection."
2. Proposed projects have signed an application for interconnection.
3. "Unspecified/Other" includes combined cycle and combustion turbine.
4. Data do not include plants that were cancelled or projects under early stages of development.
Source: ERCOT Operations and System Planning Data, available at http://oldercot.ercot.com/tmaps/ListMaps.cfm?GroupID=50, as of January 22, 2008.

Figure 5

**Capacity Additions by ISO Region (MW and % of 2007 Summer Peak Demand)
1997 - 2007**

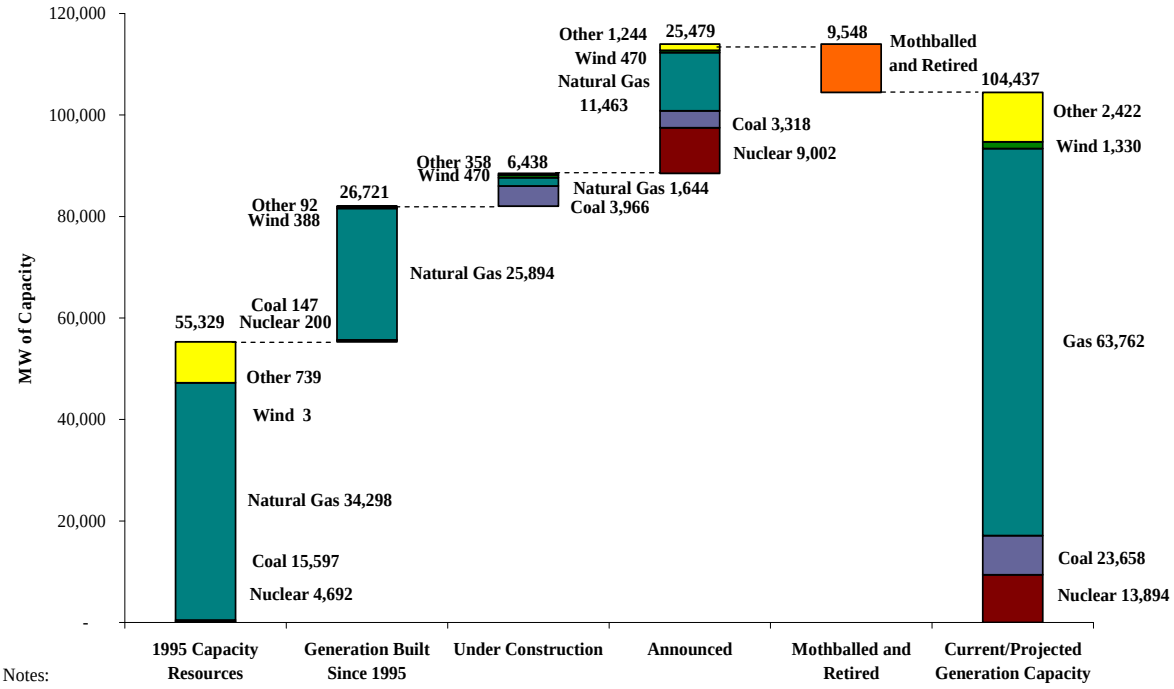


Notes:
1. The NYISO 2007 summer peak demand data is a forecasted value before reductions for Emergency Demand and Response Programs.
2. The actual 2007 summer peak demand was 48,615 MW in CAISO, 62,188 MW in ERCOT, 25,773 MW in ISO-NE, 139,428 MW in PJM, and forecasted as 33,447 MW in NYISO.
3. Capacity additions only include capacity from plants that are currently operating and exclude capacity from plants that are currently retired or mothballed. Data for ERCOT come from ERCOT Operations and Systems Planning Data, the PUCT and the Energy Velocity Database. The data for the remaining ISOs come from Platts BaseCase.
Sources:
1. California ISO, "California ISO Peak Load History 2007," April 25, 2008.
2. ERCOT, "Report on Existing and Potential Electric System Constraints and Needs," December 2007.
3. ISO New England Annual System Peak, Day & Hour Workbook, May 13, 2008.
4. New York ISO, "2007 Load and Capacity Data," April 1, 2007.
5. PJM, "2007 State of the Market Report," March 11, 2008.
6. Analysis of ERCOT Operations and Systems Planning Data as reported by the PUCT and Energy Velocity Database.
7. Platts BaseCase.

Figure 6 shows how the total amount of installed generating capacity in ERCOT may change, relative to the amount of existing capacity in 1995, if all currently announced new capacity were ultimately brought into commercial operation. It shows that 26,721 MW of additional capacity has already been added to the ERCOT system since 1995, another 6,438 MW are under construction, and an additional 25,479 MW have been announced. After factoring in mothballed and retired plants, this additional capacity could ultimately raise the total generating capacity of ERCOT to 104,437 MW, up more than 88 percent since 1995.

Figure 6

Summer Capacity Changes to Generation Capacity in ERCOT Since 1995



Notes:
1. Wind generation is discounted to 8.7% of summer capacity to reflect ERCOT's treatment of wind generation in its reserve margin analysis.
2. Capacity resources do not include DC Ties.
3. Not all "Announced" Nuclear Generation has a completed Nuclear Regulatory Commission Application.
Source: Analysis of ERCOT Operations and Systems Planning Data as reported by the PUCT and Energy Velocity Database and ERCOT, "Report on the Capacity, Demand, and Reserves in the ERCOT Region," May 2008.

Capacity margins: In light of these substantial capacity additions, reserve margins are adequate at present. ERCOT has reported actual reserve margins[57] for summer peak periods at levels above its "target" of 12.5 percent:

ERCOT Reserve Margin
(Actual, Unless Otherwise Noted)

2002	35.6%
2003	26.7%
2004	25.2%
2005	16.5%
2006	16.4%
2007	14.6%
2008	13.8% (projected)

Investment in Transmission: Significant new investment in the transmission system has taken place over the past few years in ERCOT.

ERCOT Transmission Improvements
($ million)[58]

2002	$400.9
2003	$424.7
2004	$360.1
2005	$557.4
2006	$749.4
2007	$919.5

Cumulatively, this recent investment totals $3.4 billion in the past six years. These investments have resulted in major additions of miles on the ERCOT Texas transmission grid – with relatively high levels of incremental enhancements both in absolute terms and compared to what has occurred in some other regions of the U.S. in the past decade.[59]

[57] ERCOT, "2006 Annual Report," May 2007, p. 14, and ERCOT, "2007 Annual Report," May 2008, pp. 2, 15.

[58] ERCOT, "2006 Annual Report," May 2007, p. 14; ERCOT, "2007 Annual Report," May 2008, p. 15.

[59] Taking the size of the region's load into account, ERCOT's investment is relatively high. For example, ISO-NE reports that just $1 billion has been spent on regional transmission over the past eight years combined (2000-2007), amounting to an average of $125 million annually. ERCOT's $3.4 billion transmission investment over the last six years combined (2002-2007) amounts to an average of approximately $569 million annually. Taking the ratio of average annual investment to 2007 summer peak load in each region (62,188 MW in ERCOT and 25,773 MW in ISO-NE), indicates that annual transmission investment per MW of peak demand has been nearly 90 percent higher in ERCOT than in ISO-NE ($9,144 per MW in ERCOT versus $4,850 per MW in ISO-NE). Similarly, while PJM has authorized over $7 billion in transmission investment between 2000 and 2006 (corresponding to an annual average of $1 billion), its larger peak load (139,428 MW in 2007) indicates that it is behind ERCOT in terms of load-weighted investment in transmission, with annual transmission investment per MW of peak demand more than 25 percent higher in ERCOT than in PJM ($9,144 per MW in ERCOT versus $7,172 per MW in PJM). ISO/RTO Council, "Progress of Organized Wholesale Electricity Markets in North America: A Summary of 2006 Market Data from 10 ISOs & RTOs," October 16, 2007, p. 5. (Note that ISO-NE reports that four major 345-kilovolt (kV) transmission projects have been successfully constructed and put into service in four states, and another two major 345-kV transmission projects are under construction in two states. Additionally numerous smaller projects are being planned. Statement of ISO-NE, "Regional System Planning Spurs Major Investment in New England's Transmission System: ISO-NE to Conduct

Figure 7 shows the circuit miles of new transmission added[60] in ERCOT prior to and following restructuring in Texas. In 2001, there were approximately 385 circuit miles of transmission added. This number jumped 21 percent in 2002 (to 466 circuit miles), and another 66 percent from 2002 to 2003 (to 775 circuit miles). From 1995 through 2005, ERCOT's total circuit miles of high-voltage transmission lines grew by 21 percent – a higher rate of additions than in most other electrical regions of the U.S.[61]

Significant new investment in transmission is also expected to continue in the future. ERCOT's 2007 "Electric System Constraints and Needs" report notes that $3 billion in proposed transmission projects have been planned for the next five years, with these projects expected to add 2,538 miles of transmission lines and additional autotransformer capacity. Of particular note are two new proposed 345-kV transmission lines and a switching station for the West Texas region to accommodate approximately 6,500 MW of wind generation that is installed or has completed an interconnection agreement.[62] In August 2008, the PUCT approved plans for new transmission facilities to transmit a total of 18,456 MW of wind power from West Texas and the Texas Panhandle to metropolitan areas of the state. The estimated cost is approximately $5 billion and was one of four scenarios ERCOT proposed in response to a 2005 legislative mandate that directed the PUCT to select the most productive wind zones in the state and devise a transmission plan to move power from these zones to the various population centers in Texas.[63]

Studies that Evaluate the Economics of Additional Transmission Expansion," NARUC Winter Committee Meeting and 2008 National Electricity Delivery Forum, February 21, 2008.)

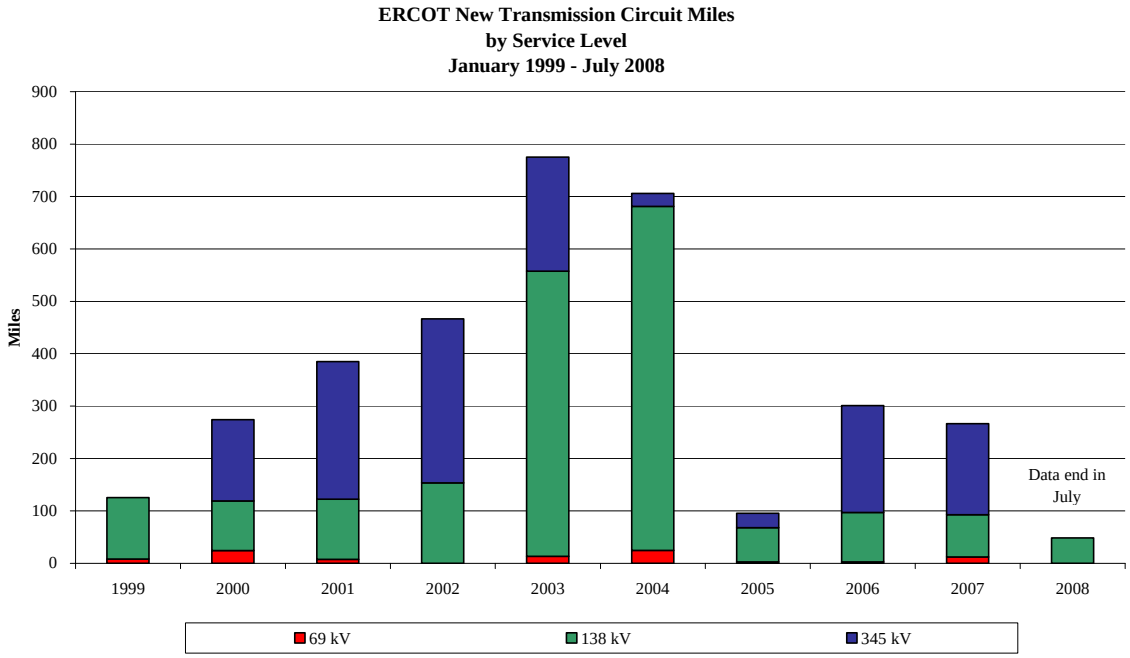
[60] Excluding circuit miles rebuilt, reconstructed, or upgraded.

[61] This refers to transmission lines of 230 kilovolts ("kv") and above in the United States. For example, over the same period, the following other regions had lower percentage increases in total circuit miles (230 kv.and above): the Western region (the "Western Electric Coordinating Council" or "WECC") increased by 7 percent; Florida (the "Florida Reliability Coordinating Council" or "FRCC") grew 8 percent; the Northeast (the "Northeast Power Coordinating Council" or "NPCC") had no increase; and the MidWest Reliability Organization ("MRO") grew by 13 percent. NERC, "High-Voltage Transmission Circuit Miles (230kV and above)," 1995-2004, 2005, available at http://www.nerc.com/files /High-Voltage_Transmission_Circuit_Miles_2005.doc, available at http://www.nerc.com /files/Historic TotalMiles_95-04.doc.

[62] ERCOT, "Report on Existing and Potential Electric System Constraints and Needs," December 2007, pp. 5-6.

[63] PUCT Order in Docket No. 33672. See PUCT, Press Release, "Texas Public Utility Commission Approves Wind Transmission Plan," July 17, 2008, available at http://www.puc.state.tx.us/nrelease/2008/071708.pdf.

Figure 7



Notes:
1. Data do not include transmission circuit miles rebuilt, reconductored or upgraded.
2. Dates are based on "Actual In-Service Date," as reported. Data include completed projects as of August 1, 2008.
Source: ERCOT Operations and System Planning Data, Transmission Project and Information Tracking Database.

Demand-Response Infrastructure: Texas has focused its attention on developing rules in ERCOT's market to create incentives for development of demand-side resources and demand response. Customers with curtailable and interruptible service compete in the markets for balancing energy and ancillary services that were initially designed for supply-side resources.[64] Industrial chemical and refinery loads with relatively predictable load patterns have participated under the new market structure, and the grid operator's ability to interrupt these customers' loads contributes over 1,600 MW of ancillary services (operating reserves) to the ERCOT market.[65] Other programs for "advanced metering" investments are currently in the beginning stages of development.[66]

Reasons for Texas's Success?

During the second half of the 1990s when Texas was actively discussing whether and how to restructure its electric industry, the state became a target of interest among investors in merchant generation. Like many of the other regions – including California

[64] Jay Zarnikau et al., "Industrial Energy Consumer Response to Wholesale Prices in the Restructured Texas Electricity Market," Draft February 2005, p. 3.

[65] Jay Zarnikau et al., "Industrial Energy Consumer Response to Wholesale Prices in the Restructured Texas Electricity Market," Draft February 2005, p. 3.

[66] PUCT Project #34610 (Implementation Project Relating to Advanced Metering) available at http://www.puc.state.tx.us/electric/projects/34610/34610.cfm.

and many parts of the Northeast – where such discussions were taking place, Texas drew the attention of power plant developers. At the time, expectations of low natural gas prices combined with availability of power plant technology with relatively low capital costs made new gas-fired power plants economically attractive for merchant plant development in these "restructuring" regions generally. Texas had the added features of local sources of natural gas, a fast-growing economy, a political climate relatively favorable to developing and permitting power plants, and environmental imperatives that pressured for cleaner air. These conditions explain the high levels of capacity additions during the second half of the 1990s.

Texas's transmission investments have also remained strong, largely as a function of ERCOT's proactive inter-connection and cost-allocation policies. As discussed more fully earlier, unlike in some other jurisdictions, in Texas, new generation facilities pay only for the costs of interconnecting with the transmission network and not for "deep" interconnection. In addition, transmission planning is done by ERCOT and not by one of the state's utilities. These policies have ensured that new entrants face relatively low transmission-related barriers to entry, and that market participants are given equal access to the transmission system with an opportunity to compete with other generators for loads.

Prices

What Has Happened in Texas?

Although too often we tend to think about prices in terms of whether they went up or down, looking at prices in that way is not particularly helpful in examining whether prices are at appropriate levels.

For one thing, the prices of fossil fuels used to generate a substantial portion of power in the state have increased significantly since 1999 when Texas passed SB7. Whether in a competitive market or a regulated industry, electricity prices generally track changes in fossil fuel prices,[67] since fuel cost is a major cost of producing electricity.[68] As of May 2008, nearly two-thirds of ERCOT generating capacity and half of its energy production came from natural gas.[69] Natural-gas-fired power plants set the market price of wholesale power more than 90% of the time.[70] Figure 8 shows the increases in natural gas

[67] See, for example, the discussion in Susan F. Tierney, "Decoding Developments in Today's Electric Industry — Ten Points in the Prism," paper prepared for the Electric Power Supply Association, October 2007, Executive Summary and Section 1 in particular.

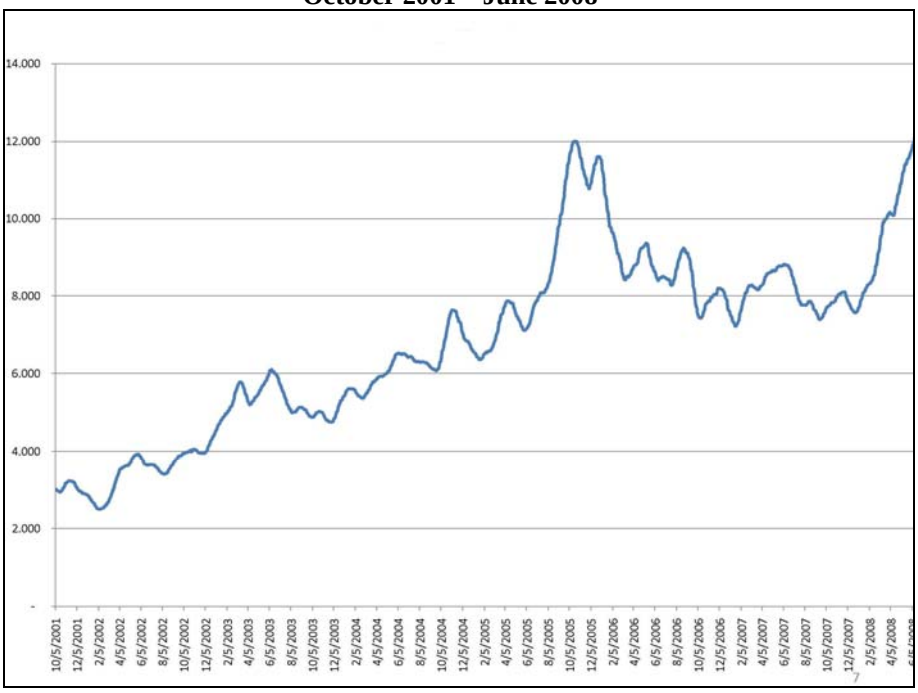
[68] This is true for power plants that use fossil fuels (e.g., coal, natural gas, oil, biomass); it is not true for forms of electricity with very low or no fuel cost (e.g., nuclear, wind, solar, hydroelectric power).

[69] In ERCOT Texas, over 80 percent of electricity produced in 2007 came from fossil fuel power production (with 46 percent from natural gas-fired power plants, and 37 percent from coal-fired power plants). Nuclear generation accounted for 13.6 percent of power produced, with wind supplying 2.1 percent and water supplying 0.2 percent of power. 65 percent of generating capacity was natural-gas-fired power plants, with 46 percent of energy produced from these same generating facilities. ERCOT, "2007 Annual Report," May 2008, p. 2

[70] This estimate is based on a 2004 Henwood study, quoted on page S-60 of the Prospectus of NRG Energy, Inc., filed under SEC Rule 424B5, on January 26, 2006, available at http://www.secinfo.com/dsvr4.vNq.htm.

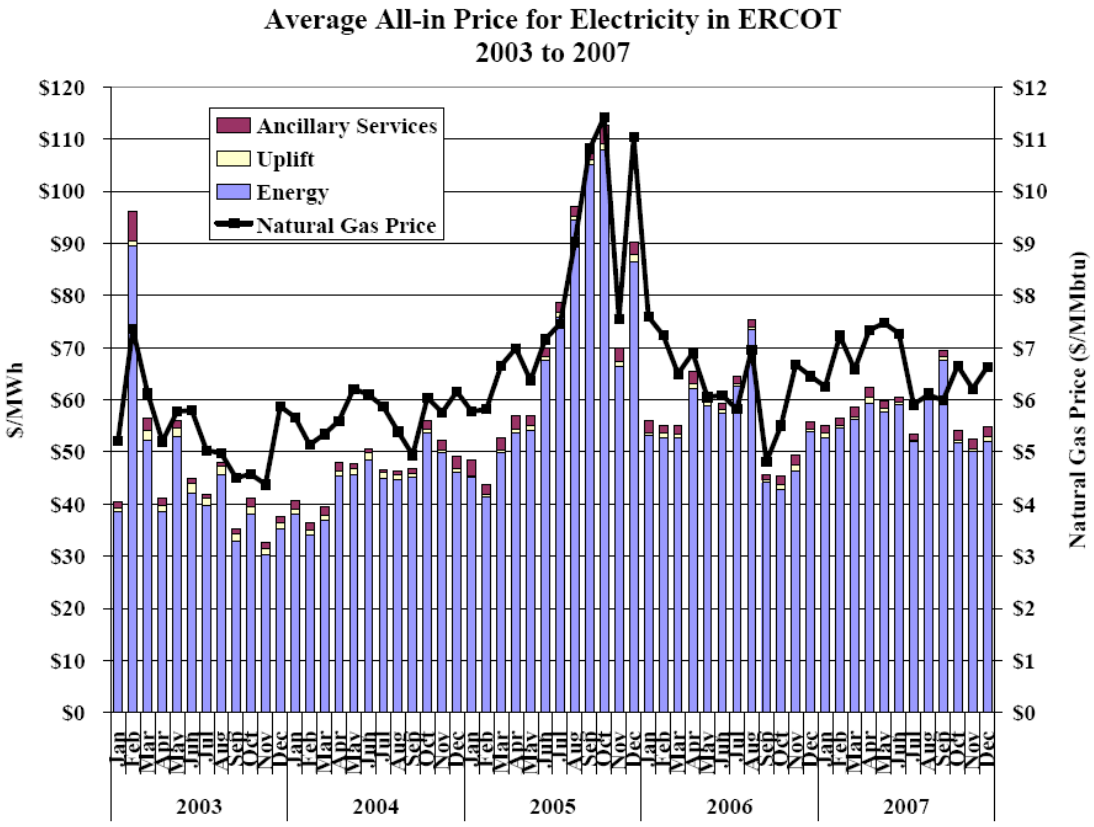
prices that have occurred since the fall of 2001, with significant increases occurring since the competitive markets opened in Texas in 2002. Focusing on the period from 2003 through 2007, Figure 9 (from the 2007 "State of the Market Report" for ERCOT) compares ERCOT's all-in wholesale electricity price to the price of natural gas and indicates how the two track each other during this recent period.

Figure 8
Natural Gas Prices: 20 Day Average
October 2001 – June 2008[71]



[71] Barry Smitherman, Chairman, PUCT, Presentation to the House Regulated Industries Committee, June 23, 2008.

Figure 9



Source: Potomac Economics (ERCOT Independent Market Monitor), "2007 State of the Market Report for the ERCOT Wholesale Electricity Markets," August 2008, p. xi.

Additionally, the costs of various other goods and services (such as construction materials, steel, aluminum, copper, concrete, and skilled labor) needed to produce electricity have risen dramatically in recent years, as a result of world-wide increases in demand for these important inputs to investment in power plants and transmission/distribution equipment. For example, the Energy Information Administration ("EIA") reports that while steel, cement, and concrete prices followed a general downward trend from the late 1970s through 2002, since then, iron and steel prices have increased by 9 percent from 2002 to 2003, an additional 9 percent from 2003 to 2004, and another 31 percent from 2004 to 2005. Cement and concrete prices have shown similar trends, although with smaller increases, from 2004 through 2006. EIA's cost index for construction materials has shown an average annual increase of 7 percent between 2004 and 2006 in real terms, whereas it had shown an average annual decrease of 0.5 percent over the past 30 years.[72] These increases in underlying cost of materials

[72] EIA, "Impacts of Rising Construction and Equipment Costs on Energy Industries," Annual Energy Outlook 2007, available at http://www.eia.doe.gov/oiaf/aeo/otheranalysis/cecei.html.

needed to construct and operate many parts of the power system have shown no sign of abating. In February 2008, IHS Inc. and Cambridge Energy Research Associates both reported that the cost of new power plant construction in North America increased 27 percent in the last 12 months and 19 percent in the most recent six months, reaching a level 130 percent higher than in 2000.[73]

Overall, electric companies spent more than $21 billion from 2002 to 2005 to comply with federal environmental laws adopted to address health problems associated with air and water pollution, also contributing to higher electric prices, and companies invested billions more to construct new and primarily natural-gas-fired generating capacity (with relatively low air emissions), including in the state of Texas.[74]

Given these changes in input costs to electricity production, it should come as no surprise then that the wholesale prices of electricity have been rising in recent years, not only in ERCOT but across most parts of the U.S. Figure 10 compares the all-in wholesale price of electricity in ERCOT against four organized electricity markets in the United States: CAISO, NYISO, ISO-NE, and PJM. ERCOT reports that while wholesale electricity markets in the U.S. experienced substantial increases in energy prices from 2004 to 2005 due to increased fuel costs, in 2006, energy prices in the U.S. dropped in every region due to decreased fuel costs. The largest decreases in electricity prices in 2006 occurred in ERCOT, with its ability to adapt relatively quickly to declines in natural gas prices "indicating natural gas resources are on the margin more frequently in this market than other markets."[75] In 2007, prices increased in all five regions, with relatively small increases in ERCOT, California and New York, and more significant increases in New England and PJM.

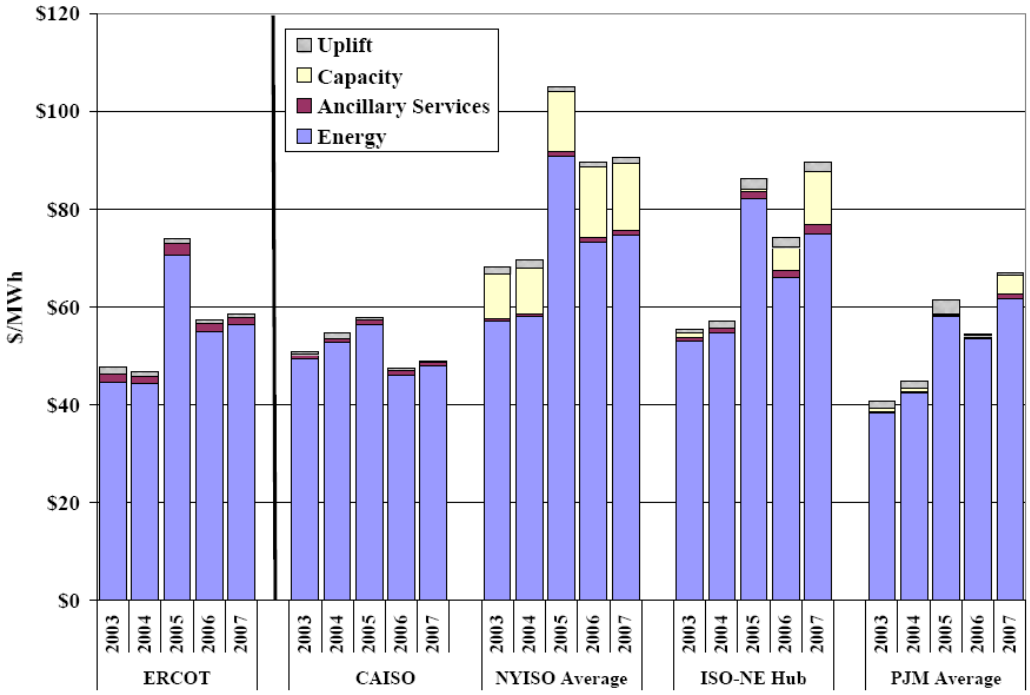
[73] IHS Inc, "North American Power Generation Construction Costs Rise 27 Percent in 12 Months to New High: IHS/CERA Power Capital Costs Index," February 14, 2008, available at http://energy.ihs.com/News/Press-Releases/2008/North-American-Power-Generation-Construction-Costs-Rise-27-Percent-in-12-Months-to-New-High-IHS-CERA.htm

[74] Rebecca Smith, "Court Decisions May Aid Some Utility Profits in Long Term," *The Wall Street Journal Online,* April 3, 2007.

[75] As noted, "natural gas resources are on the margin more frequently in this market than other markets." Potomac Economics (ERCOT Independent Market Monitor), "2006 State of the Market Report for the ERCOT Wholesale Electricity Markets," August 2007, p. xi.

Figure 10

Comparison of All-In Prices across Markets
2003 to 2007



Source: Potomac Economics (ERCOT Independent Market Monitor), "2007 State of the Market Report for the ERCOT Wholesale Electricity Markets," August 2008, p. xii.

Retail prices are affected not only by changes in the prices of wholesale power, but also by changes in the delivery costs charged by TDUs and in the REP's own internal costs. TDU delivery charges have risen since the beginning of competition. Together, overall price increases in both supply and delivery costs have meant that retail consumers see higher prices today than they did just prior to the start of competition (i.e., regulated rates in effect in December 2001). It is likely, though, that prices in Texas would have risen even in the absence of restructuring, just as they have in states that did not restructure their electric industries.[76]

To examine whether there might be a price advantage today relative to what regulated rates would have looked like in Texas without competition, a "proxy regulated rate" was developed and compared to retail rates currently in effect in parts of ERCOT Texas. The starting point of the "proxy regulated rate" was the rate in effect (in the areas now served by Centerpoint and Oncor) at the end of December 2001, on the eve of competition beginning in Texas. In order to serve as a proxy for a regulated rate in Texas today, the December 2001 rate was adjusted for changes in various underlying costs that have

[76] See, for example, my analysis comparing electricity prices in restructured states versus those that retained their traditional electric industry structure, in Susan F. Tierney, "Decoding Developments in Today's Electricity Industry - 10 Points in the Prism," paper prepared for the Electric Power Supply Association, October 2007, p. 10.

occurred since then.[77] Then, comparing current retail electricity prices in Texas, on the one hand, to the "proxy regulated rates" for 2008, would allow a general comparison of retail electricity prices "with" and "without" competition.

This analysis suggests that retail electricity consumers in Texas have fared relatively well under competition. In both the Dallas-Fort Worth and Houston areas, the "proxy regulated rate" (over 20 cents/kWh) would be approximately double what the rate was in 2001.[78] By contrast, under competition, the average August 2008 residential rate[79] in the Dallas-Fort Worth area was approximately 15.3 cents/kWh and in the Houston area was 16.1 cents/kWh. During the same month, the lowest-priced product available was 13.4 cents/kWh in the Dallas-Fort Worth area and 14.2 cents/kWh in the Houston area (see Figure 11). So this analysis suggests that while residential prices have risen in Texas since the start of retail competition, customers now have more options at lower prices than they would have had under the single regulated priced product.

[77] The rate in effect on 12-31-01 was adjusted to capture the cost (price) impacts of the following factors:

(a) changes in fossil fuel prices (to reflect the expectation that regulated rates would have included a fuel-adjustment-clause that would have permitted changes in fuel prices to flow through to customers), taking into account the mix of fuel costs used to generate electricity (which, for TXU, now the service territory of Oncor, for example, were approximately 79 percent natural gas, 18 percent coal and 3 percent nuclear);

(b) changes in labor-related portion of the rates (to reflect an expectation that rate cases since 2001 would have allowed for changes in labor-related expenses), with the labor costs in 2001 updated based on the Handy-Whitman Index for labor; and

(c) changes in the capital portion of base rates (to reflect the expectation that service-territory growth would have led to investments in new plant), using a method that started with net plant in service as of 2001, adjusted for cost increases based on the Handy-Whitman Index for utility plant

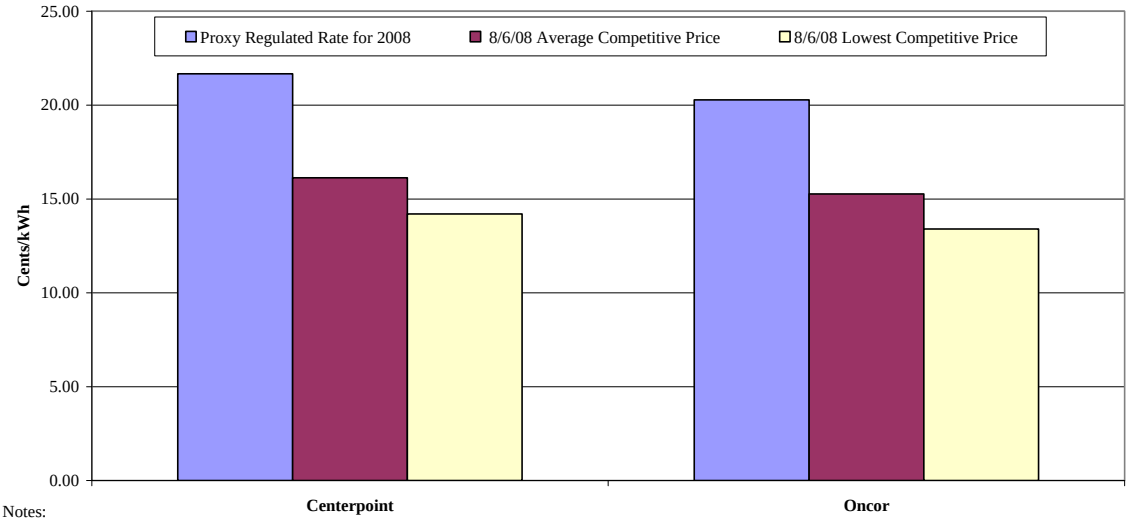
Information on 2001 rates was derived from various contemporaneous PUCT filings; adjustments to base rates used the Handy-Whitman Indices for South Regional.

[78] In December 2001, the average residential rates were: 10.40 cents/kWh for Houston Light and Power ("HLP") customers (now customers served in Centerpoint service area), and 9.67 cents/kWh for TXU customers (now customers served in Oncor service area). As shown in Figure 11, the adjusted rates for 2008 were calculated to be: 21.67 cents/kWh for HLP customers and 20.28 cents/kWh for TXU customers. The different impacts (from 2001 to 2008) for the two companies' rates reflect different fuel mixes and composition of base rates (i.e., plant versus labor costs in base rates).

[79] This reflects the price for a product with a one-year term and less than 5 percent renewables.

Figure 11

2001 Regulated Rates (Adjusted for Utility Cost Increases), Compared to Current Retail Electricity Prices (Average and Minimum Priced Offers) in Centerpoint and Oncor Service Areas



Notes:
1. The Proxy Regulated Rates for 2008 represent the 12-31-01 regulated retail rate in effect on 12-31-01 adjusted to capture the cost impacts of changes in fossil fuel prices and changes in labor-related and plant-related portions of base rates.
2. Current prices are the average and the minimum retail prices of contracts that are 12 months and have less than 5% renewable found on the Power to Choose Website for the Centerpoint and Oncor Regions on August 6, 2008.
3. The Centerpoint 12-31-01 adjusted regulated rate is based on HLP's 12-31-01 regulated retail rate. The Oncor 12-31-01 adjusted regulated rate is based on TXU's 12-31-01 regulated retail rate
Sources: Information on 2001 rates was derived from various contemporaneous PUCT filings; adjustments to base rates used the Handy-Whitman Indices for South Regional. 2008 price information: Power to Choose Website, August 6, 2008, available at http://www.powertochoose.org.

Reasons for Texas's Success

Texas has adopted a set of policies designed to induce market-based investment in generating capacity, which – in the past decade – has involved significant investment in capacity additions that use natural gas as a primary fuel. Underlying price increases in natural gas (as in other fossil fuels) in the past few years have meant that electricity prices in ERCOT's wholesale market have risen and fallen as those natural gas prices have changed, just as those impacts have occurred in the other organized RTO markets shown on Figure 10. (Note too that price increases have also occurred in states with traditionally regulated industry structures, as well.) These changes in wholesale prices have been tracked to a large degree by changes in retail prices of electricity to customers located in the ERCOT part of the state. Given the structure of retail pricing in ERCOT Texas, this relative tracking of wholesale and retail prices has had upsides and down sides for customers.

As described previously, Texas adopted a different approach than most other states in its transition from a regulated electric industry to a competitive market. One key difference was the way that Texas designed its Price-to-Beat rate, and this assisted the state in actually moving to full retail competition in parallel with wholesale competition. Texas did not establish a multi-year retail price freeze or rate cap, as other states did for their customers that remained on "default" service.[80] When Texas Choice began on January 1,

[80] California, Pennsylvania, Illinois, Rhode Island, to name a few, instituted transition price freezes or rate caps.

2002, the affiliated REPs were required to charge the rate in effect in 1999 (less 6 percent) and adjusted for then-current fuel prices. Just as important, though, the rate was allowed to be adjusted over time as changes occurred in the market prices for fuels or purchased power. This allowed the PTB rate to rise as wholesale power market prices rose.

This had two important features. It caused Texans to see prices that tracked real-world conditions, and assured that the transition period – the five-year period from 2002-2006 when PTBs were in place – would actually transition consumers to a new industry model rather than simply mask price fluctuations in underlying electricity markets leading to rate shock. Also, it offered competitive suppliers a legitimate chance to offer an attractive price relative to the PTB, since the affiliated REPs were also charging a price that reflected conditions in the wholesale markets in which all suppliers were obtaining their generation supplies. Many other states have found that at the end of their multi-year transition period in which rates were capped and eventually diverged dramatically from the underlying changes in the price to generate electricity, that not only had a competitive retail market failed to develop (since competitive suppliers could not compete against a below-market "default service" price) but also that consumers were ill-prepared to transition smoothly to a competitive market.

Given the structure of retail pricing in ERCOT Texas, this relative tracking of wholesale and retail prices has had upsides and down sides for customers. The reality of higher prices of key inputs (e.g., natural gas) to the cost of producing electricity meant that the Texas model had advantages from an economic efficiency point of view. Although few customers would actually prefer to see their prices rise, the changes occurred gradually and visibly in Texas and allowed customers to make adjustments over time.

Customers in Texas had the price signal to allow them to make their own decisions about using electricity and to rely on offerings from competitive suppliers in making their generation supply choices. As shown in the table below, in states with capped rates or rates reflecting long-term contracts, customers did not receive timely price signals and customers used more electricity year after year even though the real cost of their consumption was increasing. Contrast this with Texas, where retail consumers had price signals and usage per customer declined over time.

Percent Change in Electricity Consumption per Customer
(Weather-Adjusted Average kWh/Customer)
1998 – 2006[81]

Maryland	9%
New Jersey	10%
Pennsylvania	13%
Texas	-10%

Sources: EIA 826 data on usage and customers; NOAA weather data.

Diversity of Retail Electricity "Products," Suppliers and Electric Companies

What Has Happened in Texas?

Compared to traditional electricity service where customers have no choice of their supplier, one indicator of the degree of success in a restructured market is the extent to which customers have choices – among various products, with options among competitive suppliers. As described in a recent report, the early competitive period induced significant interest among competitive Retail Electric Providers:

> As quickly as the market opened, new [competitive REPs] entered it. They came from a variety of backgrounds. First were affiliates of existing ERCOT companies selling outside of their home territories, where they were free to discount the PTB. Second were affiliates of utility holding companies such as Sempra Energy of San Diego (parent of San Diego Gas & Electric) and Constellation Energy of Baltimore (parent of Baltimore Gas & Electric). Third were established independent energy producers such as Dynegy and Calpine who had long sold their output in wholesale markets, and fourth were retailers with non-Texas operations such as renewable power specialist Green Mountain Energy. Finally, there were companies such as GEXA and Texas Commercial Energy, which were specifically created to retail in Texas.[82]

The recent evidence confirms a vibrant level of participation of competitive REPs. Figure 12, below, shows that the number of distinct ("unique") REPs (competitive and affiliated) serving residential customers in Texas held steady between 2002 and the start

[81] Data on kWh sales and number of customers are from EIA's 826 database. Data on weather (degree days) are from the National Oceanic and Atmospheric Administration ("NOAA") for each region (Baltimore for Maryland; Newark for New Jersey; Williamsport for Pennsylvania; and Dallas for Texas) Data used to create a weather-normalized load profile were from proxy retail companies in each of the other states: Baltimore Gas & Electric for Maryland; and First Energy for both Pennsylvania and New Jersey.
EIA 826 Database, available at http://www.eia.doe.gov/cneaf/electricity/page/sales_revenue.xls and http:// www.eia.doe.gov/cneaf/electricity/epa/customers_state.xls.

[82] Robert J. Michaels, "Competition in Texas Electric Markets: What Texas Did Right & What's Left to Do," Texas Public Policy Foundation, March 2007, p. 11.

of 2005, with 10 to 12 unique REPS, but more than doubled from 11 at the start of 2005 to 27 at the end of 2007. Similarly, Figure 13 indicates that many REPs serving residential customers compete in each of the different transmission-and-distribution service territories in Texas, with the number of REPs competing in each service territory remaining relatively constant between 2002 and the start of 2005, and then roughly doubling from early 2005 through 2007.[83] During the same period, there were also increases in the number of electric products – such as "month-to-month" electricity service offers ("plans"), plans with longer contract periods, plans with fixed prices versus prices that adjust up or down over time, or plans based on electricity generated with higher-than-normal amounts of renewable energy – available to residential consumers. Using data for the CenterPoint region to illustrate these trends, Figure 14 shows this increase, with 14 separate products available at the start of 2002, 27 at the start of 2006, and 117 separate products available at the end of 2007.

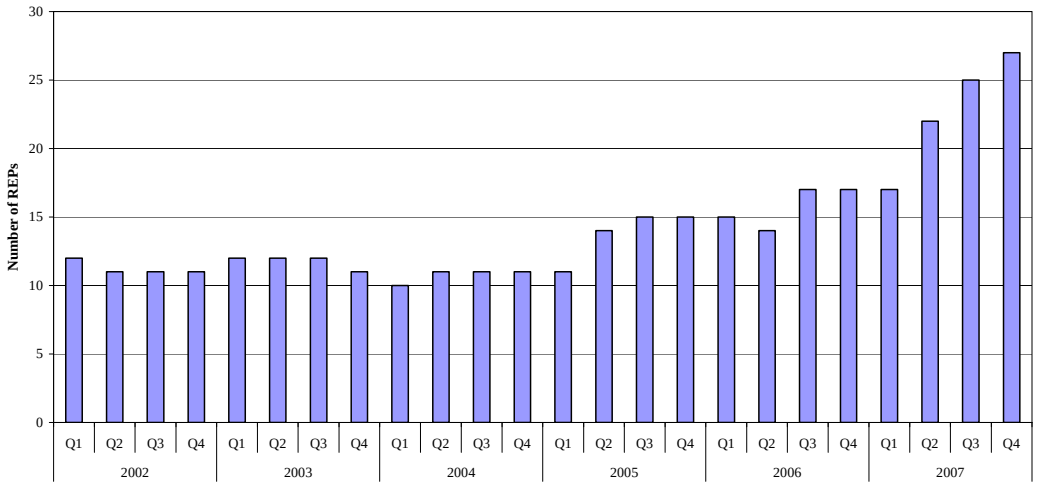
In addition to these direct service providers offering an array of products directly to retail customers, there are many other new companies involved in ERCOT's energy markets. As noted previously, ERCOT listing includes scores of market participants (as of August 2008: 122 certified competitive retailers, 138 unique qualified scheduling entities, 277 load-serving entities, 231 resource entities; and 150 transmission/distribution service entities including municipals and cooperatives), while the PUCT reports 185 registered (active) power marketers in Texas.[84] Additionally, a number of on-line energy marketing firms have emerged to assist customers in shopping among the services of competitive suppliers.

[83] Note than an individual REP may serve multiple service territories. Therefore that REP would be reflected once in Figure 12 but would be reflected multiple times in Figure 13.

[84] ERCOT, "List of Certified Competitive Retailers," http://www.ercot.com/mktparticipants/docs/UpdatedCertifiedCRs%2008192008.xls, updated as of August 19, 2008; ERCOT, "List of Qualifying Scheduling Entities," http://www.ercot.com/mktparticipants/docs/QSEs.xls, updated as of July 23, 2008; ERCOT, "List of Market Participants in ERCOT Region," http://www.ercot.com/mktparticipants/docs/List%20of%20all%20Market%20Participants_0508.xls, updated as of August 8, 2008; PUCT, "Market Directories & Utilities: Electric Companies Serving Texas," http://www.puc.state.tx.us/electric/directories/pm/pm_list.htm.

Figure 12

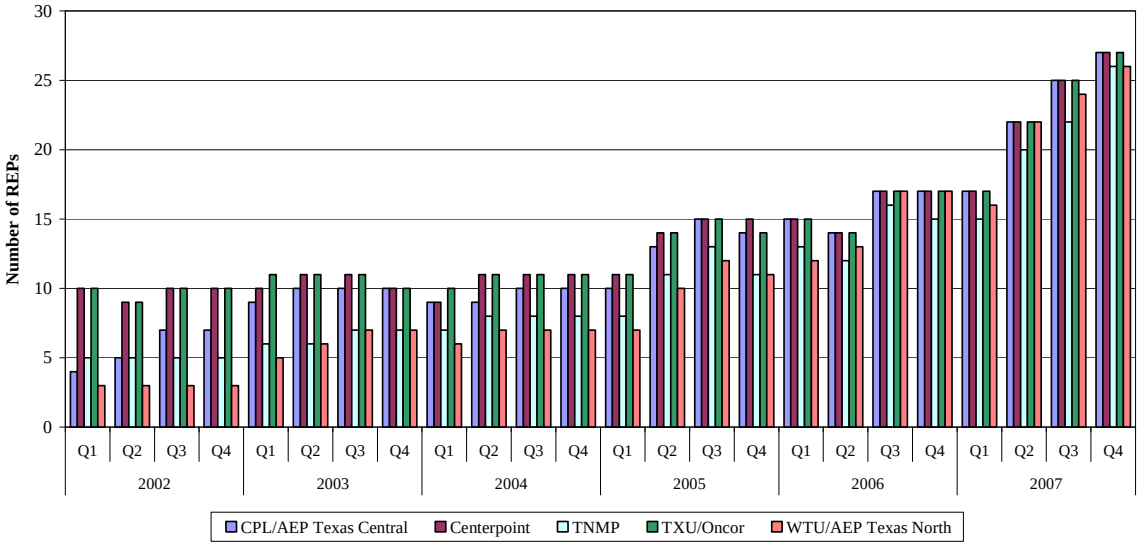
**Number of Unique REPs
for Residential Service in ERCOT
2002 - 2007**



Notes:
1. Data for 2002 through the first quarter of 2005 are provided by the Vector Group using publicly available information reported by the PUCT. Data from the second quarter of 2005 through 2007 are compiled and reported by the Vector Group.
2. Affiliated REPs are included in these data.
3. Data may not include all REPs operating in Texas.
4. The SESCO service area has been excluded due to limited data availability.
Source: The Vector Group.

Figure 13

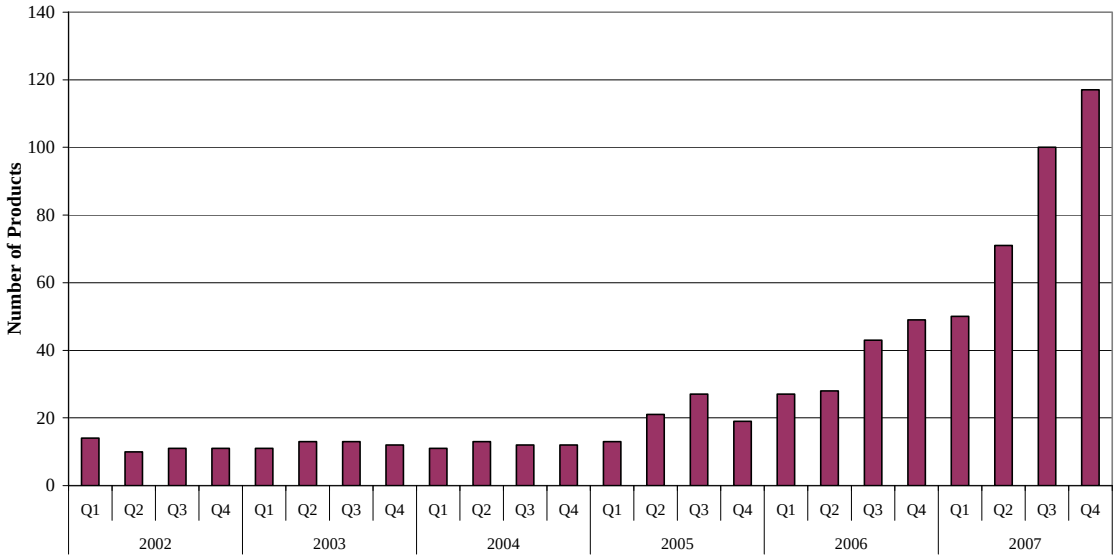
**Total Number of REPs by Transmission and Distribution Service Provider
for Residential Service in ERCOT
2002 - 2007**



Notes:
1. Data for 2002 through the first quarter of 2005 are provided by the Vector Group using publicly available information reported by the PUCT. Data from the second quarter of 2005 through 2007 are compiled and reported by the Vector Group.
2. Data may not include all REPs operating in Texas.
3. The SESCO service area has been excluded due to limited data availability.
Source: The Vector Group.

Figure 14

Number of Products in Centerpoint for Residential Service in ERCOT
2002 - 2007



Notes:
1. Data for 2002 through the first quarter of 2005 are provided by the Vector Group using publicly available information reported by the PUCT. Data from the second quarter of 2005 through 2007 are compiled and reported by the Vector Group.
2. Data may not include all REPs operating in Texas.
Source: The Vector Group.

Reasons for Texas's Success?

The retail market design in Texas allowed competitive REPs to have a chance to enter the market even as prices rose in underlying wholesale electricity markets after retail choice began in 2002. The PTB was allowed to adjust up to two times per year in parallel with changes in the price of the fossil fuel (natural gas) used predominantly to generate electricity in ERCOT. This meant that potential suppliers were not disadvantaged by having to compete against a below-market electricity price, and consumers had an opportunity to choose from among a variety of competitive suppliers vying for their business. This stands in stark contrast to the experience of other restructured states, where few competitors have entered the retail market due to conditions in which the chronically below-market "default service" price inhibited the entry of retail market participants. In addition and as previously described, consumers in these states have faced recent "rate shocks," as sudden price increases were introduced when multi-year rate freezes ended and consumers were no longer shielded from market conditions.

Other reasons for Texas's success include the availability of up-to-date information and educational materials for consumers about their options in the retail market place; the centralized switching functions carried out by ERCOT, which lowers barriers to entry for competitors and eases the process for consumers; and a series of policies (including the initial auction of capacity entitlements held previously by incumbent utility companies) that promoted fair competition.

Texas is also able to deal quickly with the business failure of REPs while providing seamless service to customers. For instance, five REPs recently defaulted on their financial obligations to ERCOT, most likely a result of the price spikes in ERCOT due to zonal congestion management in the March–June 2008 time period.[85,86] In Texas, Provider of Last Resort ("POLR") service provides a temporary, transition service allowing customers to continue to receive electric service while they choose a competitive product. Out of 6.5 million customers in ERCOT, about 44,000, or 0.7%, were transitioned to the POLRs during May and June 2008.[87] Almost two-thirds of these customers have already selected other plans or providers.

Environmental Quality and Alternative Resource Development

1. Air Pollution from Power Plants

What Has Happened in Texas?

Over the past decade, Texas's fleet of power plants has grown almost exclusively through the addition of power plants that use natural gas and wind to produce electricity.[88] The entry of significant quantities of low-emitting gas-fired and wind-power generating units into the Texas power market over the past decade has contributed significantly to decreases in emissions rates of key air pollutants in Texas. Figure 15 shows trends in

[85] Note that these REP defaults are another example pointing to the need for Texas to determine more appropriate methods for pricing transmission congestion under the zonal model and to move to a nodal market as soon as practical, as discussed later in this paper.

[86] Higher-than-normal temperatures in April and May led to increased demand in certain regions, and increased zonal congestion on the system. While some regions in ERCOT experienced greater congestion impacts, ERCOT as a whole experienced 14.4 days and 15.3 days of congestion in April and May of 2008, respectively, compared to just 3.6 days and 6.2 for the same months of 2007. (The number of days of congestion for each month were derived by averaging zonal data from pages 11 and 12 of the Barry Smitherman, Chairman, PUCT, Presentation to the House Regulated Industries Committee, June 23, 2008.) By the end of May, two companies (Pre Buy Electric and National Power) had already defaulted; by June 4th, Etricity was the third firm to default on its financial obligations. ("Etricity Brings Defaulting ERCOT Marketer Count to 3," *Restructuring Today*, June 5, 2008.) A fourth company, Sure Electric, failed a week later after its plan to declare bankruptcy was unsuccessful. By the end of the June, another company, Blu Power, had defaulted due to high wholesale power prices, bringing the total number of companies to five. ("Fourth Marketer Stripped of Customers in Challenging ERCOT Market," *Restructuring Today*, June 12, 2008; Elizabeth Souder, "Fifth Texas Retail Electric Provider to Stop Serving Customers," *The Dallas Morning News*, June 30, 2008.) On August 14th, 2008, the PUCT revoked the certificates of four of the five retail electric providers that defaulted on their service obligations. The PUCT has a continuing investigation of the activities of these companies. PUCT Press Release, "PUC Revokes Electric Provider Certificates," August 14, 2008. http://www.puc.state.tx.us/nrelease/2008/081408.pdf.

[87] Barry Smitherman, Chairman, PUCT, Presentation to the House Regulated Industries Committee, June 23, 2008; Letter from Bret Slocum to the Commissioners of the Texas PUC, dated August 6, 2008; Elizabeth Souder, "Fifth Texas Retail Electric Provider to Stop Serving Customers," *The Dallas Morning News*, June 30, 2008.

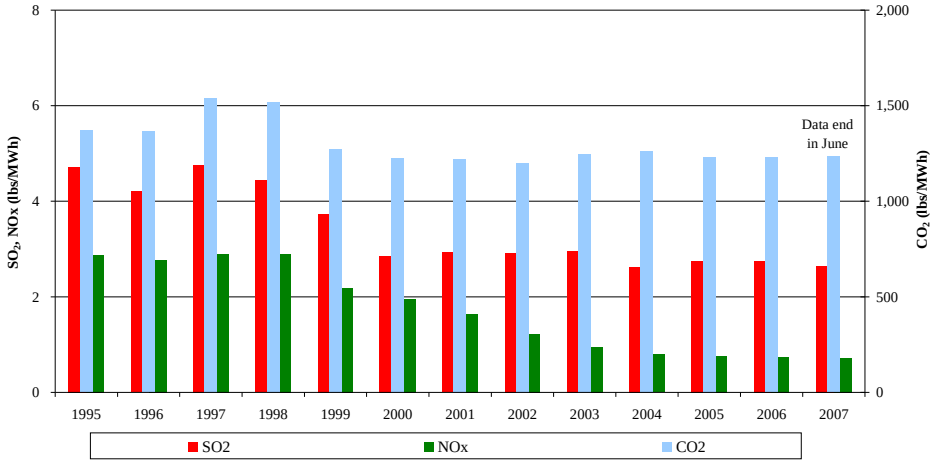
[88] Of the 26,721 MW of capacity added in Texas from 1995 through April 2008, 25,894 MW was from natural gas power plants; 388 MW from wind facilities (note that this 388 MW of wind capacity counted towards resource adequacy is actually tied to 4,457 MW of installed wind capacity actually added); 200 MW from nuclear capacity upgrades; and 147 MW from coal-fired capacity additions). Based on an analysis of ERCOT Operations and Systems Planning Data (as of October 2007), as reported by the PUCT (in November, 2007), and as updated by Energy Velocity Database (as of April 2008).

three types of air emissions from producing electricity (and combusting fossil fuel) in power plants: sulfur dioxide ("SO_2") emissions, carbon dioxide ("CO_2") emissions, and nitrogen oxides ("NOx") emissions. Figure 15 shows that from 2001 through June 2007, regulated emissions of SO_2 and NOx decreased on the basis of emissions-per-unit of electricity produced (i.e., emissions/ megawatt-hour ("MWh"): NOx emissions decreased by more than 56 percent (from 1.6 pounds/MWh to 0.7 pounds/MWh), SO_2 emissions decreased by 10 percent (from 2.9 pounds/MWh to 2.6 pounds/MWh). During the same period (2001-mid-2007), CO_2 emissions per MWh (an unregulated emission in Texas) remained relatively flat, even though it decreased since a decade ago.

Figure 16 shows that in aggregate, between 2001 and 2006, NOx emissions decreased by nearly 50 percent, while SO_2 emissions increased by approximately 5 percent, and CO_2 emissions increased by 13 percent. The increases in SO_2 and CO_2 are due to the substantial growth in electricity production.[89] Had the emissions improvement per MWh seen in the power plant fleet not occurred over the past few years, today's total emissions of NOx, SO_2 and CO_2 would have been much higher. To illustrate this point, Figure 16 also shows trend lines for each pollutant, calculated by using 1995 through 1999 (the year when SB7 was enacted) data to project emissions for the years 2000 through 2007. For each pollutant, the actual emissions in 2007 were substantially lower than what would have been predicted for 2007 based on actual 1995 through 1999 emissions.

Figure 15

Pounds of Emissions in ERCOT per Megawatt Hour of Generation
January 1995 - June 2007

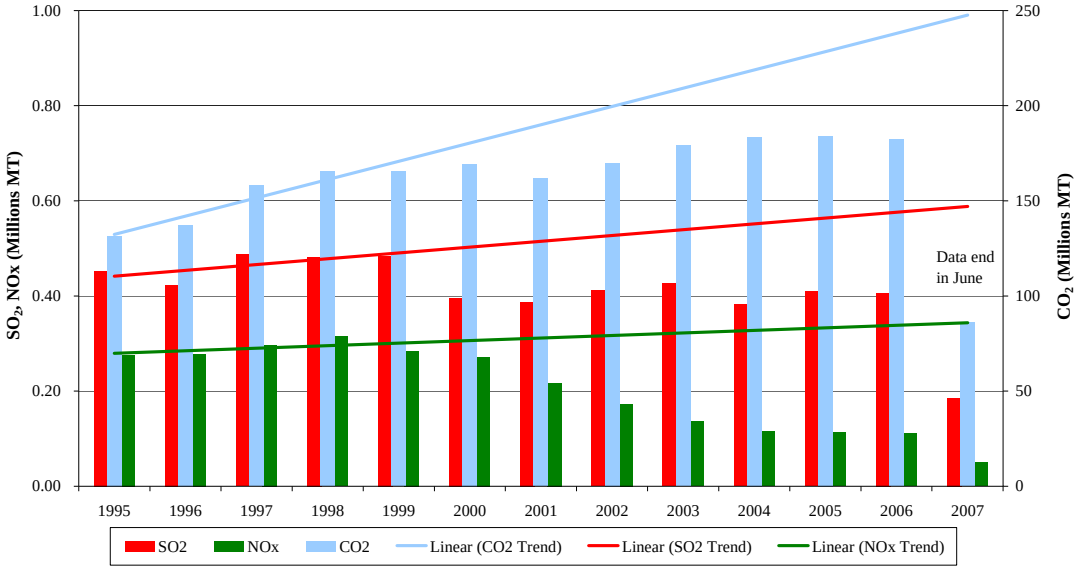


Notes:
1. Data are calculated as total emissions (lbs) divided by total ERCOT actual generation (MWh).
2. Data include plants that operate exclusively in ERCOT, as reported by Platts.
3. Data for 2007 include January - June only.
Source: Platts BaseCase.

[89] For the six-year period from 2002 through 2007, ERCOT energy consumption grew 9.4 percent, from 280.7 GWh in 2002 to 307.1 GWh in 2007. ERCOT, "2006 Annual Report," May 2007, p. 14 and ERCOT, "2007 Annual Report, May 2008, p. 15. In the U.S. electric industry overall, power production rose at two-thirds this rate, growing only 5.3 percent from 2002 through 2006 (or, from 3,858.5 GWh in 2002 to 4,064.7 GWh in 2006). EIA, "Net Generation by Energy Source by Type of Producer," from the Electric Power Annual, October 22, 2007, available at http://www.eia.doe.gov/cneaf/electricity/epa/epat1p1.html.

Figure 16

Total Emissions in ERCOT (Metric Tons)
January 1995 - June 2007



Notes:
1. Data include plants that operate exclusively in ERCOT, as reported by Platts.
2. Data for 2007 include January - June only.
3. Data are converted from pounds (lbs) to metric tons (MT).
4. Trendlines are calculated by using 1995 - 1999 data to project emissions from 2000 - 2007.

Source: Platts BaseCase.

Reasons for Texas's Success?

Among the various goals of Texas's restructuring initiative was a desire to lessen emissions of pollutants from power plants, as a way to assist the state's larger efforts to improve air quality.[90] The addition of substantial generating capacity from gas-fired power plants – facilities that are not only relatively efficient (consuming less fossil fuel per unit of electricity produced) but also use a lower-emitting fuel than coal-fired power plants – was one means to achieving this goal. The state's combination of retail and wholesale market designs enabled markets for the efficient dispatch of gas-fired power generation, with relatively low emissions per Btu of fuel burned in the power plant. The market rules allowed for incremental supplies of relatively low-emitting generation to compete with existing generation located in the Texas market. The electricity generated from wind, of course, comes with no air emissions at all. This new investment in relatively low-emitting generation has been fostered by the many improvements in market elements described above, as well as through the adoption – on two occasions – of

[90] "Air quality concerns run parallel to virtually every aspect of electric utility restructuring efforts, affecting the emerging competitive market structure on numerous levels and presenting challenges to reliability of the bulk power grid." Texas Electric Utility Restructuring Legislative Oversight Committee, "Report to the 77th Legislature," November 2000, p. 67.

increasingly more aggressive renewable portfolio standards (see below), and the cost-allocation policies that led to support for transmission infrastructure development in the state.

2. Wind Development and other Renewable Energy

What Has Happened in Texas?

The growth of Texas's large wind resource is now famous. Whereas a decade or so ago (in 1995), there were virtually no wind turbines operating in the state, by today, a vibrant wind market is on display with still-more development on the horizon. Using nameplate generating capacity as the metric, by the end of 2007 4,457 MW of wind turbines had entered commercial operation, additional projects totaling 3,600 MW had signed interconnection agreements, and another 35,000 MW of wind turbine projects had been announced.[91,92] There is no other part of the country with so much wind capacity in and/or entering the market, in spite of California's head start over the past two decades.[93]

Texas's success in developing wind turbine capacity exceeds the experience of other states, not just because of the large wind resource in the state, but because the state's market structure, renewable energy, and transmission policies provide an attractive environment for wind development. Developers of wind power in the state view these policies favorably, as noted in the following statements:

- "From the point of view of permitting, Texas 'is by far the most friendly state;'"[94]
- "Compared to other states and other markets, the siting regime in Texas for all generation resources is very favorable — but particularly for wind;"[95]

[91] The source of the commercially operating wind an analysis of ERCOT Operations and Systems Planning Data (as of October 2007), as reported by the PUCT (in November, 2007), and as updated by Energy Velocity Database (as of April 2008). The source for the other statistics is Mike Sloan, The Wind Coalition, "Competitive Renewable Energy Zones (CREZ) in Texas: Increasing Renewable Energy in the Western Grid Summit (WGA / NWCC)," September 28, 2007.

[92] As noted previously, the capacity shown in Figures 3 and 6 suggests a lower amount of wind capacity has been added in ERCOT than is indicated here, using summer capacity value of wind turbines. The capacity amounts in Figures 3 and 6 reflect the *capacity value* of generating units as counted by ERCOT for resource adequacy analyses (i.e., reserve margin planning purposes). For those purposes, ERCOT discounts the capacity of wind units to 8.7 percent of summer capacity value, to reflect the amount that can be relied upon in the peak hour for capability planning purposes. The summer capacity values are relevant here for indicating the significant amount of development of wind resources, which are capable of providing power in other periods besides the peak hour.

[93] "According to the American Wind Energy Association, by the end of 2006 Texas overtook California as the Nation's leader in wind energy capacity." EIA, "Renewable Energy Trends in Consumption and Electricity, 2005," July 2007, p. 9.

[94] John Calaway, Babcock & Brown's Chief Development Officer of wind in North America, as quoted in "Wind Developers Deem Texas Best US Market," *Electric Power Daily*, March 1, 2007.

[95] Mark Bruce, director of market affairs at FPL Energy, as reported in "Wind Developers Deem Texas Best US Market," *Electric Power Daily*, March 1, 2007.

- "We have a functional market structure…we've been able to do things with wind energy in Texas that we can't do in other parts of the country."[96]

Development has also been bolstered by the commitment of large (and even small) electric customers to obtain substantial amounts of their electricity from wind generation. For example, the Environmental Protection Agency's Green Power Partnership releases a "Top Partner" list that identifies the annual leading green power purchasers across individual sectors. As of April 28, 2008, several Texas cities and one of its universities made the top lists by deriving a certain percentage of their power from wind. On the National Top 25 List, the City of Dallas earned the 9th highest spot on the list by supplying 40 percent of its power use from wind. Close behind, the City of Houston ranked 12th, relying on wind power for 20 percent of its electricity needs. Of the top ten universities nationally, Texas A&M ranked 7th by obtaining 15 percent of its electricity from wind.[97]

The development of wind generation resources has been the primary means by which Texas has diversified its electricity mix in recent years. Overall, the region is heavily dependent upon natural gas, which in 2007 produced nearly half of the power and, in 2006, was the fuel source "on the margin" in ERCOT's balancing market in most hours of the year.[98] The addition of renewables in the future is expected to increase its share of the total mix.

Figure 17 shows that ERCOT has also been successful in developing non-wind renewable generation, albeit to a much lesser extent. Since September 1999, ERCOT has seen the addition of more than 100 MW of installed capacity from renewable sources other than wind (67 MW from landfill gases, 20 MW from biomass, 20 MW from hydro, and 1 MW from solar).[99]

[96] Mark Bruce, director of market affairs at FPL Energy, as reported in "Wind Developers Deem Texas Best US Market," *Electric Power Daily*, March 1, 2007.

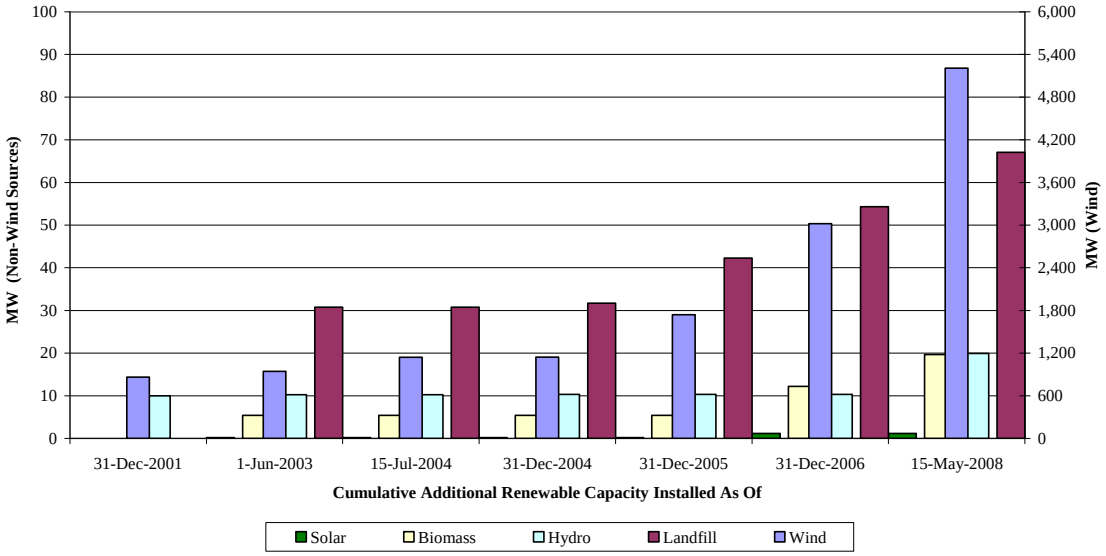
[97] Environmental Protection Agency Green Power Partnership, "Top Partner Rankings," as of April 8, 2008, available at http://www.epa.gov/greenpower/toplists/index.htm.

[98] ERCOT, "2007 Annual Report," May 2008, p. 2 and Barry T. Smitherman, "The Need for New Electric Generating Capacity in the Texas Electric Market," Presentation to the Senate Committee on Natural Resources, July 13, 2006 available at http://www.puc.state.tx.us/about/commissioners/smitherman/present/pp/BTS_SCNR_071306.pdf.

[99] Texas Renewables, "Existing/New REC Capacity Report," available at https://www.texasrenewables.com/publicReports/rpt5.asp.

Figure 17

ERCOT Renewable Capacity Installed After September 1999
by Fuel Type
2001 - May 2008



Notes:
1. Data for 2008 are reported as of May 15, 2008.
2. Capacity additions after September 1999 reflect additional installed capacity that is participating in the REC program and may not reflect all additional installed capacity.

Sources:
1. 2008 data is from the Existing/New REC Capacity Report, available at www.texasrenewables.com, as of May 15, 2008.
2. 2001-2006 data are from the Annual Reports, available at www.texasrenewables.com.

Reasons for Texas's Success?

Several factors have contributed to Texas's success in developing wind turbine and other renewable capacity. The enormous size of the state's available wind resource, combined with Texas's favorable transmission investment/cost-allocation policies, have helped to enable Texas wind developers to bring projects successfully to commercial operation. Furthermore, Texas's vibrant retail market allowed REPs to develop, market and sell differentiated "green" electricity products to an informed and interested set of consumers. Finally, like many states, Texas adopted a Renewable Portfolio Standard ("RPS") as part of its 1999 restructuring law. This mandate helped to jumpstart the market, but it has become evident over the last several years that other factors were as if not more important in allowing Texas to lead the nation in wind development.

Customer Involvement

What Happened in Texas?

One of the metrics easiest to track in examining activity in Texas's retail electricity markets is to observe what customers actually do, once they have the opportunity to choose to buy power from a competitive supplier: Do they stay on the same plan after the option to choose became available?[100] Or do they switch to another plan once they have had the chance to do so?

As shown in Figure 18, below, an ever-increasing share of Texas residential consumers has elected to buy power from a competitive supplier, even during the 2002-2006 transition period when they had the option to take power under "regulated" PTB prices. Figure 18 reports data on the year-end percentage of residential electricity customers in Texas served by a competitive REP since the introduction of competition in 2002. It shows that at the end of 2002, only 7 percent of residential customers were served by a competitive REP; just five and a half years later, at the end of June 2008, however, that number had increased over six-fold, to 43 percent. Moreover, by June 30, 2008, 76 percent of residential consumers in ERCOT had made a choice of a product other than the default rate.[101] This is many times greater than in any other market. These percentages are even higher for larger consumers of electricity – commercial and industrial customers (data not shown).

Overall, a much higher percentage of residential customers in Texas has switched to competitive plans as compared to the patterns in other restructured states. As shown in Figure 19, in 2006, 36 percent of residential customers in Texas received their power from competitive providers, while just 3 percent did in Connecticut, 8 percent did in Massachusetts, 7 percent did in New York, 2 percent did in Pennsylvania and less than 0.1 percent did in New Jersey.[102]

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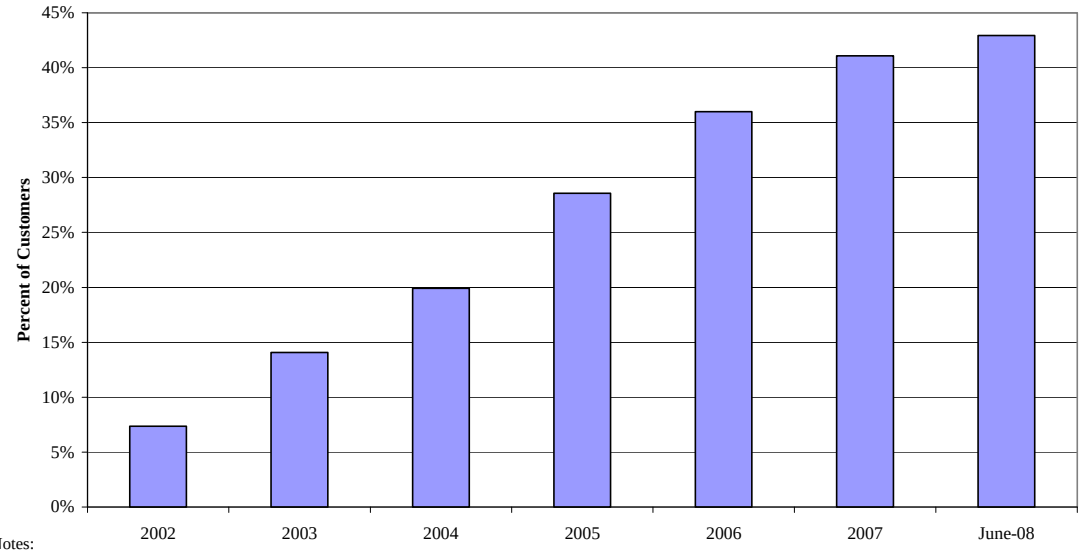
[100] In Texas, this would have been the original affiliated REP; customers who "chose not to choose" in areas of Texas open to competition on January 1, 2002, were served by the affiliate REP of the incumbent utility.

[101] The 76 percent includes residential customers who have either chosen a competitive retailer or an affiliated REP non-PTB product, and POLR transition customers. Letter from Bret Slocum to the Commissioners of the Texas PUC, dated August 6, 2008.

[102] Figure 19 uses EIA's 861 database, which provides a consistent database for comparing migration across the states. This database does not provide the most up-to-date information on migration, however. Therefore, using migration information for each of the relevant states, the migration data for 2007 are: 11.3 percent for Massachusetts (for December 2007); 13.1% for New York (for December 2007); 0 percent for New Jersey; 2.8 percent for Pennsylvania; and 41 percent for Texas. Sources of information: Massachusetts Division of Energy Resources, "2007 Electric Power Customer Migration Data," January 24, 2008, available at http://www.mass.gov/Eoca/docs/doer/2007migrate.pdf; New York State PUC, "December 2007 Electric Retail Access Migration Reports," available at http://www.dps.state.ny.us/Electric_RA_Migration_12_07.htm; New Jersey Board of Public Utilities, "Switching Data: New Jersey Electric Statistics," August – September 2007, available at http://www.bpu.state.nj.us/bpu/divisions/energy/switching.html; Pennsylvania Office of Consumer Advocate, "Pennsylvania Electric Shopping Statistics," January 1, 2008, available at http://www.oca.state.pa.us/Industry/Electric/elecstats/Stats0108.pdf, and Pennsylvania PUC, "2007 Report on Universal Service Programs & Collections Performance," 2007, p. 6, available at http://www.puc.state.pa.us/General/publications_reports/pdf/EDC_NGDC_UniServ_Rpt2007.pdf; Letter from Bret Slocum to the Commissioners of the Texas PUC, dated January 24, 2008.

Figure 18

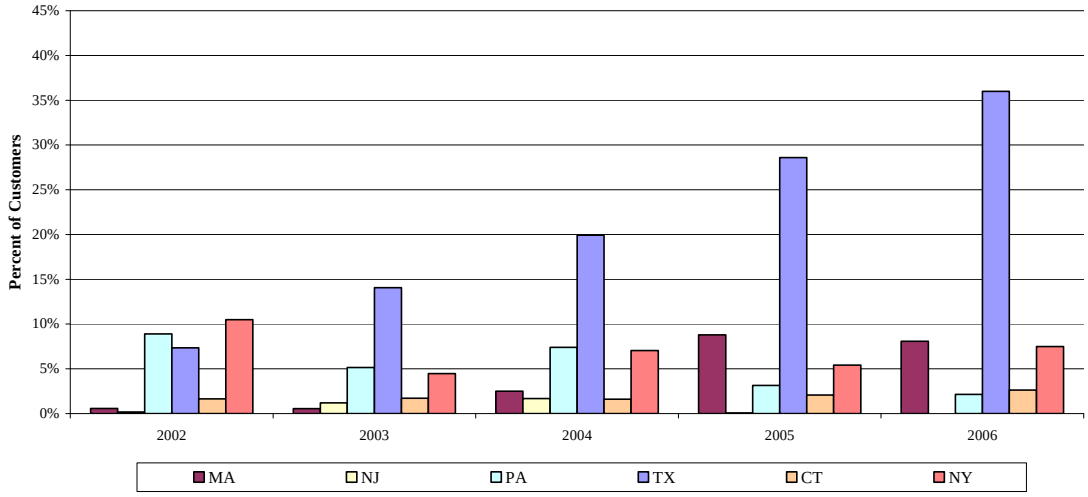
Percentages of Residential Customers with a Competitive REP in ERCOT
2002 - June 2008



Notes:
1. Data represent the percentage of customers with a competitive REP as of December of that year for 2002-2007. Data for 2008 are as of June 30.
2. Data from 2002 - 2005 come from the Texas PUC. Data for 2006 - June 2008 come from ERCOT and are presented as attachments in letters from Bret Slocum to the Commissioners of the PUCT.
Sources:
1. Public Utility Commission of Texas, "Summary of Performance Measure Data," http://www.puc.state.tx.us/electric/reports/RptCard/index.cfm, obtained January 2008. 2. Letters from Bret Slocum to the Commissioners of the Texas PUC, dated March 9, 2007, January 24, 2008, and August 6, 2008.

Figure 19

Percentages of Residential Customers with a Competitive REP
2002 - 2006

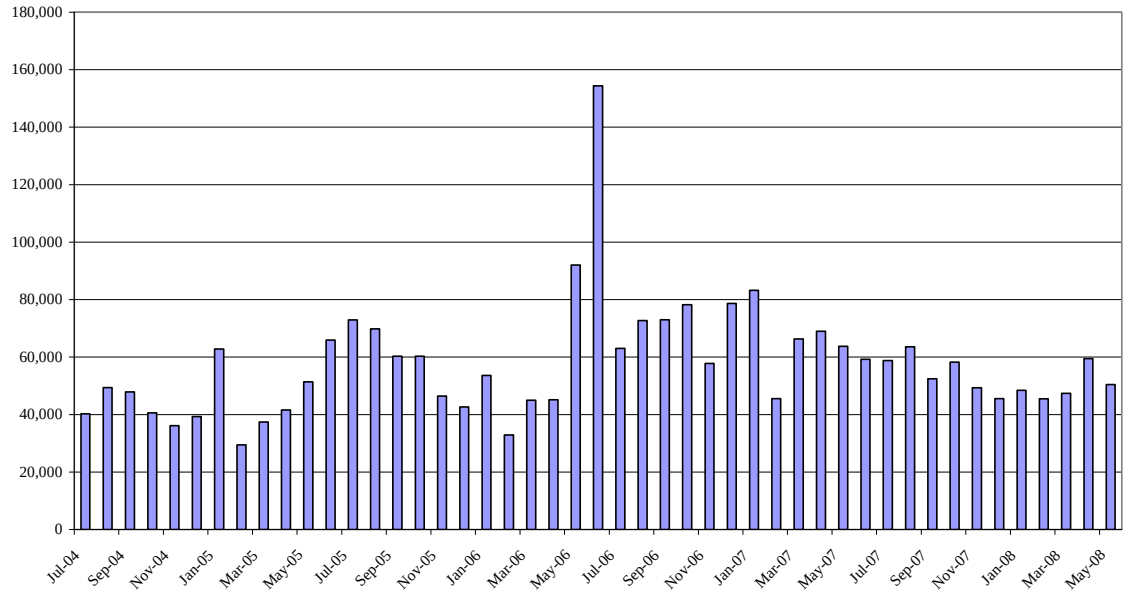


Notes:
1. Competitive REPs are defined as "Power Marketers" for CT, MA, NJ, NY, and PA as reported in the EIA 861 database. The total number of customers served by competitive REPs and affiliated REPs have been estimated by summing the number of customers served by "Power Marketers" and those reported as receiving a "bundled" service from an "Investor Owned" utility.
2. For Texas, data for 2002 through 2006 represent the percentage of customers with a competitive REP as of December of that year. Data from 2002 - 2005 come from the PUCT. Data for 2006 come from letters from Bret Slocum to the Commissioners of the PUCT.
Sources:
1. Energy Information Administration, Form EIA-861, EIA.gov, available at http://www.eia.doe.gov/cneaf/electricity/page/eia861.html.
2. Public Utility Commission of Texas, "Summary of Performance Measure Data," http://www.puc.state.tx.us/electric/reports/RptCard/index.cfm, obtained January 2008. 3. Letters from Bret Slocum to the Commissioners of the Texas PUC, dated March 9, 2007.

Customer switching has been relatively strong in Texas over the past few years, as shown in Figure 20. These data (for mid-2004 through May 2008) indicate a relatively high and continuing degree of customer engagement in the retail market.

Figure 20

Number of Switches Made per Month in ERCOT
July 2004 - May 2008



Notes:
1. The date corresponds to the number of switches made in that month.
2. No data exist for September 2005. The values in August and October of 2005 were used to approximate the value in September 2005.
3. As of May 2008, 4,100,715 switches had been made since June 1, 2001.
Sources: ERCOT, "Market Operations Reports," presented at ERCOT Board of Director's Meetings, August 2004 - July 2008.

Reasons for Texas's Success?

Clearly, Texans are aware that their state has an electric industry model in which they are expected to choose their electricity provider, much as consumers normally understand that they have to choose a mobile-telephone service provider, or a plumber, or other providers of service to their home or business. This high degree of consumer awareness is fundamental to any well-functioning market, because without knowledge that a market *exists* where one previously did not, consumers are unlikely to exercise their option to choose.

Among the more significant reasons for the high degree of customer awareness and resulting engagement with the market are three principal factors found in Texas: intense commitment to customer education; direct consumer interaction with their REP; and the relative ease of the process through which consumers switch to alternative providers. While each of these has been mentioned previously, they are important for helping to explain Texas's success:

- **Customer Education**: Texas adopted a deliberate, strong and continuing consumer education effort. SB7 established, and the PUCT has administered, an extensive statewide-customer education campaign to inform retail customers about their choices in the new competitive market. In addition, REPs provide educational material and services to consumers.

- **Direct Consumer Interaction with their REP**: Unlike other states that restructured their electric industries, Texas adopted a model in which the REPs would interact directly with customers, rather than through the local distribution company. This has meant that it is the REP that furnishes the customer with his or her monthly electric bill, receives calls for almost all customer issues (REPs may instruct customers to contact the local distribution company for outages and certain service orders), and otherwise has the direct commercial relationship with the customer. Also key is part of the market design where new customer initiation requires the customer to select its provider. This, combined with other features of Texas's relatively vibrant retail market, has led to a greater understanding among consumers[103] that they have options, that it is their responsibility to choose, and that their primary relationship for electricity service is with their supplier rather than with the local "wires" company.

- **Relative Ease of the "Switching" Process:** Texas adopted a centralized system for administering the processes by which retail customers obtain electric service from a REP. As the centralized registration agent for all of ERCOT Texas, ERCOT has the responsibility to receive and manage the transaction orders to assure that the transactions necessary for customers to receive electric service when they move to a new location (or move out of one) and arrange for power to be supplied by a REP are communicated to all parties. This centralization of "service registration" functions is different than in other states that restructured their retail electricity markets, where these functions are carried out by the local TDU, which can cause the retail provider to build multiple registration systems for a single state. This was an explicit element of the design of the retail market, in which the PUCT desired to reduce the barriers to entry for REPs entering the Texas market.[104] Additionally, it has meant that service connections, switches, etc., involve a relatively smooth process for consumers.

[103] See the further discussion on customer awareness, below.

[104] PUCT, "Report to the 78th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2003, p. 19.

Low Income and Other Customer Programs, Services and Protections

What Happened in Texas?

Low-Income and Other Targeted Programs: As part of its electric industry restructuring, Texas included a number of consumer protections and programs to assure that electricity would be broadly available to retail consumers. These programs were funded by a "system benefit charge" paid for by REPs[105] with funds deposited into a "system benefit fund." The system benefit charge is tied to a consumer's usage levels; for a typical household REPs support an annual payment of approximately $9.75 per household to the system benefit fund.[106]

One of the functions supported by the Texas system benefit charge is helping to subsidize the monthly bills of low-income residential electricity customers. Texas's low-income program – the "LITE-UP Texas" program – provides a discount that has ranged from 10 percent to 20 percent[107] on the bills of qualified low-income customers in the competitive areas of ERCOT.[108] The discount must be provided by every REP to qualifying customers, and thus is competitively neutral. REPs are reimbursed for offering this discount from system benefit fund monies collected from all REPs.

Other programs included in the system benefit fund are: a weatherization program offered at no cost to eligible customers to help them lower their electricity (and other energy) bills by making improvements to homes and apartments that save natural gas and electricity; payment assistance funds to assist customers in times of need; customer education about electric competition; and market monitoring.[109,110]

Not all of these programs, including the low-income discount, have been funded in every budget cycle. The low-income discount was available year-round from 2002 through 2005. In response to the Texas 2003 budget crisis, the Legislature allowed the money in the system benefit fund to be used for other programs in 2005, including programs not directly or indirectly related to the provision of electric services in the state.[111] Of the $152 million collected for the fund in 2005, for example, less than half (about $60

[105] Unlike other states, in Texas the System Benefit Charge ("SBC") is not a separate line item on retail electricity customer bills. While it is presumed to be a charge that is passed through to consumers by their REPs, it is not necessarily the case as it is in other states where the electric utility company is in some sense the collection agent for dollars tied to line items on customers' monthly electricity bills.

[106] AECT, "System Benefit Fund: Current Status," February, 2005.

[107] AECT, "System Benefit Fund: Current Status," February, 2005.

[108] PUCT, "Frequently Asked Questions," available at http://www.puc.state.tx.us/ocp/assist/liteup/LiteUp_FAQ_e.pdf.

[109] Texas Rose, "System Benefit Fund Weatherization," available at http://www.texasrose.org/RTF1.cfm?pagename =System %20Benefit%20Fund%20Weatherization.

[110] PUCT, "Customer Facts: Electric Customer Low Income Assistance," available at http://www.puc.state.tx.us /ocp/electric/elecfacts/LOWINCO.pdf.

[111] AECT, "System Benefit Fund: Current Status," February 2005.

million) went to SBF programs.[112] In 2005, the Texas Legislature chose not to appropriate any funds to LITE-UP Texas for the regular budgeting cycle of the 2006-07 biennium.[113] In 2007, the Legislature appropriated funding only to support discounts during the summer months, beginning with July 2007.[114]

Reasons for Texas's Relative Success

From the point of view of assuring that low-income and other programs have been sustained during the transitions to a competitive retail market, Texas has faced some bumps in the road. The system benefit charge, as originally envisioned by Texan legislators, was to be exclusively used to support low-income electric and other public benefit programs. However, support for these programs in Texas has faced some of the same pressures experienced in many other states in recent years where funds collected from electricity customers for various electricity-related purposes (i.e., the system benefit fund) have been used for other public purposes unrelated to electricity as determined to be necessary by state legislatures in times of state budget constraints. That said, Texas has managed to administer its programs in a competitively neutral fashion, from the perspective of holding all retail suppliers to comparable requirements.

Reasons for the Overall Success of Texas's Competitive Electricity Market

The success of the competitive electricity market in Texas can be attributed to a variety of factors that could be replicated by other states that may be considering changes in the features of their own competitive electric markets.

Factors That Could Be Replicated In Other States or Regions

1. **Customer Focus**: Texas designed its power market with the customer as its focal point. Customers have been the target of information campaigns, of systems to ease switching and the provision of service, of relationships with competitive suppliers (rather than with the utility or the generator). Customer choice is considered both a right and a responsibility, in ways more akin to the expectations of customers in other types of markets than in traditional electric service arrangements provided by monopoly utility companies. In Texas, the customer relationship is a key element of the competitive market, and the relationship lies with the retail supplier, not the utility.

2. **Design of Retail Default Service:** Texas designed its five-year transition in a way that assisted the state and its electricity customers in actually moving to full

[112] AECT, "System Benefit Fund: Current Status," January 2007.

[113] PUCT, "Report to the 80th Texas Legislature: Scope of Competition in Electric Markets in Texas," January 2007, p. 47.

[114] PUCT, "Frequently Asked Questions," available at http://www.puc.state.tx.us/ocp/assist/liteup/LiteUp_FAQ_e.pdf.

competition, rather than temporarily shielding customers from price signals reflecting the realities of today's energy market conditions. The transition allowed for periodic price adjustments to the PTB when underlying fuel and purchased power prices changed. These facts allowed a robust retail electricity market to develop and served to *transition* consumers to a new industry model rather than simply buffer them from price fluctuations in underlying electricity markets. Ironically, one of the measures that many other states adopted as a way to assure that customers received some benefits from competition – that is, the reliance on long-term rate caps – ended up serving in some states to undermine the very development of competitive retail electricity markets, along with the innovations and other benefits that they might produce for customers in the long run.

3. **Uniform Business Rules and Codes of Conduct:** Entry barriers for prospective REPs were lowered as a result of the policy to have uniform business rules and to centralize the electricity service registration functions at ERCOT. The "Code of Conduct for Electric Utilities and Their Affiliates," established in 1999, was important to ensure that competitive market participants (i.e., retail electricity providers and power generation companies) received non-discriminatory treatment by transmission/distribution utility companies. In addition, PURA 39.157 provides the PUCT the authority to monitor market power associated with the generation, transmission, distribution, and sale of electricity in Texas and the ability to require mitigation of market power following a finding that market power abuses or other violations are occurring.

4. **Customer Education**: Texas's and REP's aggressive customer education and outreach programs have supported a relatively informed base of retail electricity customers, with nearly universal awareness among "electricity decision makers" of their rights and responsibility to choose their supplier of electric service.

5. **Transmission Expansion Policies**: Texas supported generation investment through its transmission access and cost-allocation policies. In ERCOT's approach, new generation pays for only the direct costs of interconnecting with the transmission network, rather than for more remote transmission system enhancements needed to upgrade the network to accommodate moving power from the resource to demand centers.[115] These other costs are broadly socialized among all users. Such a policy has trade-offs, but served to broaden the geographic footprint of the markets, create incentives for generating capacity additions (including remote wind resources distant from loads) during the early years of the market, and provide customers' access to remote generation resources.

6. **Initial Market Power Mitigation Policies**: Texas supported the start of the wholesale and retail markets through its initial policy of requiring traditional utilities to sell entitlements to at least 15 percent of the power from their installed capacity in

[115] Ross Baldick and Hui Niu, "Lessons Learned: The Texas Experience," University of Texas at Austin, undated, p. 39.

ERCOT. These auctions promoted competition by increasing the amount of generating capacity available to competitive REPs.

7. **Strong Policies for Environmental Improvement**: As part of its restructuring legislation, Texas ensured that emissions from electric generating sources would be reduced through policies that addressed generating resources with air emissions such as fossil fuel power plants that emitted air pollutants (e.g., SO_2, NOx and CO_2). Texas has also excelled in developing wind turbine capacity, not just because of the large wind resource in the state, but because the state's transmission policies lowered barriers to new wind generation and the state's integrated market design provided fertile ground for new wind generation.

8. **Strong Alignment of Retail and Wholesale Market Design and Policies**: The Texas electricity wholesale and retail markets were designed at the onset as a unified whole to support the development of efficient markets in each. The state's initiatives enabled the market to develop many important "prerequisite" conditions for a market to operate efficiently, including through structural changes; unbundling of the utilities into a PGC, a TDU, and a REP; mandatory auctioning of incumbent utilities' entitlements to capacity for initial periods of the transition; grid operations and certain market-administration functions (e.g., energy balancing, ancillary services, switching registration functions) carried out by the ISO (ERCOT); market monitoring functions carried out under the oversight of the PUCT and with the assistance of a third-party market monitor; establishment of a series of policies to support informed consumers; a bilateral contracting environment among willing buyers and willing sellers; and creation of an environment in which retail customers were the focus of core relationships in the competitive marketplace. Additionally, long-standing policies to support relatively short permitting periods and strong investment in transmission infrastructure facilitated the entry of generation and transmission capacity. Together, these allowed for the conditions necessary for an efficient electricity market.

9. **Stable Regulatory Environment**: Finally, a decade of relatively stable and transparent market rules has helped to send favorable signals to the investment community about prospects in the Texas market. These market rules include tools for the REP to manage bad debt risk including the ability to disconnect for non-payment of electric service.

On the Texas Agenda: Continuing Improvements and Challenges

Several elements of the Texas power market have been identified by policymakers and various market participants as needing to further refinement in the future, in order for Texas's market to continue to improve. These include:

Congestion and a Nodal Wholesale Market: ERCOT has found that management of local (intra-zonal) and inter-zonal transmission congestion remains challenging,[116] and decided in 2006 to move from a zonal market system to a nodal design starting in 2009. The new nodal energy market will include a two-settlement market (day-ahead and real-time) based on central dispatch and locational marginal prices. This will be a clearing-price market for each of the settlement periods, with a single price at each of the nodes. The real time market will replace the current balancing energy market. A new day-ahead market will provide price and quantity commitments, and is expected to add price certainty and to attract more generators bids because their owners will be better able to calculate whether or not they will recover their startup and ramping costs.[117] Supporters of the new design indicate that it will provide improved price signals in different locations on the grid, improved dispatch efficiencies producing a lower overall cost of power supply and more efficient management of congestion, and direct assignment of local congestion costs.[118] This change in market design will render ERCOT closer in design to some of the "organized" markets in other regions of the U.S., including PJM, New York, and New England.[119] Under the revised design, ERCOT will continue with its energy-only market.

The increased zonal congestion occurring in 2008 has put a significant strain on the capabilities of the ERCOT market and exposed some of the weaknesses in its structure for pricing transmission congestion. The events of May-June 2008 clearly demonstrate the need for a nodal market, as well as the need to improve both the market design for the pricing of and the operational management of inter-zonal congestion. (The nodal market successfully ran a 29 minute test at the end of June, but has experienced setbacks in the launch date due to late software deliveries. The market, originally set to open December 1, 2008, has now been pushed back to an undetermined date.[120])

Figures 21 and 22 demonstrate the difference in pricing under the zonal and nodal models for a particular constraint in ERCOT. These figures simulate the differences in prices

[116] In early June 2008, ERCOT voted on an emergency basis to "give its staff more flexibility in picking power plants for dispatch into balancing energy markets to relieve severe local congestion, which has been seen as a major reason for the recent swings in electric power prices in Texas….The new market rule also lets ERCOT staff apply more precise, localized congestion management techniques, rather than working to manage congestion zone by zone…Zonal congestion management is 'inherently inefficient...even when it has been effective,' said ERCOT Independent Market Monitor Dan Jones, a consultant with Potomac Economics." Jeff Beattie, "ERCOT Scrambles To Ease Soaring Texas Grid Prices," The Energy Daily, June 10, 2008.

[117] Robert J. Michaels, "Competition in Texas Electric Markets: What Texas Did Right & What's Left to Do," Texas Public Policy Foundation, March 2007, p. 21.

[118] See, for example, Potomac Economics (ERCOT Independent Market Monitor), "2006 State of the Market Report for the ERCOT Wholesale Electricity Markets," August 2007, pp. iv-v.

[119] See, for example, Susan F. Tierney, Todd Schatzki and Rana Mukerji, "Pay-As-Bid versus Uniform Pricing: Discriminatory Auctions Promote Strategic Bidding and Market Manipulation," *Public Utilities Fortnightly*, March 2008.

[120] "ERCOT Runs Nodal Market Test 29 Minutes Without a Hitch," *Restructuring Today*, June 30, 2008; ERCOT, "EROCT Announces Delay in Nodal Market Launch Date," May 20, 2008, available at http://www.ercot.com/news/press_releases/2008/nr05-20-08.

that would arise under congestion conditions for different subareas of ERCOT under the two pricing models.

Figure 21
N-S Constraint Zonal Simulation[121]

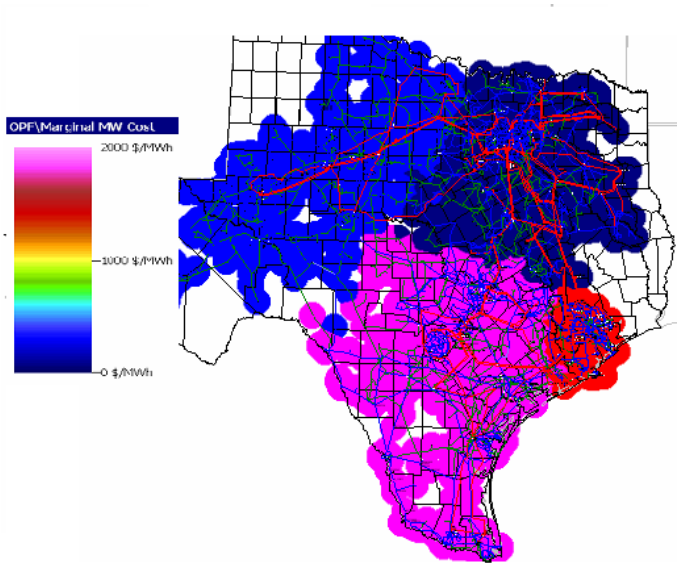
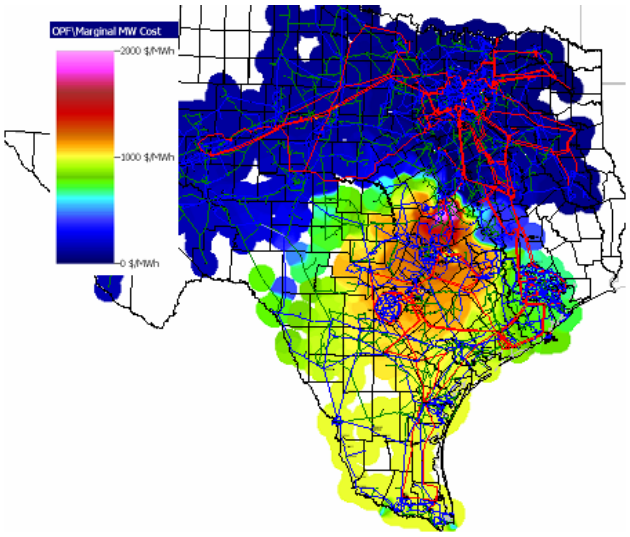


Figure 22
N-S Constraint Nodal Simulation[122]



As can be seen, under the zonal market, prices are much higher (magenta and red colors, as shown in the southern half of ERCOT in Figure 21) over a much broader area than

[121] Dan Jones, Potomac Economics, ERCOT's Independent Market Monitor, "ERCOT Wholesale Market," Presentation before the Texas House Regulated Industries Committee on June 23, 2008.

[122] Dan Jones, Potomac Economics, ERCOT's Independent Market Monitor, "ERCOT Wholesale Market," Presentation before the Texas House Regulated Industries Committee on June 23, 2008.

under a nodal design (where these high prices appear in a relatively limited area in central ERCOT on Figure 22). This is because the current zonal market treats all generation as having the same impact on a constraint, and therefore deserving of being paid the same price to relieve the constraint. In fact this is unlikely to be true in most places during congestion conditions, as the nodal design demonstrates. Beyond this pricing design flaw, the assumption that all generation in a zone has the same impact on a constraint also leads to inefficient and thus more expensive deployment of generation to relieve a constraint. As a result, the cost to consumers has been very high recently. ERCOT should consider ways to address this pricing design flaw pending the move to a nodal design.

Continued Monitoring and Mitigation of Concentration of Generation Ownership: After the initial period in the transition to competitive markets during which generating companies were required to divest entitlements in generating capacity so as to limit their control over generation resources in ERCOT, concerns have been raised more recently about market power in ERCOT's wholesale markets. Two generating companies – TXU and NRG Energy – own a substantial share of generating resources in the market. As noted previously, the PUCT has authority to monitor and, if appropriate, mitigate market power in ERCOT and does so through the thorough assistance of an Independent Market Monitor ("IMM"), a position held by Potomac Economics.

After investigating conditions in certain aspects of ERCOT's during portions of the summer of 2005, the PUCT's IMM found that one generating company, TXU, had acted in ways that constituted an abuse of market power in the balancing energy market during that period.[123] The PUCT Staff subsequently issued a notice of violation and proposed a substantial financial penalty[124] on TXU. An outcome from this proceeding is still awaiting action at the PUCT.

More recently, the PUCT's IMM has found that overall, "the competitive performance of the market improved in 2006" and noted a number of ways in which the changes underway in ERCOT's markets (including the implementation of a nodal market design

[123] The IMM's report found that "TXU had the ability to substantially increase balancing energy prices. TXU's ability to raise prices is highest when it is "pivotal", i.e., its balancing energy offers are necessary to satisfy the balancing energy demand. Given the frequency with which TXU is pivotal, and the historical information available to TXU on offer patterns and deployments in the balancing energy market, TXU could foresee that economically withholding significant quantities would be likely to result in higher balancing market prices. TXU was a substantial net seller in the balancing energy market during the Study Period, which provided it the incentive to raise prices. The offers that TXU submitted under its RBS strategy were not competitive and contributed to a significant increase in balancing energy prices during the Study Period. This increase in prices was inefficient and did not reflect underlying market fundamentals …. Based upon these results, we conclude that TXU's actions constituted an abuse of market power in the balancing energy market during the Study Period." Potomac Economics (ERCOT Independent Market Monitor), "Investigation of the Wholesale Market Activities of TXU from June 1 to September 30, 2005," March 2007, p. 4.

[124] The initial penalty of $210 million was later revised to $171 million after recalculation by the PUCT. Jaime Jordan, "PUC Staff Recommends Reduced TXU Penalty," *Dallas Business Journal*, September 18, 2007, available at http://www.bizjournals.com/dallas/stories/2007/09/17/daily13.html?ana=from_rss.

in 2009 and a stronger demand side of the market) will continue to enhance the competitive performance of the Texas wholesale market.[125]

A Stronger Demand Side of the Market: One of the notable themes in recent discussions of wholesale power market design and performance around the U.S. is the need to assure a strong demand-side element in the market.[126] Other wholesale power markets are endeavoring to install infrastructure to provide at least a segment of the customer base with advanced metering capability so that customers (or their agents, acting on their behalf) can "see" real-time prices and then manage portions of their energy use in response to those price signals. Such price-responsive demand can improve the efficiency of power production and mitigate the potential exercise of market power among generators. Doing so, however, requires investment in infrastructure. Market participants and the PUCT are currently working toward rolling out advanced meter infrastructure and associated products.[127]

Further Price Transparency and Liquidity in Wholesale Markets: While Texas has a relatively high degree of price information in retail markets, it offers less transparency in wholesale prices and less liquidity in the day ahead and real-time markets than in some of the organized markets in other regions of the U.S. When ERCOT develops its two-settlement energy market, a greater degree of information about wholesale market prices and greater liquidity will exist, as compared to today.

Continued Improvements in Transmission Planning and Grid Operations: One of the major initiatives on the agenda of the PUCT is planning and designing support for transmission investments needed to bring power from "Competitive Renewable Energy Zones" ("CREZ") for delivery in other parts of the state. Right now, potentially large amounts of renewable energy resources are bottled up in West Texas, but new generation can be built much faster than new transmission. At least through 2006, the McCamey area of West Texas has had more wind generation added than there was transmission capability to export the power.[128] ERCOT faces a technical challenge of managing greater amounts of wind generation. Quite recently, in mid-July 2008, the PUCT approved a 18,456 MW wind-resource scenario as part of the regulatory effort to endorse a transmission plan tied to deliver power generated from the "most productive wind" zones to various populated areas in the state.[129]

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[125] See Potomac Economics (ERCOT Independent Market Monitor), "2006 State of the Market Report for the ERCOT Wholesale Electricity Markets," August 2007, generally and p. xxxi.

[126] See for example, FERC Staff Report, "Assessment of Demand Response and Advanced Metering," September 2007, http://www.ferc.gov/legal/staff-reports/09-07-demand-response.pdf; and FERC Staff Report, "Assessment of Demand Response & Advanced Metering," *Docket AD-06-2-000*, August 2006, p. 7.

[127] See, PUCT Project #34610 (Implementation Project Relating to Advanced Metering) available at http://www.puc.state.tx.us/electric/projects/34610/34610.cfm.

[128] Ross Baldick and Hui Niu, "Recent History of Electricity Market Restructuring in Texas," University of Texas at Austin, presentation dated August 30, 2006.

[129] Senate Bill 20 (2005) had directed the PUCT to select the most productive wind zones in the state and devise a transmission plan to move power generated from these zones to various populated areas in the state. Pursuant to this directive, the PUCT had asked ERCOT to provide several transmission and wind scenarios to the PUCT. The four scenarios contained a total of 12,053, 18,456, 24,859, and 24,419 MW of installed wind generation distributed among

Conclusion

Following the end of Texas's transition period to a fully competitive market at the beginning of 2007, the performance of the state's electricity market has been of interest to a wide variety of stakeholders. After examining the performance of Texas's electricity market from both a qualitative and quantitative perspective, it is evident that Texas has had an overall successful competitive power market experience.

Texas has met the various qualitative and quantitative criteria for strong competitive market performance and conditions. In contrast to the performance of other states that restructured their electricity markets, Texas's retail and wholesale markets show strong evidence of many of the basic features of competitive markets: the presence of many buyers and sellers; low barriers to entry (including price levels that support (over time) new investment); non-discriminatory access of market participants to essential facilities (such as the wires) and other services necessary to participate in markets; means to monitor the performance of markets and mitigate the ability of market participants to exercise market power; informed consumers; and transparent and relatively stable market rules.

The success of the competitive electricity market in Texas can be attributed to a variety of factors. These are:

1. **Customer Focus**: Texas designed its power market with the customer as its focal point. Customers have been the target of information campaigns, of systems to ease switching and the provision of service, of relationships with competitive suppliers. Customer choice is considered both a right and a responsibility. In Texas, the customer relationship is a key element of the competitive market, and the relationship lies with the retail supplier, not the utility.

2. **Design of Retail Default Service:** Texas designed its five-year transition in a way that assisted the state and its electricity customers in actually moving to full competition, rather than temporarily shielding customers from price signals reflecting the realities of today's energy market conditions. The transition allowed for periodic price adjustments to the PTB when underlying fuel and purchased power prices changed. These facts allowed a robust retail electricity market to develop and served to *transition* consumers to a new industry model rather than simply buffer them from price fluctuations in underlying electricity markets.

3. **Uniform Business Rules and Codes of Conduct:** Entry barriers for prospective REPs were lowered as a result of the policy to have uniform business rules and to centralize the electricity service registration functions at ERCOT. The PUCT has the

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five Competitive Renewable Energy Zones ("CREZs") in West Texas and the Texas Panhandle. "This morning the Public Utility Commission of Texas (PUC) selected a transmission scenario that will eventually transmit a total of 18,456 megawatts of wind power from West Texas and the Panhandle to metropolitan areas of the state. The PUC selected scenario 2, which is estimated to cost $4.93 billion, or approximately $4.00 per month per residential customer once construction is complete and costs are reflected in rates. It is expected that the new lines will be in service within four to five years." PUCT Press Release, "Texas Public Utility Commission Approves Wind Transmission Plan," July 17, 2008 available at http://www.puc.state.tx.us/nrelease/2008/071708.pdf.

authority to monitor and mitigate market power associated with the generation, transmission, distribution, and sale of electricity.

4. **Customer Education**: Texas's and REP's aggressive customer education and outreach programs have supported a relatively informed base of retail electricity customers, with nearly universal awareness among "electricity decision makers" of their rights and responsibility to choose their supplier of electric service.

5. **Transmission Expansion Policies**: Texas supported generation investment through its transmission access and cost-allocation policies. In ERCOT, new generators pay for the direct costs of interconnecting with the transmission network, but not the more remote transmission system enhancements needed to upgrade the network. These other costs are broadly socialized among all users. These policies have served to broaden the geographic footprint of the markets, create incentives for generating capacity additions (including remote wind resources), and provide customers access to remote generation resources.

6. **Initial Market Power Mitigation Policies**: Texas supported the start of the wholesale and retail markets through its initial policy of requiring traditional utilities to sell entitlements to at least 15 percent of the power from their installed capacity in ERCOT. .

7. **Strong Policies for Environmental Improvement**: As part of its restructuring legislation, Texas ensured that emissions from electric generating sources would be reduced through policies that addressed generating resources with air emissions such as fossil fuel power plants that emitted air pollutants (e.g., SO_2, NOx and CO_2). Texas has also excelled in developing its wind resource, in part as a result the state's overall siting, permitting, and transmission policies.

8. **Strong Alignment of Retail and Wholesale Market Design and Policies**: The Texas electricity wholesale and retail markets were designed at the onset as a unified whole to support the development of efficient markets in each. The state's initiatives enabled the market to develop many important "prerequisite" conditions for a market to operate efficiently, including through structural changes; unbundling of the utilities into separate entities with different functions; mandatory auctioning of incumbent utilities' entitlements to capacity for initial periods of the transition; grid operations and certain market-administration functions carried out by ERCOT; market monitoring functions carried out under the oversight of the PUCT; establishment of a series of policies to support informed consumers; a bilateral contracting environment among willing buyers and willing sellers; and creation of an environment in which retail customers were the focus of core relationships in the competitive marketplace.

9. **Stable Regulatory Environment**: Finally, a decade of relatively stable and transparent market rules has helped to send favorable signals to the investment community about prospects in the Texas market.

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