Energy Efficiency as a Resource in Texas

Whitepaper prepared for The SPEER Commission on Energy Efficiency

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August 2014

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For the SPEER Commission on Energy Efficiency
July 2014

It is not common in Texas to think of energy efficiency as a resource similar to natural gas, coal, or renewable energy. Investments in energy efficiency, however, result in some of the most cost-effective resource benefits: they yield energy and demand savings that displace the need for fuels or electricity generation from supply-side resources. A study by the American Council for an Energy Efficient Economy (ACEEE) determined that Texas utility energy efficiency programs are able to capture and acquire efficiency at a cost of 2.6 cents per kWh, which is at least competitive and almost always cheaper than the marginal cost of generating electricity.[1]

Texas was a leader in energy efficiency in the early 2000's when it became the first state in the U.S. to set a target percentage of energy efficiency to obtain each year. Legislation passed in 1999 instructed utility companies to charge rate payers to fund efficiency programs, which led to significant savings for Texans. The Public Utility Commission of Texas (PUCT) released a report in 2008 stating that "the value of the avoided use of energy provides direct monetary savings for ratepayers. The utilities spent a total of $87,199,116 for energy-efficiency measures implemented during calendar year 2008…yielding ratepayer savings of $217 million dollars." This means that for every dollar Texans spent on efficiency, ratepayer savings were $2.49. Considering that Texas households pay the 5th highest electricity bills in the nation[2], a 2.5x return on efficiency spending provides a great financial benefit for Texans.

Despite these savings and a national trend of states increasing spending on efficiency, Texas' investments in efficiency programs have not grown significantly and will even be decreased next year. This lack of growth in Texas' programs causes unnecessarily higher energy bills for all consumers and missed opportunities for energy savings from energy efficiency as a resource. This paper outlines how Texas' energy efficiency policies came about, and tracks how Texas went from being a national leader in energy efficiency, to trailing other states and leaving efficiency benefits on the table.

Efficiency in Texas before Deregulation

Prior to energy deregulation in Texas, the electricity industry was composed of vertically integrated utilities that performed all three functions of providing electricity: generating power, distributing power to consumers, and providing customer services and billing to consumers. Investor-owned utilities (IOUs) were regulated by the Public Utility Commission of Texas (PUCT), while city councils were responsible for operation of municipal utilities, and elected boards oversaw the operation of rural electric cooperatives. Each regulatory body designed rates sufficient to cover each utility's operating costs and investment

[1] Molina, Maggie. "The Best Value for America's Energy Dollar: A National Review of the Cost of Utility Energy Efficiency Programs."American Council for an Energy Efficient Economy (ACEEE). March 2014.
[2] Residential average monthly bill by Census Division, and State. U.S. Energy Information Administration. Fact Sheet: http://www.eia.gov/electricity/sales_revenue_price/pdf/table5_a.pdf

costs, while allowing a reasonable level of savings or return on investment. The investor owned utilities[3] submitted resource plans to the PUCT regarding new investments in energy generation, or transmission infrastructure. Once the PUCT determined the investments in the resource plans to be cost-effective, the utilities were allowed the opportunity to recover their costs and a profit from ratepayers over the projected life of the project.

In the 1980s, energy regulators across the nation began to realize that reducing overall energy demand could be less expensive than investing in additional energy generation capacity. Concerns about air quality and environmental protection also increased regulatory and societal demand for efficiency. Following suit, the PUCT incorporated Demand Side Management (DSM) into the resource planning process for IOUs, with the goal of including all potential resources into the generation capacity planning process. Each utility[4] developed plans in which energy efficiency measures were weighed against a pure power generation scenario for meeting the needed demand. Utilities published requests for proposals both for generating power and achieving efficiency, ranking each submission according to its cost effectiveness. Although utilities had concerns about the impact of consumption reduction on revenues, this process granted efficiency a modest role in meeting the region's overall needs, and therefore had a modest negative impact on IOUs' bottom line if the regulators would allow recovery for the program costs of delivering efficiency. Most of the system-wide benefits of energy efficiency could be internalized, so utilities at least had an opportunity to use energy efficiency to also reduce their overall costs.

The means of capturing energy efficiency changed for IOUs after electric deregulation legislation was adopted in Texas in 1999. Deregulation of the investor owned electric utilities separated, or 'unbundled' the services of these formerly vertically integrated utilities into three separate services performed by separate entities: power generators, transmission and distribution utilities (TDUs), and retail electric providers (REPs).[5] Now, power generating companies sell power into a deregulated wholesale market where it is purchased by the REPs who in turn sell the energy to the customers they service. The function of transmitting and distributing energy across the grid remains regulated by the PUCT and is performed by the investor-owned TDUs.

While this unbundling was meant to create a more competitive electric market, it also caused the public benefits from energy efficiency to be diluted amongst the different market participants, as opposed to being fully internalized by the vertically integrated utility. Rather than lose the societal and economic

[3]Municipal utilities were only subject to PUCT review upon appeal of disaffected customers. Initially, cooperatives were rate regulated, but regulation was relaxed over time and eliminated in 1999.

[4] Municipally-owned utilities and electric cooperatives were not required to adopt portfolio management type approaches or later market variations on the basis that they are constituent-, or member-owned and run. Their locally elected or appointed leadership was allowed to determine whether and how to integrate considerations of demand side management

[5] Municipal and cooperative utilities were relatively unaffected by the changes to the retail market, because they were exempt from the new competitive market initiative unless they opt to move toward competition voluntarily.

benefits of efficiency, the legislature delegated the responsibility of acquiring "cost-effective efficiency"[6] to the regulated public utilities (TDUs). The legislation directed the TDUs to serve as the market-neutral administrators of efficiency acquisition programs. The legislature established an Energy Efficiency Resource Standard (EERS) mandating that at least 10% of an investor-owned utility's annual growth in electricity demand be met through energy efficiency programs each year.[7]

Texas as an Energy Efficiency Leader…then Laggard

When Texas adopted the EERS in 1999, it became the first state in the U.S. to pass a statewide energy efficiency resource standard. The Texas EERS established goals beginning in 2002 that were easily met and exceeded. In 2007, the American Center for an Energy Efficient Economy (ACEEE) rated Texas 11th in the United States for energy efficiency attainment. At the same time, the legislature increased the goal for the TDUs to at least 20% of growth in demand, and the PUCT subsequently increased the efficiency goals to 30% of growth in demand in 2010. A 2008 PUCT-commissioned study measuring the potential for energy efficiency programs in Texas estimated net benefits to the citizens could range from $4.2 billion to $11.9 billion as a result of capturing the savings from expanded energy efficiency programs over the next decade.[8]

The efficiency programs in Texas have achieved cost-effective efficieny. TDUs Oncor and CenterPoint accounted for a combined $479 million in efficiency program spending from 2008-2013, resulting in total savings of over four times that amount: $1.97 bilion.[9] Despite these results and national trends of increasing efficiency, Texas' initial leadership in efficiency has all but completely eroded. While Texas started out ahead, efficiency investments have leveled off, and are now decreasing.[10] A series of legislative and regulatory policy changes over the last decade reduced participation and funding for efficiency programs by exempting industrial customers and then even allowing some commercial customers to simply opt out of any contribution to the programs. Despite the fact industrial customers make up 30% of the state's total consumption, these customers neither contribute to, nor draw upon the efficiency programs. Now, thousands of smaller customers can apply to simply opt out of the state's efficiency programs, reducing the funding base for program operations.

In 2011, the legislature changed the efficiency goals (SB1125) to 0.4% of each utility's total residential and commercial demand. This shift was originally recommended in 2008 to avoid linking the State's goal to the vacillations of demand growth, but depending on the rate of growth over the next few years, the

[6] Public Utility Regulatory Act, Section 39.905

[7] Again, Municipally-owned utilities and electric cooperatives are not included under this rule.

[8] "Assessment of the Feasible and Achievable Levels of Electricity Savings from Investor Owned Utilities in Texas: 2009-2018." Submitted to Texas Public Utilities Commission by Itron Inc., December 10, 2008.

[9] Data collected from the Energy Efficiency Plan and Reports filed by Oncor and CenterPoint, 2008-2014 on the PUCT website.

[10] Oncor and CenterPoint submitted April 1 2014 filings for 2014 Energy Efficiency Plan and Report showing program budget decreases for 2015.

0.4% goal may well be less than the 30% growth in demand goal, creating another limitation on the Texas investment in efficiency.

Finally, under pressure from retail electric providers to limit total charges to be passed on to customers, in 2010 the PUCT placed a cap on utility charges per customer to support energy efficiency programs. The legislature followed suit in 2011 and accepted the concept of caps, regardless of the cost-effectiveness of programs, in legislation.

26 states now have Energy Efficiency Resource Standards, but Texas' goal is far below the U.S. average EERS, and ranks the lowest in the nation. While Texas was ranked 11th for efficiency in 2007, the 2013 ACEEE Scorecard on Efficiency ranked Texas at 33rd. Texas consumes the most energy in the United States, with California as the second largest consumer, but in 2011, California consumed half as much energy as Texas while saving 4 times more through energy efficiency – 2 ,677,845 MWh saved compared to Texas' savings of only 721,445 MWh.

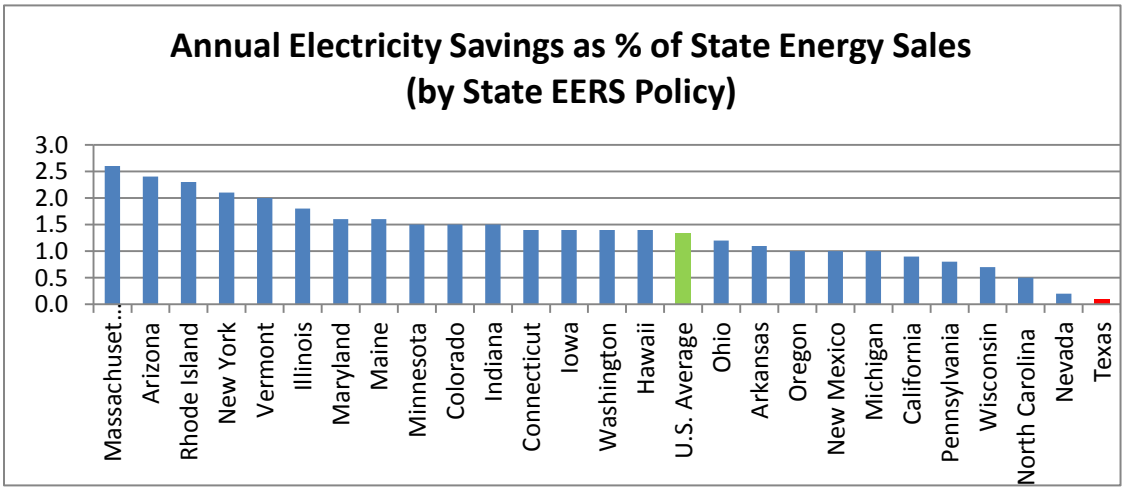

Figure 1. For the purpose of comparison, ACEEE estimated an average annual savings target by calculating each state's EERS savings over the years specified in the EERS policy. Source: ACEEE 2013 State Energy Efficiency Scorecard, p. 33.

Stated differently, in 2012, Texas consumed 9.9% of total U.S. Electricity, yet made up only 2% of the total U.S. spending on efficiency.[11] California, Florida, Illinois, Washington, Ohio, New York, Massachusetts, and Pennsylvania all spent more on efficiency programs than Texas, despite all using significantly less energy. As a result, those states all saved a greater percent of retail sales of electricity than Texas, and nine out of ten saved more energy total than Texas.[12]

[11] Total spending in Texas divided by total U.S. Spending, calculated from "Summary Of Electric Utility Customer-Funded Energy Efficiency Savings, Expenditures, And Budgets." The Edison Foundation Institute for Electric Innovation. March 2014.

[12] Data from 2011, "Summary Of Electric Utility Customer-Funded Energy Efficiency Savings, Expenditures, And Budgets." The Edison Foundation Institute for Electric Innovation. March 2014.

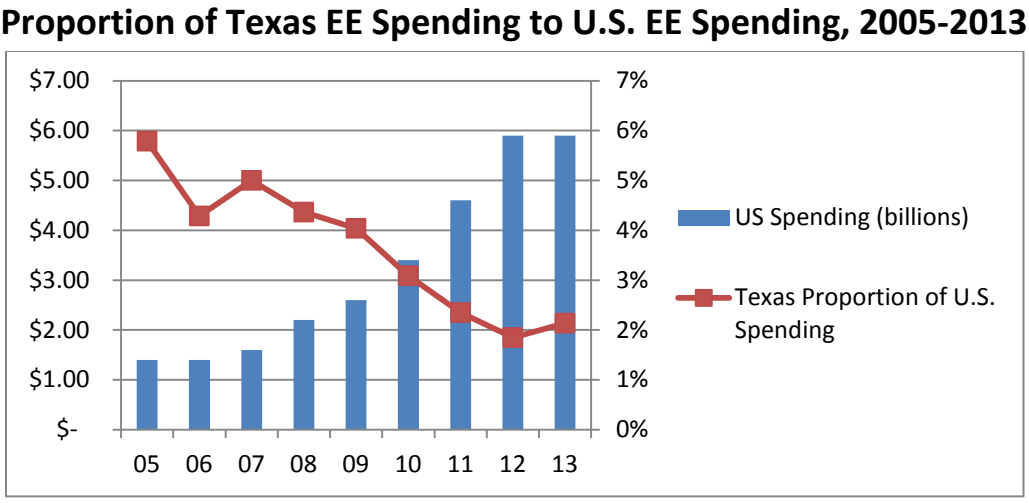

Figure 2.Calculation based on TDU filings for energy efficiency spending in Texas 2005-2013 and U.S. Spending data from the Edison Foundation, March 2014.

As shown below, Texas also spends less per capita on energy efficiency than 39 other states. The U.S. per capita spending was $18.17.

Per Capita Spending on Energy Efficiency by State

Top 15 States				Botton 15 States			
1	MA	$	77.59	35	OK	$	8.94
2	VT	$	62.78	36	SC	$	8.57
3	RI	$	58.46	37	KY	$	8.31
4	WA	$	49.99	38	NC	$	6.33
5	OR	$	39.25	39	SD	$	5.76
6	NJ	$	37.16	40	TX	$	5.54
7	CT	$	35.68	41	WV	$	5.34
8	NY	$	34.18	42	MO	$	4.37
9	CA	$	30.67	43	KS	$	4.26
10	IA	$	29.47	44	DE	$	4.14
11	MN	$	29.00	45	MS	$	3.99
12	ID	$	24.25	46	GA	$	3.01
13	MT	$	20.89	47	AL	$	2.09
14	DC	$	19.29	48	LA	$	0.80
15	NH	$	17.34	49	VA	$	0.20

Figure 3. Calculated based on state's 2011 budgets and population data from Census (2012).
Source: ACEEE 2013 State Energy Efficiency Scorecard, p. 113.

Texas investments in efficiency are budgeted to drop next year. The two largest utilities in the state will spend less in 2015 despite reporting over $485 million combined in energy savings for 2013. Based on the TDUs' 2014 Energy Efficiency Plans and Reports released in April 2014, Oncor's efficiency spending

will drop 20%, from $52 million in 2014 to $42 million in 2015[13], and CenterPoint from $34,880,000 to $34,725,000, for 2015.[14]

Not everywhere in Texas is decreasing investments in efficiency, however, and the benefits from investments are significant. According to a recent study by The Brattle Group,[15] Austin Energy has spent five times more on energy efficiency than the statewide average for IOUs. Annual incremental energy savings from Austin's programs accounted for 15% of statewide energy savings in 2012, despite the fact that Austin Energy accounts for only 4% of the state's total sales. As a result, the average customer in Austin is more efficient, consuming only 900kWh per month compared to the statewide average of 1,200 kWh per month. Because Austin has already realized many efficiency opportunities that the state has not, The Brattle Group estimates that the Austin Energy results conservatively represent the statewide energy efficiency potential when scaled up to a statewide level. In recent years, San Antonio City Public Service (now CPS Energy) has made commitments approaching those of Austin. With few programmatic exceptions, all other municipal and cooperative efficiency programs implemented are created and operated primarily as customer services programs rather than resource adequacy investments.

So why did Texas start out fairly strong on efficiency, and fall backwards?

One reason may be the form of the efficiency programs. The legislation creating the current goal was written in order to foster competition among retail electric providers and energy efficiency service companies, and thereby assure the maximum value was delivered to Texas customers. So the current approach to stimulating efficiency is administered by regulated utilities through service providers. In Austin, and in most states, a 'standard offer' efficiency program is one that notifies all customers that standard incentives exist and are available, however, and allows customers to work with the energy services provider of their choice to receive the benefits. In Texas, TDUs have been prevented from actively reaching out to customers, because the role of interfacing with consumers has been delegated to competitive Retail Electric Providers and Energy Service Companies. Thus, most customers don't even know the program incentives exist, and they can only benefit from the programs if they happen to hear about it from a service provider willing to target them. A study commissioned by the PUCT in 2008 revealed that more than 70% customers had never even heard of the efficiency programs or incentives.[16] The average customer does not have a clear pathway to assistance toward greater efficiency.

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[13] Oncor Electric Delivery Company LLC, 2014 Energy Efficiency Plan and Report. April 1, 2014. p. 19

[14] CenterPoint Energy Houston Electric, LLC, 2014 Energy Efficiency Plan and Report, April 2014, p. 35

[15] "Exploring Natural Gas and Renewables in ERCOT, Part III: The Role of Demand Response, Energy Efficiency, and Combined Heat & Power." By Drs. Ira Shavel, Peter Fox-Penner and Jurgen Weiss, et al., The Brattle Group, June 3, 2014. http://www.texascleanenergy.org/2014-research.php

[16] "Assessment of the Feasible and Achievable Levels of Electricity Savings from Investor Owned Utilities in Texas: 2009-2018." Submitted to Texas Public Utilities Commission by Itron Inc. December 10, 2008.

The funding for efficiency programs is also so modest that many competent service providers do not even tell their customers about the incentives. First of all, the incentives available to a single REP would hardly cover the development of collateral materials for a real marketing campaign. Second, for a REP to offer help to customers to obtain efficiency incentives, the REP would need to be able to rely on sufficient funds being available to meet the demand created. Otherwise, the REP might have to meet demand out of its own funds. In addition, because competitive REPs have no guarantee of holding onto their current customer base, they are limited in what services they can offer as part of a rate package. For example, to give away a communicating thermostat, a REP generally has to require a customer sign a two-year contract to recover the investment. More costly services offer a risk of stranded investment. Because the REPs haven't become a channel for utility incentives as the legislation envisioned, the utilities often look to special-purpose third-party program administrators to help acquire the savings they are required to obtain.

The modest scale of the utility programs also undercuts the success of delivering efficiency to new customers. An early evaluation of the utility programs by Itron Energy Consulting suggested that free ridership may be a major issue.[17] That is, the study found that the natural rate of adoption of efficiency was greater than the scale of the programs, and since the incentives were so small, that it was likely that many customers were accepting incentive payments to do what they would have done without the programs. This is an implementation issue that all program administrators face; free ridership cannot be avoided. According to Itron, increased program scale and incentives would make free ridership a modest but manageable fraction of the total program participation, assuring a net positive impact.

For all these reasons, there are few strong supporters of the current programs. Because they aren't really designed or scaled to support REP services, the REPs have even come to oppose the utility administered programs, seeing them as competition with their own offerings. Many REPs object to the cost of the programs being recovered through their billings, and lobby to cap their cost. Most customers don't know about the programs, much less appreciate their value.

Finally, efficiency is a somewhat abstract resource from a policy point of view that may not seem to fit the paradigm of the current energy market. Unlike the demand for generation of electricity, it is very difficult to measure demand for efficiency. How much is the right amount to acquire? Currently, the legislature determines the efficiency standard. While it offers a public good, is it really a necessity that the State should help procure efficiency for the public, like roads, or education?
Currently, the price or value of efficiency is based on avoided costs for the utility. By contrast, ERCOT administers the competitive market for electricity in Texas, and the price of energy reflects the cost to generate energy.[18] If energy efficiency could participate in the market as a fungible commodity like energy generation, perhaps it would be easier to see energy efficiency as a resource. One possible way

[17] See note 16

[18] Although even here there are regulatory efforts needed to assure optimal price signals to the market, and policy affects or limits price. The PUCT itself is in the process of considering whether the market design allows actual cost, including long-term replacement cost to be reflected in power prices.

to proceed is to move acquisition of accepted and commercially available efficiency measures into the market, and focus the utility programs on overcoming market failures that are unlikely to be resolved by the simple imposition of a more organized market mechanism. This change could continue the utilities' vital role in expanding markets for new energy efficiency technology or services which have yet to reach scale, or where significant market failures or barriers exist, while allowing more established efficiency measures and projects to bid into a competitive market, to win or lose based on price.[19]

Stabilizing Price and Reliability in Texas with Efficiency Lowers Energy Costs

Energy efficiency could help solve the biggest problems facing Texas right now: high summer energy bills and resource adequacy or grid reliability. While the prices of a kilowatt hour remains relatively low in the state, average electricity consumption per Texas home is 26% higher than the national average.[20] Despite low rates, energy customers in the DFW and Houston area already pay higher electricity bills than anywhere in the country, averaging at $162 and $155 per month respectively.[21] Texas households spend about $1,800 a year on electricity.[22]

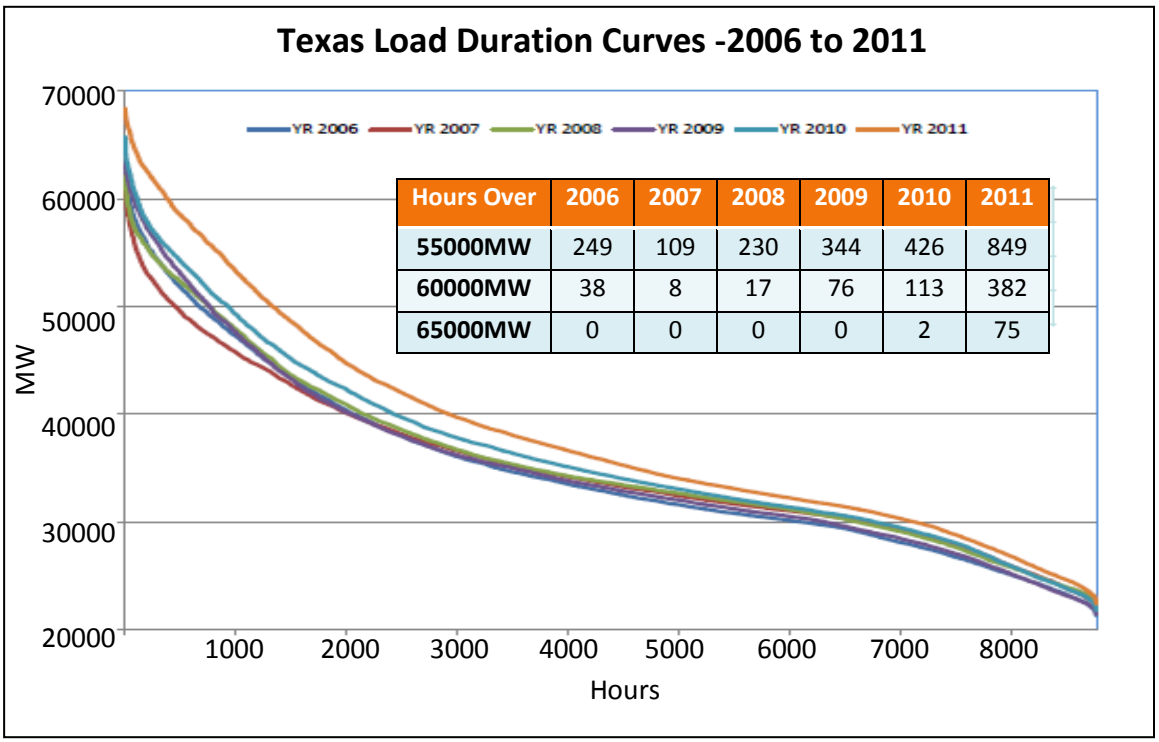
These higher costs are partly driven by the need to build and maintain infrastructure to generate and deliver power for a relatively few hours a year. The "load duration curves" shown below, taken from an ERCOT staff presentation, show how many hours of the year demand reaches various levels. There are relatively few hours that loads are very low, or very high. The peak is primarily set by extreme weather events (hot or cold), and the weather sensitivity of the building stock, as the exceptional year 2011 proved. One can see that we build our transmission and distribution system to meet the few hours (only 75 hours even in 2011) of peak demand on the system.

[19] "Toward A More Efficient Electric Market: New Frameworks for Advancing Energy Efficiency in Texas." SPEER Publication. June 2013. http://eepartnership.files.wordpress.com/2013/06/toward-a-more-efficient-electric-market-june-20131.pdf

[20] "Household Energy Use in Texas." U.S. Energy Information Administration Residential Energy Consumption Survey, 2009. http://www.eia.gov/consumption/residential/reports/2009/state_briefs/pdf/tx.pdf

[21] Forbes, "America's Highest Power Bills" http://www.forbes.com/2010/04/01/biggest-power-bills-business-energy-texas-electric.html

[22] See note 20.



Hours Over	2006	2007	2008	2009	2010	2011
55000MW	249	109	230	344	426	849
60000MW	38	8	17	76	113	382
65000MW	0	0	0	0	2	75

Figure 4. Load Duration curves from "ERCOT – CHALLENGES & OPPORTUNITIES" Presentation by Tripp Doggett,ERCOT President and CEO, March 7, 2013. http://www.ercot.com/content/news/presentations/2014/ChallengesOpportunities-Mar%202013.pdf

Recent studies by the Brattle Group for the PUCT found that the current energy-only market leads to a reserve margin of about 8%.[23] That is, given the way the market works and the payments it transfers to generators, market participants are likely to produce only about 8% more capacity than needed on a peak day. This is more than sufficient unless significant assets malfunction unexpectedly or weather is unusually severe, as we were reminded in 2011. As a result, state regulators and market participants have spent a great deal of time discussing what market enhancements or alterations might be needed to generate and distribute sufficient power even during such contingencies.

In a similar vein, ERCOT has a transmission planning process aimed at reducing congestion and designed to provide the capability of delivering power from generators anywhere in the state to customers on the highest peak days. For this reason, Texas transmission providers spent over $500 million a year for the first decade of this century, and then more than $1 billion per year in the last several years for assets that are utilized on average only about 50% of the time. The result is a system that is over-designed for average loads and very expensive.

[23] "Exploring Natural Gas and Renewables in ERCOT, Part III: The Role of Demand Response, Energy Efficiency, and Combined Heat & Power." By Drs. Ira Shavel, Peter Fox-Penner and Jurgen Weiss, et al., The Brattle Group, June 3, 2014. http://www.texascleanenergy.org/2014-research.php

Texas' dramatic peak demand is driven both by brutal summer temperatures and highly climate-sensitive energy usage in older buildings. More than two-thirds of the homes in Texas are 20 years or older.[24] The inefficiency of most Texas homes is directly contributing to high energy peaks and high energy prices. In fact, residential and small commercial load represent 73% of the peak summer load that ERCOT strives to satisfy. Upgrading the climate resistance of the existing building stock could be a very cost-effective way to reduce peak demand, therefore decrease the need for new power generation and associated power infrastructure costs, such as building new transmission lines or upgrading the distribution system.

Perhaps it is time to reconsider what resource acquisition vehicle might be appropriate to our current market structure and philosophy? We know energy efficiency and permanent load shifting (investments to permanently reduce total demand or reshape the demand profile), as well as, demand response, are required to reduce the systemic inefficiencies that are driving peak load and high costs in Texas. But it is also likely that without a market of its own—because of the millions of individual actions required to obtain efficiency at scale—we are unlikely to approach an optimum level of efficiency investment as a society. Nationally, efficiency programs have proven successful, as many states capture more efficiency than Texas, and at a national average cost of only 2.8 cents per kWh – cheaper than the marginal cost of electricity.[25] Can we reexamine our existing programs to determine whether they are capable of contributing efficiency at scale successfully? Or can we find another uniquely Texas structure to help stimulate and capture the additional, cost-effective savings available in so many attics, and offices, and schools across the state?

[24] "Household Energy Use in Texas." U.S. Energy Information Administration Fact Sheet: http://www.eia.gov/consumption/residential/reports/2009/state_briefs/pdf/tx.pdf

[25] "The Best Value for America's Energy Dollar: A National Review of the Cost of Utility Energy Efficiency Programs."American Council for an Energy Efficient Economy (ACEEE). March 2014.