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An Alliance for Clean, Reliable, Affordable Texas Energy

**Our Energy Future:
The Need to Expand and Diversify Texas
Power Generation**

By

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EXECUTIVE SUMMARY

For decades, Texas has been the nation's fastest-growing large state, adding population and employment at a multiple of the national averages. The state has a current population of 23.5 million and an employment base of 10 million. According to the Texas Workforce Commission, just over 892,000 of these jobs were in the manufacturing sector, accounting for over 9% of non-agricultural employment. The state is projected to grow to 40 million by 2030 and add nearly five million jobs.

Implicit in these projections is an assumption that reliable and adequate supplies of electricity will be available at a reasonable cost. But by the end of the decade, electricity demand could well outstrip supply—unless new base load power plants are added to the grid. At present, Texas relies predominantly on natural gas for power generation—about 72 percent of capacity—compared to a national average of 46 percent. By contrast, coal accounts for only 19 percent of Texas' capacity compared to a national average of 33 percent. The key to reliable and affordable power—and consequently to a vibrant economy-- is a balanced mix of several fuel sources and technologies.

This lack of new generation could conceivably undermine Texas' ability to offer affordable and reliable electricity to households and businesses in the years ahead. To ensure this isn't the case, several electric utilities have proposed adding new coal-fired generation plants to the fuel mix in the near term. Because of their lower operating costs, coal plants afford the best prospect for lowering delivered power rates to Texas consumers.

Adding low-cost coal plants to the power mix will confer other benefits to Texas' households and businesses:

- Texas manufacturing is a critical component to the state’s economic well-being. While recent growth has been somewhat stagnant, Texas added more manufacturing jobs in the previous decade than any other state. These jobs pay higher wages than most other economic sectors and could be in danger if Texas’ energy needs become less reliable and affordable.
- Because the state’s burgeoning high technology industries consume large amounts of electricity, a stable, reliable and affordable power supply is critical to their long term health as well as the ability of Texas to continuing growing and attracting technology-based companies. Building the proposed coal plants will help ensure a reliable and affordable future power supply for this important and growing sector of the Texas economy.
- Texas’ low-income households pay a much higher proportion of their total earnings for electric service than do upper income households. Because states with higher percentages of coal in their generation mix tend to have lower average residential rates, the falling cost of delivered power that would follow the addition of coal plants to the Texas power grid will be especially beneficial to these families.
- Electricity has become a sizeable percentage of the costs of operating public transit systems. Dallas-Fort Worth, Houston and other Texas metropolitan areas are developing public transit systems to help reduce traffic congestion and improve air quality. Holding down the cost of electricity is crucial to the success of these public transit initiatives.

Some detractors have argued that Texas' future power demands can be satisfied through a combination of conservation and renewables, or through reliance on new technologies that, while promising, are not sufficiently proven for base-load generation. While investments in the development of such technologies are commendable, even under the most optimistic assumptions of their potential, the state's utilities will still have to construct dozens of base-load power plants in the next two decades.

In a today's economy businesses must operate with an eye on their global cost structure. To remain competitive, Texas must offer an attractive economic environment and cost structure on all fronts—including utility costs. Against this economic reality, lower-cost coal generating plants are a sensible choice for a portion of the state's future power needs. Adding these plants to the fuel mix will diversify Texas' energy sources, ensure reliability, and help hold down electric power costs in the decades ahead with attendant benefits to current and prospective households and businesses.

Introduction

In the summer of 2006, several electric utilities and project developers announced plans to build a number of new coal-fired generators in the state. Though Texas' environmental regulators have already issued draft permits to several of the proposed plants, community opposition has surfaced in some parts of the state and lawsuits have been filed in an attempt to stop or slow construction of these plants. Though the utilities have agreed to employ the best available control technology to meet or exceed existing environmental standards, opponents of the plants claim that these operations will result in the deterioration of air quality across the state.

The reality is that Texas' utilities will need to add substantial new base-load generation capacity to the power grid in the decade ahead, just to keep up with expected demand. Otherwise, adequacy and reliability will be impaired. What's more, because electric power rates in Texas are generally higher than the national average, it is imperative that some additions to the grid come from lower-cost generating plants. Building efficient coal-fired generators offers the best hope for diversifying the power mix and holding down electric rates in the years ahead. Not only will such a strategy ensure an affordable and reliable power supply to Texas' households and businesses, it will also enhance the state's competitive position in the quest for new industry.

Population, job growth, and the demand for energy in Texas

For several decades, Texas has been one of the fastest-growing states in the nation, in terms of both population and employment. For example, in 1970 the state's population stood at 11.2 million, making it the fourth largest in the nation. By 2005, the number of Texas residents exceeded 23 million and the state was second largest in the nation. Projections by the U.S.

Bureau of the Census and the Texas State Data Center show Texas' population growing to 40 million by the year 2030 and 50 million by 2040.

Among the nation's 10 largest metropolitan areas, Dallas-Fort Worth and Houston have been the second- and third-fastest growing since 1990 with only Atlanta adding residents at a faster pace. In absolute numbers, Dallas-Fort Worth has added more people—about 1.7 million—than every metropolitan region except greater New York.

Job growth in Texas has also been impressive in recent decades, with total payroll employment nearly tripling since 1970 to almost 10 million. Among the nation's largest metropolitan areas, Dallas-Fort Worth and Houston posted employment gains of 32.3 percent and 29.7 percent respectively between 1990 and 2004. Projections from the Texas Comptroller's office indicate the state will add another 5.5 million jobs by the year 2035.

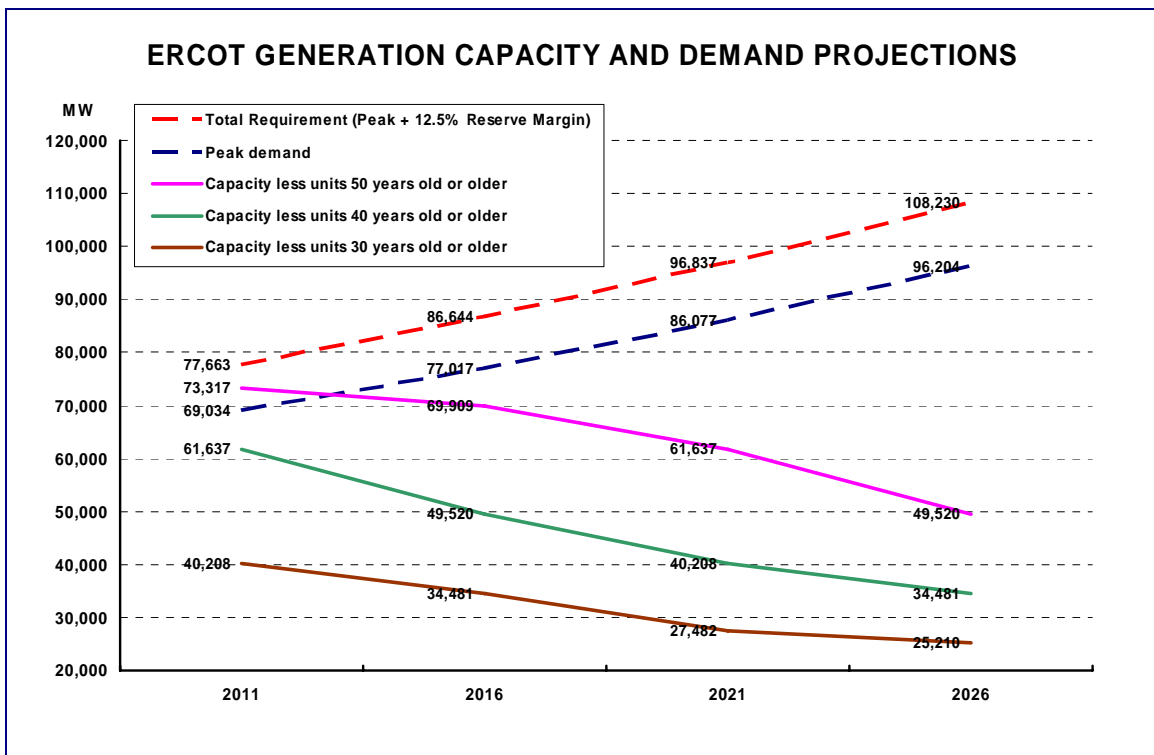
In tandem with expected increases in population and employment, the overall size of the Texas economy will continue to expand. According to the most recent projections from The Perryman Group, state output will jump from slightly less than \$1 trillion today to about \$2.2 trillion by 2030. This expansion, along with new household formation, will generate increasing demands for energy in all forms, including electric power.

Current and future electric power needs in Texas

Businesses and households take for granted a dependable supply of electricity. But reliability is only assured through long-range planning by power providers that results in the construction of new power plants well ahead of demand. Historically, the state has met this challenge, providing an adequate power supply while maintaining a sizeable reserve margin.

But by the end of decade, power demand could well outstrip supply (see Figure 1). ERCOT (Electric Reliability Council of Texas) estimates that in the next ten years Texas will need an additional 500 MW of generation if only plants more than 50 years old are retired and up to 47,900 MW of new power sources if plants at least 30 years old are retired. By the year 2025, the potential gap between supply and demand becomes even more substantial—barring the construction of new power plants.

Figure 1



Source: Electric Reliability Council of Texas.

To some degree, projected electricity demand can be offset through conservation. For example, a recently released study by the McKinsey Global Institute concludes that the growth rate of energy consumption could be cut in half over the next 15 years through a combination of

demand abatement and greater energy efficiency.¹ Renewables also offer some potential for satisfying Texas' future energy needs. To that end, in 1999 the Texas Legislature passed a bill requiring at least 2,000 MW of renewable energy by 2009—an amount that has already been surpassed. At present, 2,631 megawatts of wind-electricity are being supplied to the Texas grid by 2,044 wind turbines with another 2,700 MW expected to be added by the end of 2007. In fact, Texas recently surpassed California to become the nation's number one producer of wind energy.

However, wind power's potential contribution to the electricity mix is limited. All the windmills in Texas today produce power equal to about one-third the capacity of a single midsize coal boiler. Furthermore, windmills don't run as many hours as coal boilers and they tend to shut down on sultry summer afternoons when the demand for power is highest.² And though there is some talk of a nuclear revival in Texas and elsewhere, under a best-case scenario it will be 10 to 15 years before a new nuclear plant comes on line in Texas.

Therefore, even under the most optimistic assumptions about the potential of conservation and renewables, Texas must add to its base load power generating capacity. To help meet this need, TXU has proposed the construction of several new coal-fired generating plants in the state. NRG, City Public Service of San Antonio, and several other power companies have also proposed building new coal-fired plants in Texas.

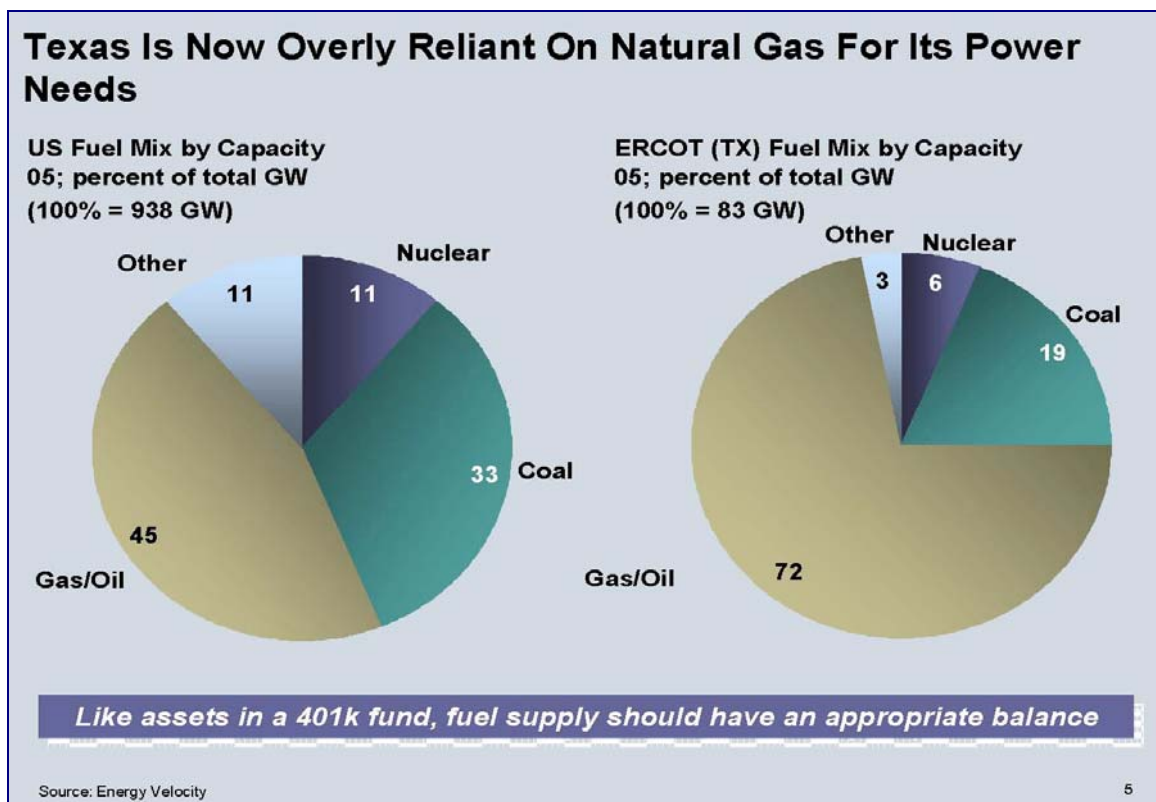
¹ McKinsey Global Institute, *Productivity of Growing Global Energy Demand: a Microeconomic Perspective*, November 2006.

² In a December 28, 2006 *New York Times* article, respected energy reporter Matthew Wald observes that "Wind, almost everybody's best hope for big supplies of clean, affordable electricity, is turning out to have complications. Engineers have cut the price of electricity derived from wind by about 80 percent in the last 20 years....But for all its promise, wind also generates a big problem: because it is unpredictable and often fails to blow when electricity is most needed, wind is not reliable enough to assure supplies for an electric grid that must be prepared to deliver power to everyone who wants it—even when it is in greatest demand."

The imperative to diversify Texas' electric generation mix

As mentioned above, Texas' electricity generation is fueled by gas, coal, nuclear and wind. The state relies heavily on natural gas, due largely to the substantial gas turbine capacity added over the past decade in the aftermath of wholesale and retail deregulation (see Figure 2). Today, about 72 percent of Texas' electricity capacity consists of gas-fired power plants. By contrast, the national share is only 46 percent. The reverse is true in the case of coal-fired plants, which account for only 19 percent of Texas' generating capacity compared to a national share of 33 percent.

Figure 2



Natural gas is both a clean and an extremely flexible fuel. Undoubtedly, it will continue to play a significant role in meeting Texas' industrial and electric power needs in the future, particularly as new domestic resources and LNG infrastructure is brought online. Indeed, it is

the flexible nature of natural gas as a fuel source that places it in high demand. While electric generation can be powered by a variety of fuel sources, a number of the industrial sectors that are key to the Texas economy require natural gas both as a feedstock and as a source of process heat. Natural gas is a key feedstock for the production of chemicals, fertilizers and refined petroleum products. Other industries such as forest and paper products and metals rely on natural gas for process heat.

In light of these facts, it makes economic sense for Texas to support market-based investments in a variety of fuel sources to power electric generation. A diverse fuel mix will allow Texas to draw on whichever generating assets and fuel sources can deliver the most cost-efficient power at that point in time for base load capacity. By diversifying its fuel mix for electric generation, Texas will be taking steps to enhance the competitiveness of the state's economy.

Texas needs to increase its fuel diversity and balance in its generation mix in order to maintain its ability to offer affordable and reliable electricity to households and business in the years ahead. In the near term, the construction of new base-load coal plants offers the best opportunity to achieve diversification while ensuring reliability and affordability. Because coal is plentiful, its price has increased relatively little over the past decade. And unlike windmills, coal plants can operate on demand and with little downtime. Coal plants can also be built relatively quickly and at a competitive cost.

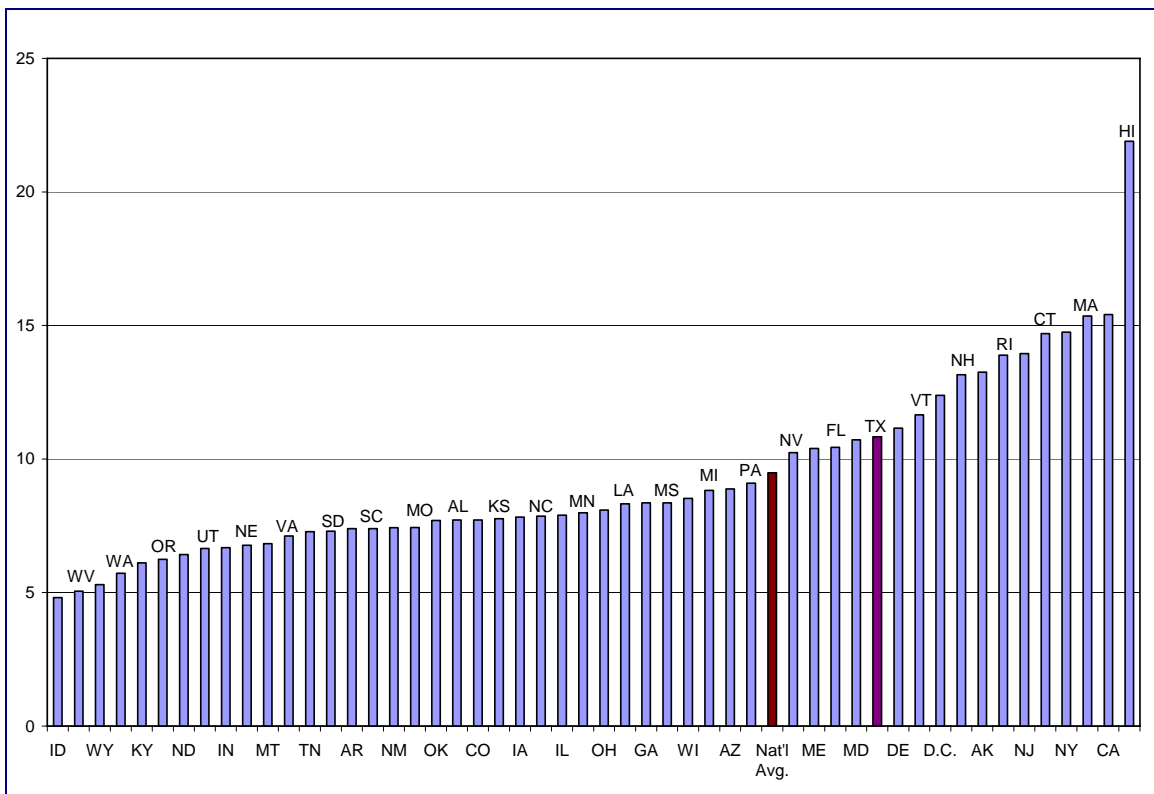
Keeping Texas' energy supply reliable and affordable by rebalancing the power mix

Texas' electricity costs are currently above the national average (see Figure 3). At present, the average electricity rate in Texas is 10.38 cents per kilowatt-hour compared with a

national average of 9.48 cents. True, consumers in eleven states and the District of Columbia are paying a higher rate for electricity than Texans. But all of those states are located in the Northeast and California where the summers are relatively mild and, consequently, the demand for air conditioning is lower than in Texas.

Figure 3

**Average electricity Rate for All Sectors as of July 2006
(Cents per Kilowatt-hour)**



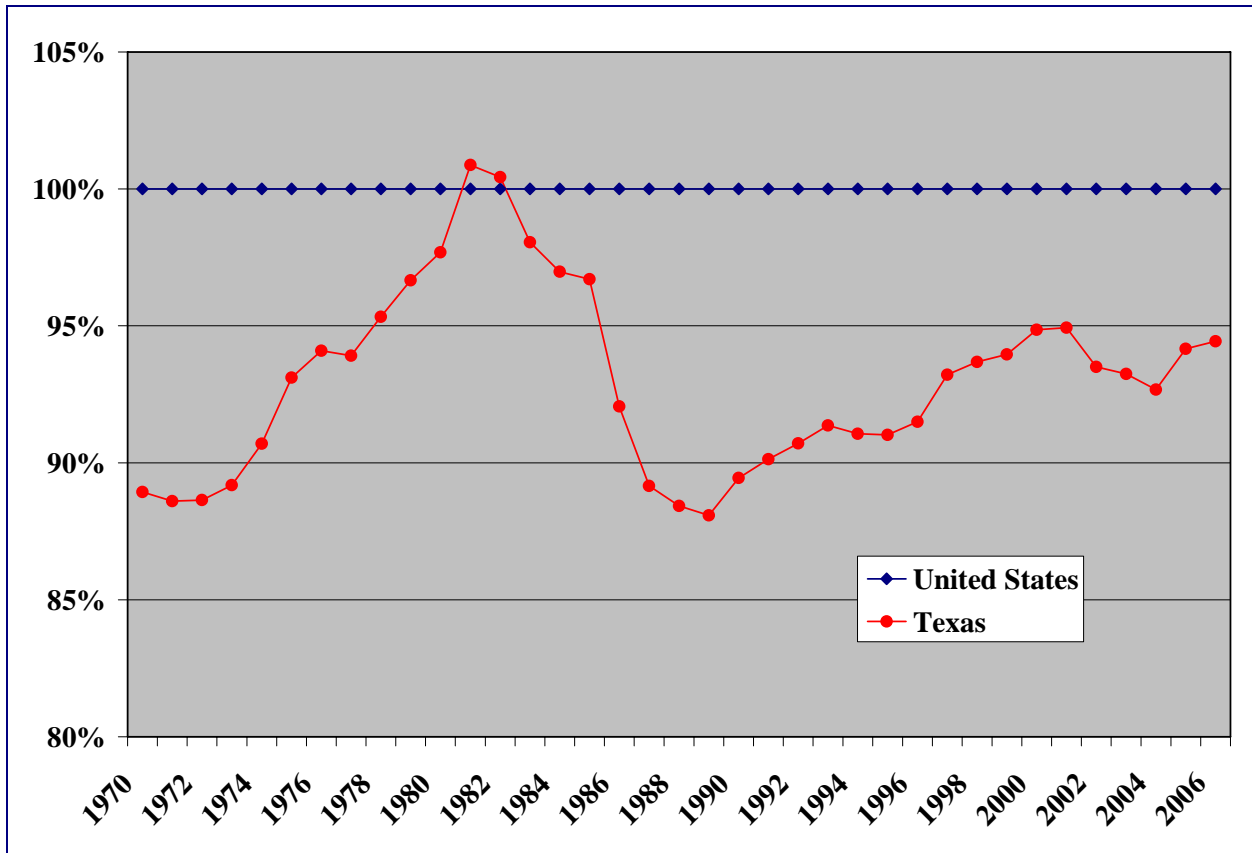
Source: *Electric Power Monthly*.

Contrary to the conventional wisdom, Texas is a low-income state (see Figure 4 and Table 1). In fact, in only two of the past 37 years has Texas’ per capita income exceeded the nation’s. Median household income also trails the national median and is considerably lower than in other high-cost power states. Because incomes are low, the typical Texas customer gets “triple-whammied” when high rates and strong weather-related demand for power are factored

in. Consequently, the share of household budgets allocated to electricity consumption is higher in Texas than in most other states.

Figure 4

Texas per Capita Income as a Percentage of U.S. Per Capita Income 1970-2006



Source: Bureau of Economic Analysis.

Table 1**Income and Poverty by State, 2005**

State	Median Household Income*	Per Capita Personal Income[†]	Poverty Rate[‡]
U.S. Average	\$46,242	\$34,495	13.3%
TEXAS	\$42,139	\$32,604	17.6%
Delaware	\$52,499	\$37,084	10.4%
Vermont	\$45,686	\$32,731	11.5%
Washington, DC	\$47,221	\$56,329	19.0%
New Hampshire	\$56,768	\$37,835	7.5%
Alaska	\$56,234	\$35,433	11.2%
Rhode Island	\$51,458	\$35,219	12.3%
New Jersey	\$61,672	\$43,822	8.7%
Connecticut	\$60,941	\$47,519	8.3%
New York	\$49,480	\$40,072	13.8%
Massachusetts	\$57,184	\$43,702	10.3%
California	\$53,629	\$36,890	13.3%
Hawaii	\$58,112	\$34,468	9.8%

*Median Household Income (in 2005 inflation-adjusted dollars); Data Set: 2005 American Community Survey; Source: http://factfinder.census.gov/servlet/GRTTable?_bm=y&-_box_head_nbr=R2001&-ds_name=ACS_2005_EST_G00_&-format=US-30&-CONTEXT=grt

[†]Per Capita Personal Income; All state and local area dollar estimates are in current dollars (not adjusted for inflation); Source: <http://www.bea.gov/bea/regional/spi/>

[‡]Poverty Rate: Source: 2005 American Community Survey

A recent survey by the Energy Information Administration (EIA) supports this conclusion. According to the EIA, the lowest income households, even accounting for lifeline and other assistance programs, pay a much higher proportion of their total earnings for electric service (see Table 2). Households with earnings below the federal poverty line are spending almost 4 percent of their income on electricity, while those with earnings under \$10,000 are spending 6.3 of their income on electric power. By contrast, moderate and upper income households pay less than 2 percent of their income for electricity.

Table 2

Average Annual Electric Energy Expenditures per Household, 2001

2001 Household Income	Average Annual Electric Energy Expenditures	Percentage of Top of Scale Income
Less than \$10,000	\$ 628	6.3%
\$10,000 to \$24,999	\$ 772	3.0%
\$25,000 to \$49,999	\$ 922	1.8%
\$50,000 or more	\$ 1,172	1.6% **
Below Poverty Line*	\$ 706	3.8%
Eligible for Federal Assistance^	\$ 776	Varies by state

*The 2001 federal poverty line for a family of four is \$18,104; ^Below 150 percent of poverty line or 60 percent of median State income; **Percent of \$75,000 income.

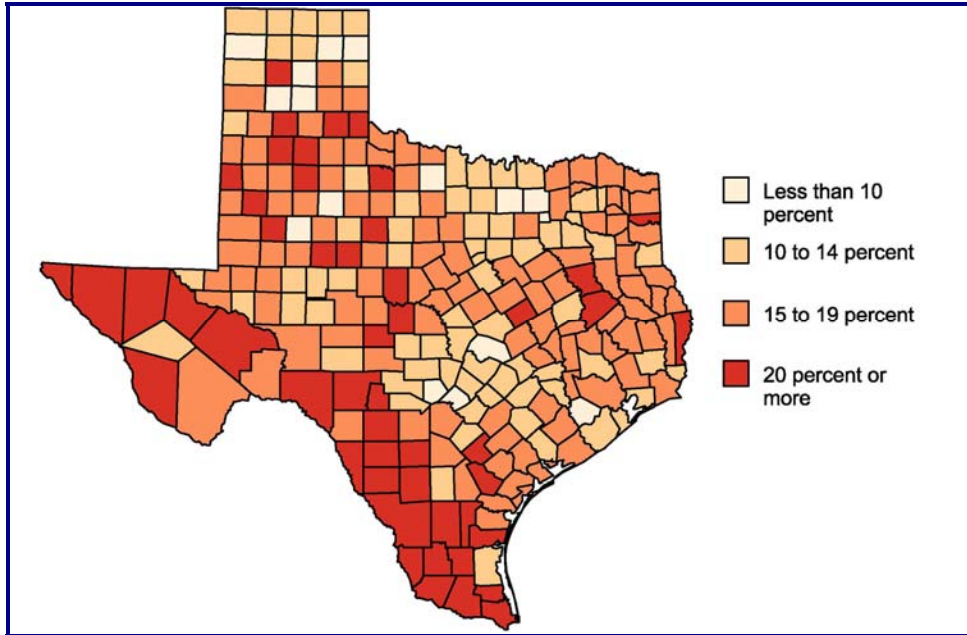
Source: *Household Energy Consumption and Expenditure, U.S. Energy Information Administration.*

As indicated in Table 1, the poverty rate in Texas is much greater than it is in other high-cost power states, so Texas' lowest income families are hit especially hard. The situation may be even worse in Texas' rural communities, where income levels are lower and poverty rates higher than in the state's metropolitan areas (see Figure 5).³ To make matters worse, many of Texas' rural counties have been losing people and jobs for years (see Figure 6). Currently high rates for electricity are clearly a deterrent to job creation in rural Texas.

³ The Economic Research Service of the U.S. Department of Agriculture estimates Texas' rural poverty rate at 18.1 percent compared with an urban poverty rate of 15.9 percent. In many Panhandle and South Texas counties, the poverty rate exceeds 20 percent.

Figure 5

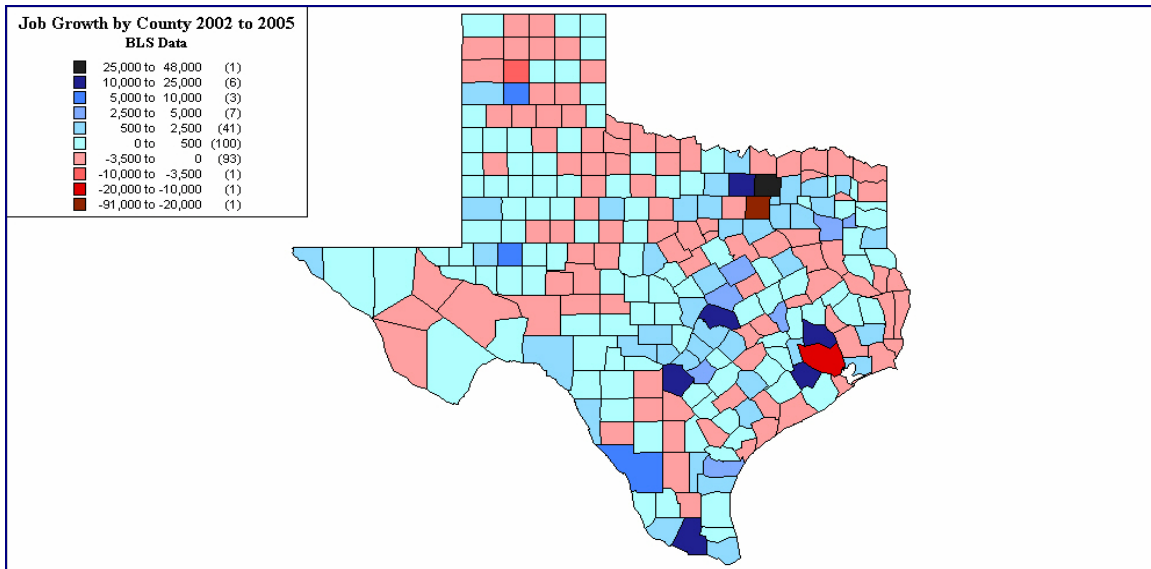
Percentage of Total Population in Poverty, 2003



Source: U.S. Department of Agriculture, Economic Research Service, <http://www.ers.usda.gov/Data/PovertyRates/PovListpct.asp?ST=TX&view=Perce>

Figure 6

Job Growth by County 2002 to 2005



Source: U.S. Bureau of Labor Statistics.

Households in both urban and rural Texas—especially those with low incomes—need rate relief. The best hope for bringing down electric power rates in the near term is to add more low-cost coal-fired generators to the energy mix. Some critics argue that lower construction and operating costs for coal plants won't necessarily be reflected in lower retail prices to consumers; and it's true that the price of delivered power includes costs other than those associated with generation, such as transmission, fuel-adjustment, and competition transition charges. But the experience of states where coal constitutes a larger portion of the fuel mix suggests coal plants do help to hold down rates.

As indicated in Table 3, many of the states with below-average residential electricity rates derive a large percentage of their power from coal-fired generating plants. What's more, rate increases between 2000 and 2005 tended to be lower in states where coal plants were the major source of power. And none of the coal-dominant states recorded rate hikes anywhere close to those seen in Texas between 2000 and 2005.⁴

Texas will never be another West Virginia, Kentucky or Wyoming deriving 90+ percent of its electric power from coal plants. But boosting coal's share in the Texas power mix over time to between 30 and 35 percent can have a salutary long-term effect on delivered electricity costs while at the same time assuring reliability to the state's households and businesses.

⁴ Not every state has a fully deregulated electric power market, and to some extent price differences may reflect the degree of deregulation that has occurred to date. Some states have deregulated wholesale power sales, others have deregulated both the wholesale and retail markets, while still others remain fully regulated. Most areas of Texas will be fully deregulated at both the wholesale and retail levels on January 1, 2007.

Table 3
Average Residential Electricity Rates (Cents per kWh) and Percentage of Power Generation Using Coal

STATE	2000	2005	% Change	% Coal Generated	STATE	2000	2005	% Change	% Coal Generated
WV	6.27	6.21	-0.96%	98%	SC	7.58	8.67	14.38%	38%
ID	5.39	6.29	16.70%	1%	MS	6.93	8.71	25.69%	38%
WA	5.13	6.54	27.49%	10%	AZ	8.44	8.86	4.98%	40%
KY	5.47	6.57	20.11%	91%	LA	7.67	8.87	15.65%	25%
TN	6.33	6.98	10.27%	60%	DE	8.54	9.01	5.50%	59%
ND	6.44	6.99	8.54%	95%	CO	7.31	9.06	23.94%	71%
MO	7.04	7.08	0.57%	86%	DC	8.03	9.10	13.33%	0%
NE	6.53	7.14	9.34%	66%	NM	8.36	9.13	9.21%	86%
OR	5.88	7.25	23.30%	7%	IA	8.37	9.27	10.75%	78%
WY	6.50	7.48	15.08%	94%	US-TOTAL	8.24	9.45	14.68%	50%
IN	6.87	7.50	9.17%	95%	FL	7.77	9.62	23.81%	28%
UT	6.29	7.52	19.55%	94%	WI	7.53	9.66	28.29%	68%
SD	7.42	7.77	4.72%	46%	PA	9.53	9.86	3.46%	56%
KS	7.65	7.90	3.27%	76%	NV	7.28	10.20	40.11%	46%
OK	7.03	7.95	13.09%	52%	TX	7.96	10.93	37.31%	38%
AR	7.45	8.00	7.38%	48%	NJ	10.27	11.74	14.31%	19%
AL	7.05	8.00	13.48%	57%	CA	10.89	12.51	14.88%	1%
MT	6.49	8.10	24.81%	65%	VT	12.30	12.96	5.37%	0%
VA	7.52	8.16	8.51%	44%	RI	11.28	13.04	15.60%	0%
MN	7.52	8.28	10.11%	63%	ME	12.49	13.23	5.92%	2%
IL	8.83	8.34	-5.55%	48%	AK	11.45	13.30	16.16%	69%
MI	8.52	8.40	-1.41%	57%	MA	10.53	13.44	27.64%	25%
MD	7.95	8.46	6.42%	55%	NH	13.15	13.51	2.74%	17%
OH	8.61	8.51	-1.16%	88%	CT	10.86	13.64	25.60%	12%
GA	7.60	8.64	13.68%	64%	NY	13.97	15.72	12.53%	14%
NC	7.97	8.65	8.53%	62%	HI	16.41	20.70	26.14%	14%

Source: Energy Information Administration

Addressing power needs and the fate of Texas manufacturing

Manufacturing assets are a key component of the Texas economy. The Texas Workforce Commission places total employment in Texas manufacturing at around 892,000 – or just over 9 percent of the state’s non-agricultural employment. The Federal Reserve Bank of Dallas observes that Texas’ manufacturing constitutes roughly seven percent of all United States manufacturing output.

On average, manufacturing jobs in Texas produce wages in excess of a thousand dollars a week. These wages are higher than in most industries—literally twice as high as the retail sector. And, according to the U.S. Bureau of Economic Analysis (Department of Commerce), some 95 percent of Texas exports were made up of manufactured goods – totaling about \$122.6 billion.

During the decade of the 1990s, according to data gathered by the Texas Manufacturing Assistance Center (TMAC), Texas gained more manufacturing jobs than any other state in the nation. By 2000, the nation had entered a nationwide manufacturing recession. But, by 2005, TMAC detected a slight up tick in manufacturing employment in the state – adding 4,900 additional jobs as part of the first job growth since 2000. Capital expenditures in the sector totaled \$11.6 billion in 2005, up from \$9.3 billion the year before. This modest growth was in part due to the ability of the state to attract new investment (such as the Toyota facility) with the elements of an attractive business climate.

A key complicating factor in the recovery of the Texas manufacturing sector is fuel diversity in the electric generation sector. This conclusion is based upon two mutually – reinforcing factors. First, electric costs themselves are important indicators of a favorable business client for a large majority of manufacturing facilities. Second, in Texas particularly, many manufacturing industries utilize natural gas as a key input and feedstock. An unintended

consequence of certain clean-air policies has been to stimulate the use of natural gas in power generation. Of course, new generations of coal-fired facilities achieve impressive air quality results and use the best available control technology. Allowing greater penetration of coal in the electric marketplace allows for more rational and value-added uses of natural gas in the manufacturing sectors. As Dr. Charles Holland, president of the Texas Institute for the Advancement of Chemical Technology (TIACT) and an emeritus professor of engineering at Texas A&M University recently found, “The production of basic chemical commodities such as ethylene requires the use of significant amounts of natural gas and electricity. Manufacturers are getting whipsawed by high natural gas prices.”

Consistently high natural gas prices have resulted in temporary or permanent shutdowns of fertilizer plants throughout the United States, according to the National Petroleum Council’s (NPC) September 2003 report entitled, “Balancing Natural Gas Policy: Fueling the Demands of a Growing Economy.” The U.S. chemical industry writ large is the largest user of natural gas, consuming one-tenth of total national demand. The NPC further found that “energy for both fuel and power needs and feedstocks accounts for up to 85% of total production costs” in the chemical industry. Capacity in methanol, ammonia and ethylene production has actually been idled in response to high natural gas prices. The NPC study also termed natural gas “an essential feedstock for petrochemical manufacturing.” The American Chemistry Council has found that for every dollar that natural gas prices increase, \$3.7 billion in costs are added to the chemical industry.

According to Commerce Department data, in 2005 alone chemical exports from Texas were valued at almost \$25 billion – much of that amount destined for recipient countries with which the U.S. currently runs a negative balance of trade.

The potential harm to the Texas economy arising from a less competitive chemical sector should not be taken lightly. The State of Texas recently commissioned a study by economists at the Harvard Business School and elsewhere to assess the relative contributions of various sectors to the Texas economy. In August 2005, the Texas Industry Cluster Initiative reported that, “On average, a \$1 increase in orders from a Texas petrochemical plant generates \$2.33 of business in the state economy, and increases personal income by \$0.45. Every new job in these industries creates a total of 6.6 new jobs in Texas.” In short, Texas would be hard pressed to recover the substantial economic multiplier effects that results from a robust chemical sector in the state.⁵

One note of caution: we do not contend that natural gas is less important as a commodity than coal or other power sources. To the contrary, it is the extraordinary value of natural gas to the manufacturing sector and the power sector that understates the need for a balanced portfolio of electric generating assets in the state.

Keeping an attractive investment climate in Texas

As discussed above, Texas has become an economic powerhouse with a rapidly growing population and employment base. Virtually all forecasts project that Texas will continue to outpace the nation in population and job growth for the foreseeable future. But implicit in all these projections is the assumption that reliable and affordable electric power will be available to businesses large and small.⁶ Supplying this energy will pose a tremendous challenge to Texas’ utilities in the decades ahead.

⁵ A 2000 study by the authors of this report found that each \$1 increase in the price of natural gas decreases state output by \$4.3 billion and displaces 21,000 jobs paying \$758 in wages. See *The Impact of Higher Natural Gas Prices on the Texas Economy*, www.unt.edu/cedr/naturalgas.pdf.

⁶ According to the Perryman Group of Waco, even a one percent shortfall in electric power availability would result in the loss of more than 50,000 jobs and \$2.3 billion of personal income.

Texas consumes more energy in all forms than any other state (see Table 4). In fact, Texas households and businesses utilize 50 percent more BTUs each year than California. About half of Texas' demand comes from its industries, especially those involved in the production and processing of raw energy and metals. With its huge concentration of oil and gas rigs, refineries, and petrochemical plants, the Texas Gulf Coast is the nation's "Energy Capital." But it takes energy—including lots of electric power—to make energy.

Table 5 expresses electric power costs as a percent of total operating expenses for a variety of Texas' energy-intensive industries.⁷ Primary aluminum and industrial gases top the list, at 17.4 percent and 14.6 percent. The petrochemical industry also ranks high in power consumption as do paper manufacturing, electroplating, glass, and primary metals. Because many of these industries are engaged in fierce international competition, keeping power costs affordable is one of the keys to ensuring their long-term survival.

What's true for the state's heavy industries is generally true for most manufacturing and business service companies—in particular Texas' burgeoning high-tech industries.⁸ For example, the new Texas Instruments fabrication plant in Richardson draws about 30 megawatts of power daily. Though energy accounts for only a few percent of a chip's cost, electricity can be the largest single non-labor operating expense for a chipmaker, totaling millions of dollars annually at a single plant.⁹

Data centers also consume huge amounts of electricity. Partly to keep up with the Internet's surging growth, data centers have increased the number of servers world-wide from 14 million to 28 million just in the past six years, with many located in the state of Texas. Power

⁷ Given the run-up in power costs since 2003, the percentages are undoubtedly higher today.

⁸ According to the American Electronics Association, in 2005 Texas employed 446,000 workers in high technology occupations, second only to California.

⁹ Christian Page, "With a Little Help from RMI, Texas Instruments Breaks Ground," <http://www.rmi.org/sitepages/pid3116.php>.

consumption can account for up to 40 percent of a data center's operating costs, which helps explain why companies such as Google, Microsoft and Yahoo have put their largest data centers in Oregon, Washington and other states where electricity supplies are affordable and reliable. And in a recent survey of its members, the Association for Computer Operations Management (AFCOM) reported that 90 percent of its members were worried that power issues over the next five years would halt data center operations, costing their companies between \$250,000 and \$5 million per hour of disruption.¹⁰

Studies of factors affecting site selection for technology firms confirm the importance of affordable and reliable electric supplies:

Utility evaluations are very important to technology firms. The demands of the digital world result in large consumption of power. Affordable, reliable electricity is of utmost importance, particularly for manufacturers or data centers...Site selectors will evaluate brownouts, outages due to storms, power spikes, and excess capacity of peak periods.¹¹

Another study by the Atlanta-based consulting firm Moran, Stahl & Boyer found that "the location requirements needed to support the "innovation commercialization process" in high technology companies include the availability of low-cost and redundant power."¹²

While Texas is making significant investments in its efforts to attract and retain business through the Texas Enterprise Fund, these efforts will be for naught if Texas cannot offer, particularly to highly desirable technology businesses, the affordable and reliable electricity on which they rely to compete.

¹⁰ Bob Keefe, "Soaring Electricity Costs a Subtle Threat to Internet and Entire High-Tech Industry," *Atlanta Journal-Constitution*, August 1, 2006.

¹¹ Angelos G. Angelou, "Site Selection for the Technology Industry," *Trade & Industry Development*, winter 2004. As an example of how a lack of reliable power can affect the bottom line, Freescale Semiconductor asked the municipal utility in Austin to compensate them for alleged losses of \$15 million during a two-day outage in July 2006.

¹² Cited in "Top Ten Cyberstates," *Site Selection Magazine*, July 2005.

Table 4

**Energy Consumption by Sector
Ranked by State, 2003**

<u>Total Consumption</u>			<u>Residential Sector</u>		<u>Commercial Sector</u>		<u>Industrial Sector</u>		<u>Transportation Sector</u>	
Rank	State	Trillion Btu	State	Trillion Btu	State	Trillion Btu	State	Trillion Btu	State	Trillion Btu
1	Texas	12,369.8	Texas	1,624.3	California	1,438.6	Texas	6,706.3	California	3,274.6
2	California	8,130.3	California	1,469.2	New York	1,353.4	Louisiana	2,270.6	Texas	2,694.4
3	Florida	4,287.8	Florida	1,306.3	Texas	1,344.8	California	1,902.9	Florida	1,394.4
4	New York	4,220.6	New York	1,234.9	Florida	1,017.2	Indiana	1,341.1	New York	1,088.2

Source: Energy Information Administration.

Table 5

**Electric Power as Percent of Operating Expenses
for Selected Texas Industries, 2003**

Industry	Percent of Operating Expenses
Primary aluminum	17.4%
Industrial gases	14.6
Inorganic chemicals	5.4
Lime manufacturing	4.4
Mineral wool	3.8
Primary nonferrous metals	3.7
Glass containers	3.7
Ferrous metals	3.5
Electroplating	3.3
Iron and steel	3.1
Paper	3.0
<i>Public transportation</i>	4.8

Source: Authors' estimates based on IMPLAN Input-Output Model, 2005.

Surprisingly, electricity has also become a sizeable percentage of the costs of operating public transportation systems in Texas. Dallas-Fort Worth and Houston are planning major expansions of their electric rail services, and several other Texas cities are also looking at rail as part of their future public transit mix. Texas cities are pursuing public transit options for two major reasons: to reduce traffic congestion and to improve air quality in compliance with EPA standards. Holding down the cost of electricity, which in turn holds down the cost of public transit, can help Texas cities achieve both goals.

Would Texas have been able to snag the new Texas Instruments chip plant in Richardson or the just-opened Toyota truck plant in San Antonio in the absence of an affordable and reliable power supply? Probably not. In an economy where states are fighting each other for new business as never before, Texas must remain competitive on all fronts—including utility costs. Against this economic reality, Texas' utilities must pursue lower-cost coal generating plants for

adding megawatts to the power grid, thereby helping to ensure both reliability and affordability to current and prospective businesses.

Conclusion

Texas today is an economic superpower, with a rapidly expanding population and employment base. Part of the state's historic economic success can be attributed to affordable and reliable utility services, especially the provision of electricity to households and businesses. But in order to maintain this growth, Texas must maintain fuel diversity and balance in the Texas power generation mix, utilizing natural gas, coal, nuclear, and renewable sources.. Not only do high power costs put Texas' many energy-intensive industries at risk, they also burden the state's large and growing number of poor families.

ERCOT projects Texas will need up to 47,900 MW of new power a decade from to keep up with expected demand. That means the state's electric utilities must begin constructing new power plants today to ensure an adequate and reliable supply. At the same time, it is imperative that future electric power rates in Texas be no higher than the national average in order to protect low-income families and keep Texas' industries competitive.

Some detractors have argued that Texas' future power demands can be satisfied through a combination of conservation and renewables such as wind. But even under the most optimistic assumptions of their potential, the state's utilities will still have to construct dozens of base-load powers plants over the next 10 years.

As in the past, Texas' future economic prosperity will hinge partly on ensuring that businesses and households are not burdened by excessive utility costs, in particular electric

power. Adding new coal plants to the fuel mix will diversity Texas' energy sources and help hold down electric power costs in the decades ahead.