ENERGY EFFICIENCY IN THE SOUTH

APPENDIX G

STATE PROFILES OF ENERGY EFFICIENCY OPPORTUNITIES IN THE SOUTH: TEXAS

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A Profile of Energy-Efficiency Opportunities in Texas

The economic recession, climate change concerns and rising electricity costs have motivated many states to embrace energy efficiency as a way to create new local jobs, lower energy bills and promote environmental sustainability. With this surge of interest in energy efficiency, policymakers are asking: "how much energy can be saved?" The rapid growth of U.S. energy consumption, coupled with a concern for dependable, affordable, and clean energy in the future, has led policymakers to ask how much wasted energy can be eliminated by investing in energy-efficient technologies. This profile addresses the opportunity for energy-efficiency improvements in Texas's residential, commercial and industrial sectors. It draws on the results of a study of *Energy Efficiency in the South* conducted by a team of researchers at the Georgia Institute of Technology and Duke University. The study presents primary and in-depth research of the potential for energy-efficiency improvements, using a modeling approach based on the EF-NEMS (National Energy Modeling System).[1]

With a population of 23.8 million people,[2] Texas represents about 7.9% of U.S. population, 7.9% of the nation's GDP, and 11.6% of U.S. energy consumption (Figure 1). Thus, compared to the rest of the nation, Texas has a higher-than-average level of energy intensity (that is, it consumes more energy per dollar of economic activity than most other states).

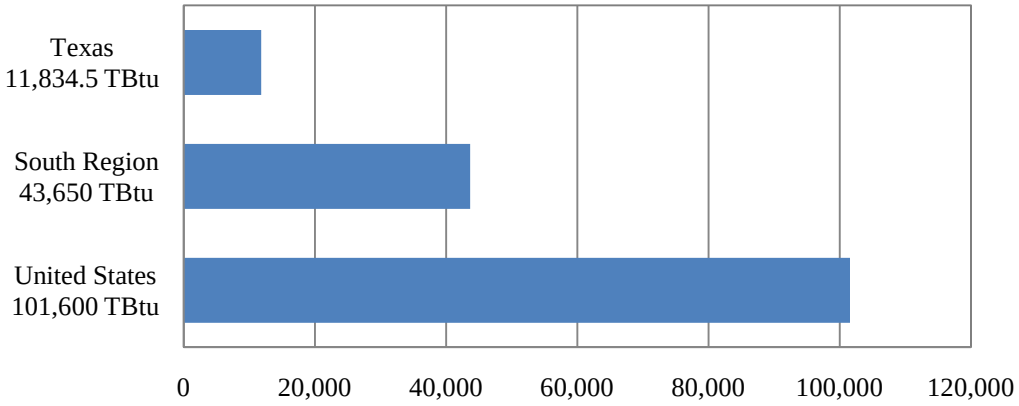

Figure 1: Texas, South, and United States Energy Consumption, 2007[3]

Texas's consumption of industry energy as a percentage of its overall energy budget exceeds that of the nation and the rest of the South (Figure 2). Texas's manufacturing and refining drive industrial energy consumption. This contributes to Texas's higher per capita energy consumption, ranking 5th nationally. [4]

The State consumes more petroleum and other fuels, such as electricity imports, and relatively less coal than the South and the nation as a proportion of overall energy consumption (Figure 3). Texas's electricity is largely generated from natural gas (39%), coal (29%), and renewable resources (13%).[4]

The state consumes more petroleum and natural gas fuels than the nation with energy consumption focused in the industry sector with predominance of petroleum refining industries (Figure 3).

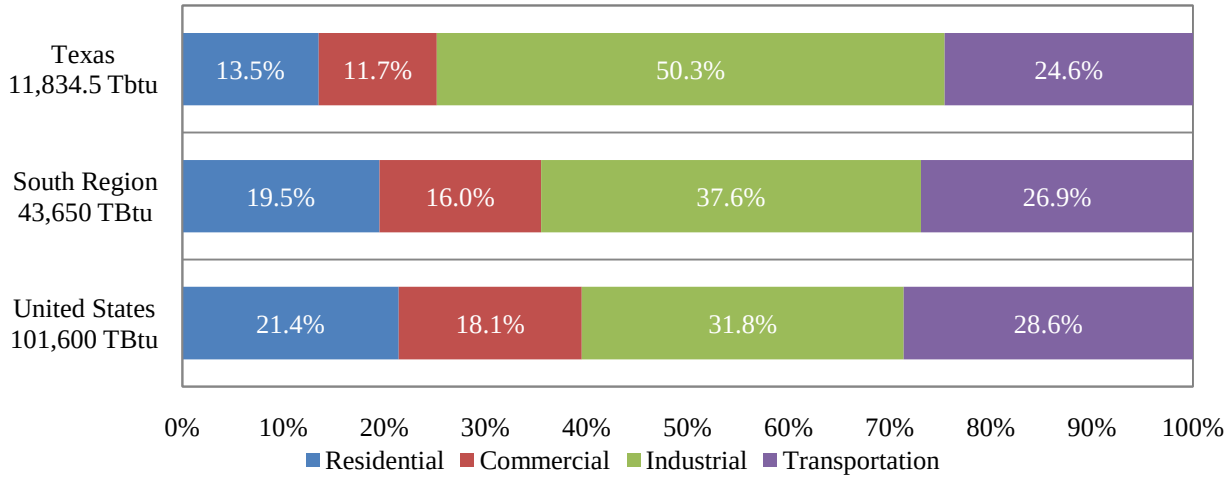

Figure 2: Texas, South, and United States Energy Consumption by Sector, 2007

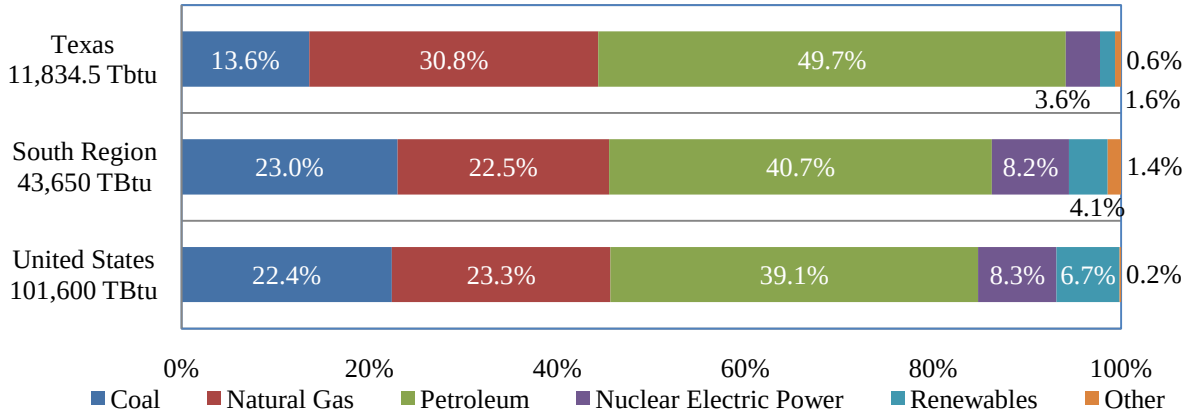

Figure 3: Texas, South, and United States Energy Consumption by Fuel Type, 2007

Texas has a number of energy-efficiency policies already in place. For instance, the Texas Emissions Reduction Audits Program provides useful information to industries to improve energy management. Texas also offers workshops and training for local governments and municipalities subject to the Texas Emissions Reduction Senate Bill 5.[5, 6] As one of the first States to adopt an Energy Efficiency Resource Standard, Texas legislated reductions in energy consumption. In 2009 Texas applied the State Energy Conservation Office (SECO), which

received $218 million in funding from the American Recovery and Reinvestment Act (ARRA). This funding is oriented to improvement of state actions to save energy in five areas: building efficiency and retrofit, transportations, incentive to the use of renewal energies, training, and education in energy management programs. [7]

Nevertheless, the *2009 State Energy Efficiency Scorecard* from the American Council for an Energy Efficient Economy suggests that additional policy initiatives are needed in the State to encourage households, businesses, and industries to utilize energy more effectively. Specifically, the ACEEE study rated Texas 23rd of the 50 states and DC for its adoption and implementation of energy efficiency policies. This score is based on the state's performance in six energy efficiency policy areas: utility and public benefits, transportation, building energy codes, combined heat and power, state government initiatives, and appliance efficiency standards.[8]

Chandler and Brown reviewed Texas's energy-efficiency studies in the *Meta-Review of Efficiency Potential Studies and Their Implications for the South* (2009). Energy savings range from 5-11% based on this review from projected energy consumption under a moderate pursuit of achievable savings in these studies.[9] Texas's energy-efficiency potential would be higher than this range with the implementation of all cost-effective opportunities, but the number of studies with such estimates is limited. The ACEEE (2007) study conducted in Texas estimates important potential contributions from energy efficiency (11%), CHP (6%) and renewable resources (5%) in the period 2008-2023.[10]

Energy Efficiency Potential by Sector

The State's total energy consumption (residential, commercial, industrial, and transportation sectors) is projected to increase 18% from 2010 to 2030. This profile describes the ability of nine energy policies to curb this growth in energy use by accelerating the adoption of cost-effective energy-efficient technologies in the residential, commercial, and industrial sectors of Arkansas. Altogether, these policies offer the potential to reduce Texas' energy consumption by approximately 12.7% of the energy consumed by the State in 2007 (1,500 TBtu in 2030) (Figure 4). With these policies, Texas' energy consumption could remain fairly stable over the 20 year period. For complete policy descriptions, refer to *Energy Efficiency in the South by* Brown et al. (2010).

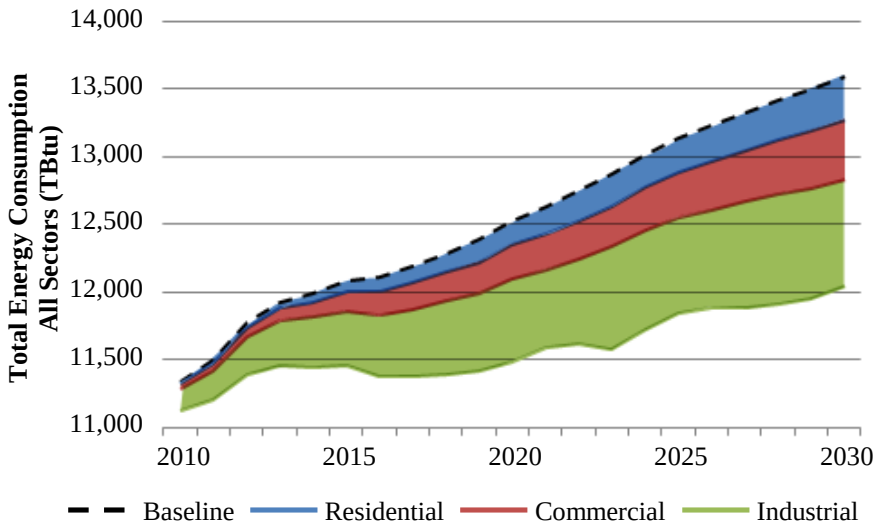

Figure 4: Energy Efficiency Potential in Texas

The industry sector offers the greatest energy efficiency potential in Texas (Figure 5). In 2020, savings from all three sectors is about 10% (1,180 TBtu) of the total energy consumed by the State in 2007. Electricity savings constitute 668 TBtu of this amount. With these policies, the generation of electricity from the equivalent of 17 power plants of 500-MW each could be avoided in the year 2020. [11]

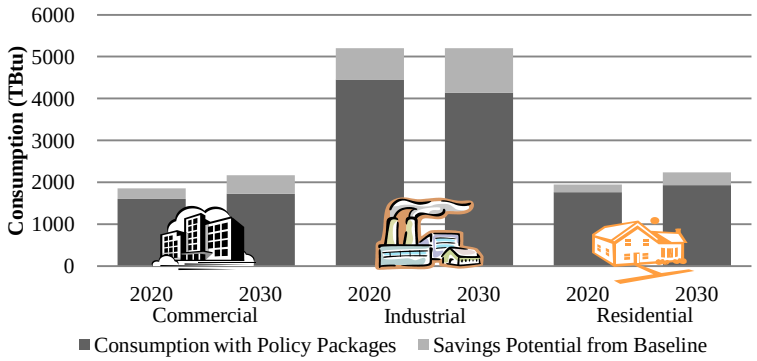

Figure 5: Energy Efficiency Potential by Sector in Texas, 2020 and 2030

Residential Sector

Four residential energy efficiency policies were examined: more stringent building codes with third party verification, improved appliance standards and incentives, expanding the Weatherization Assistance Program, and retrofit incentives and increased equipment standards."Their implementation could reduce Texas' projected residential consumption by about 9% (180 TBtu) in 2020 and 14% (310 TBtu) in 2030 (Figure 6).

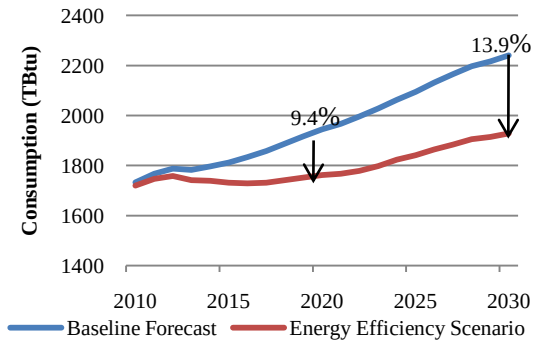

Figure 6: Residential Sector Savings

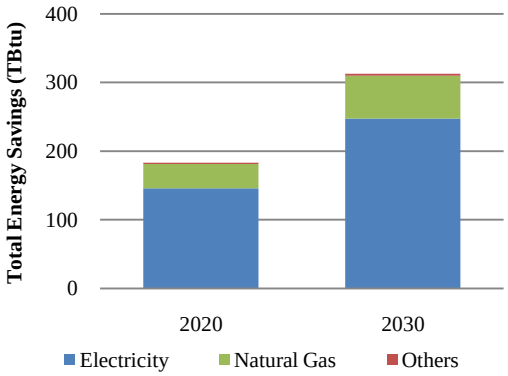

Figure 7: Residential Sector Savings by Fuel Type

In 2020, the residential energy required by about 950,000 Texan households could be avoided or average annual energy bill savings of $330 per household. The principal energy savings are from electricity, but natural gas savings could also occur (Figure 7). With these policies, residential energy consumption could be constrained to only modest growth.

Commercial Sector

The implementation of energy efficiency policies in Texas' commercial sector can reduce projected consumption in 2020 by about 13.6% (250 TBtu), and by about 20.4% (440 TBtu) in 2030 (Figure 8). In 2020, the commercial energy required by about 7,200 Wal-Mart stores can be saved or about $31,000 in average annual savings per retail establishment. [12] The principal energy savings are from electricity, with natural gas providing additional savings (Figure 9). The rapid growth of commercial energy consumption forecast for Texas could be constrained to only modest growth with these two energy efficiency policies.

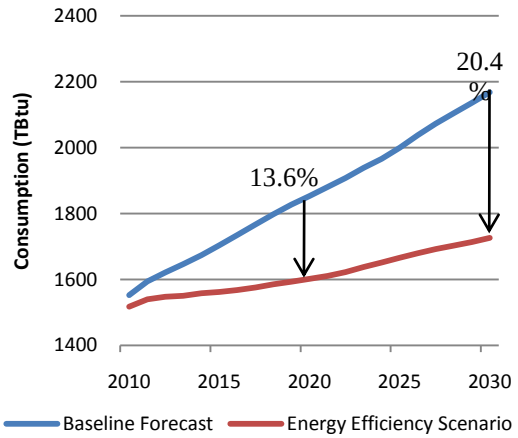

Figure 8: Commercial Sector Savings

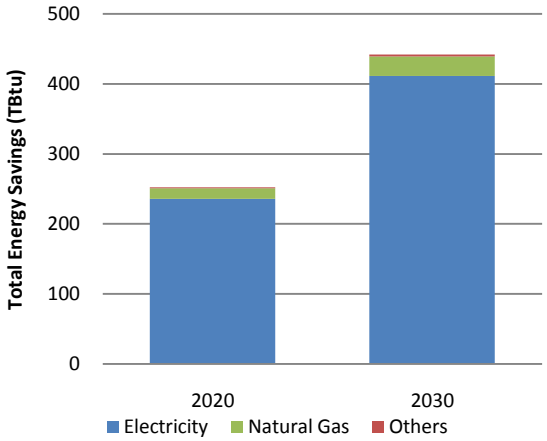

Figure 9: Commercial Sector Savings by Fuel Type

Industrial Sector

The implementation of plant utility upgrades, process improvements, and combined heat and power policies in Texas' industrial sector can reduce projected consumption by about 12.5% (745 TBtu) in 2020 and 17.7% (1055 TBtu) in 2030 (Figure 10). The industrial energy required by about 879 average industrial facilities is avoided in 2020, or about $404,000 average annual savings per industrial facility. The principal energy savings are from natural gas, but significant electricity savings could also occur (Figure 11). These three energy efficiency policies could significantly reduce the growing consumption of industrial energy over the next two decades.

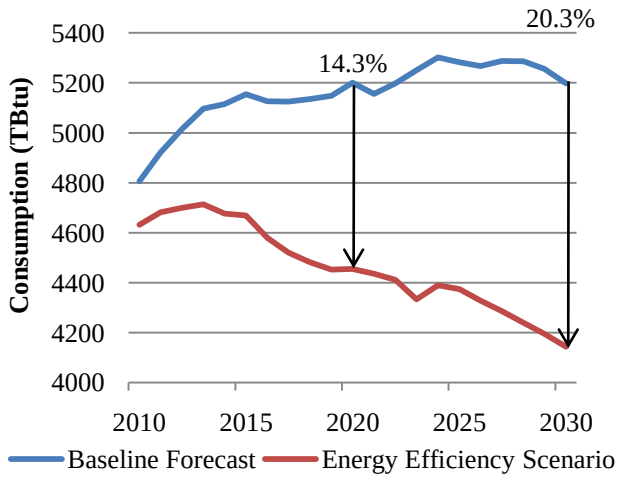

Figure 10: Industrial Sector Savings[13]

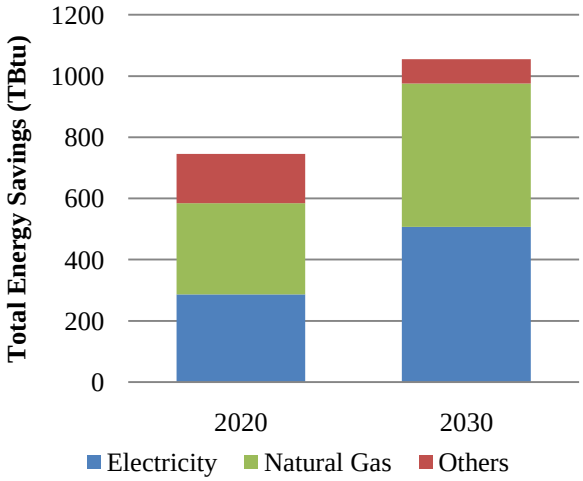

Figure 11: Industrial Sector Savings by Fuel Type

Efficient Technology Opportunities

The projected energy efficiency potential can be realized through an array of new and existing technologies. *Energy Efficiency in the South* enumerates a number of these.

New residential products can provide greater energy savings without sacrificing performance. For instance, recently available heat pump water heaters can cut annual energy costs for water heating from 50-62% and pay back initial costs within three years.[14]

Opportunities for commercial energy efficiency may be obtained through technologies like the geothermal heat pump (ground-source heat pump), which can reduce energy consumption by up to 44% when compared to air-source heat pumps and by up to 72% when compared to electric resistance heating with standard air-conditioning equipment. Though the installation cost is higher, the long lifetime of 20-25 years ensures energy bill saving benefits over time. [15]

Super boilers, which represent over 95 percent fuel-to-steam efficiency, can be implemented in the industrial sector. This technology is able to improve heat transfer through the use of advanced firetubes with extended surfaces that help achieve a compact design through reducing size, weight, and footprint. The advanced heat recovery system combines compact economizers,

a humidifying air heater, and a patented transport membrane condenser. These technologies are illustrative. Please refer to *Energy Efficiency in the South* for additional technology descriptions and examples. [16]

Economic and Financial Impacts

The nine energy efficiency policies evaluated in *Energy Efficiency in the South* would reduce energy costs for Texas consumers and would generate jobs in the State (Table 1). Residential, commercial and industrial consumers could benefit from total energy savings of $13.7 billion in 2020 ($5.3 billion of which is specific to electricity), and $21.5 billion in total energy savings in 2030. In comparison, the State spent $34.0 billion on electricity in 2007.[3] Texas could gain additional savings from natural gas of $3.6 billion in 2020.[17]

Using an input-output calculation method from ACEEE – with state-specific impact coefficients and accounting for declines in employment in the electricity and natural gas sectors – we estimated that Texas would experience a net gain of 96,300 jobs in 2020, growing to 132,100 in 2030. In comparison, there were over 1 million unemployed residents of Texas at the end of 2009. [18]

As is true for the South at large, the policies would also lead to an increase in Texas's economic activity. Specifically, its Gross State Product would increase by an estimated $283 million in 2020 and by $390 million in 2030. This change is a small fraction of Texas's $1,149 billion economy. [19]

Table 1: Economic and Employment Impacts of Energy Efficiency

Indicator	2020	2030
Public Sector Policy Financial Incentives (in million $2007)	2,205	3,456
Private Sector/Household Productive Investment (in million $2007)	2,949	3,015
Change in Electricity Costs (in million $2007)	-5,269	-10,216
Change in Natural Gas Costs (in million $2007)	-3,627	-7,121
Annual Increased Employment (ACEEE Calculator)	96,300	132,100
Change in Gross State Product (in million $2007)	283	390

Conclusions

The energy-efficiency policies described in this report could set Texas on a course toward a more sustainable and prosperous energy future. If utilized effectively, the State's substantial energy-efficiency resources could reverse the long-term trend of ever-expanding energy consumption. With a concerted effort to use energy more wisely, Texas could grow its economy, create new job opportunities, and reduce its environmental footprint.

For more information on the methodology used to derive this state profile, please see *Energy Efficiency in the South*.

Acknowledgements

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