ENERGY EFFICIENCY IN THE SOUTH

APPENDIX G

STATE PROFILES OF ENERGY EFFICIENCY OPPORTUNITIES IN THE SOUTH: ALABAMA

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A Profile of Energy-Efficiency Opportunities in Alabama

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 Alabama'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 primarily an 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 4.7 million people[2], the State represents about 1.5% of the U.S. population, 1.2% of the nation's Gross Domestic Product (GDP), and 2.1% of U.S. energy consumption[3] (Figure 1). Thus, compared to the rest of the nation, Alabama has a higher-than-average level of energy intensity (that is, it consumes more energy per dollar of economic activity than most other states).

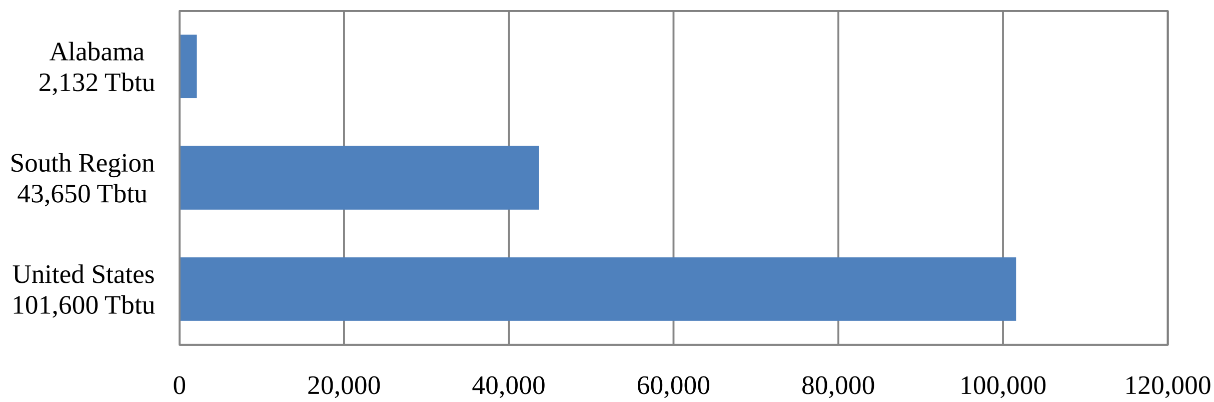


Figure 1: Energy Consumption in Alabama, the South, and the U.S., 2007

Alabama is an energy production state with a coal industry, a crude oil industry with both onshore and offshore reserves and new onshore drilling activity, and a natural gas industry with access to pipelines reaching Louisiana and Texas. These activities provide Alabama with a thriving industrial economy. Alabama's consumption of industrial energy as a percentage of its overall energy budget exceeds that of the nation and most states in the South. On the other hand, its commercial and transportation energy consumption is lower (Figure 2).

The State consumes more coal and nuclear energy than other states in the South. On the other hand, it consumes relatively less natural gas (Figure 3). Alabama consumed much of its primary energy (19%) to generate electricity to be sold to adjacent states in 2007.

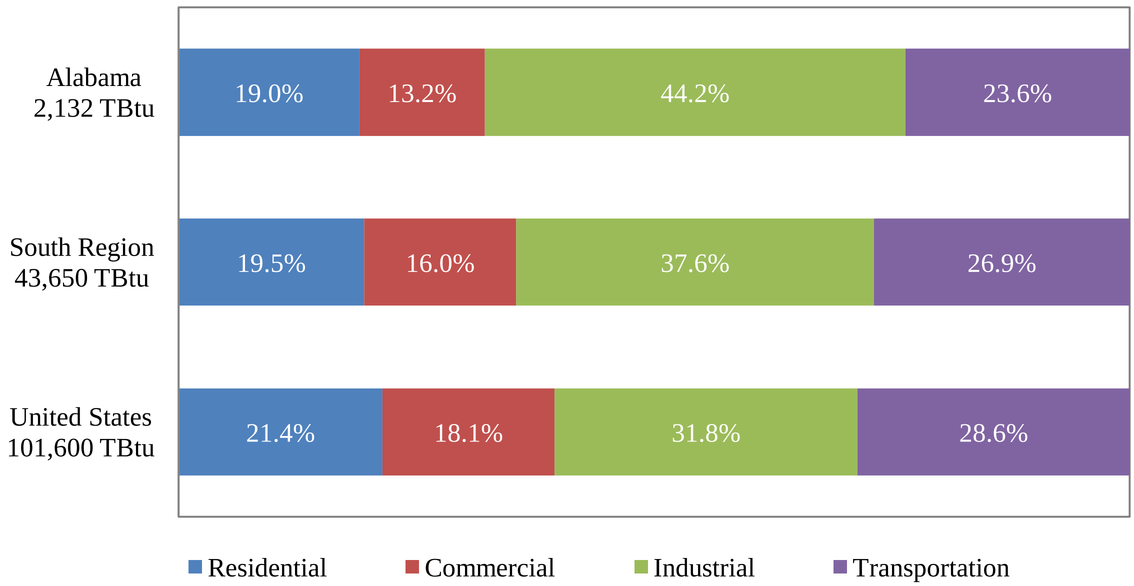


Figure 2: Energy Consumption in Alabama, the South, and the U.S. by Sector, 2007

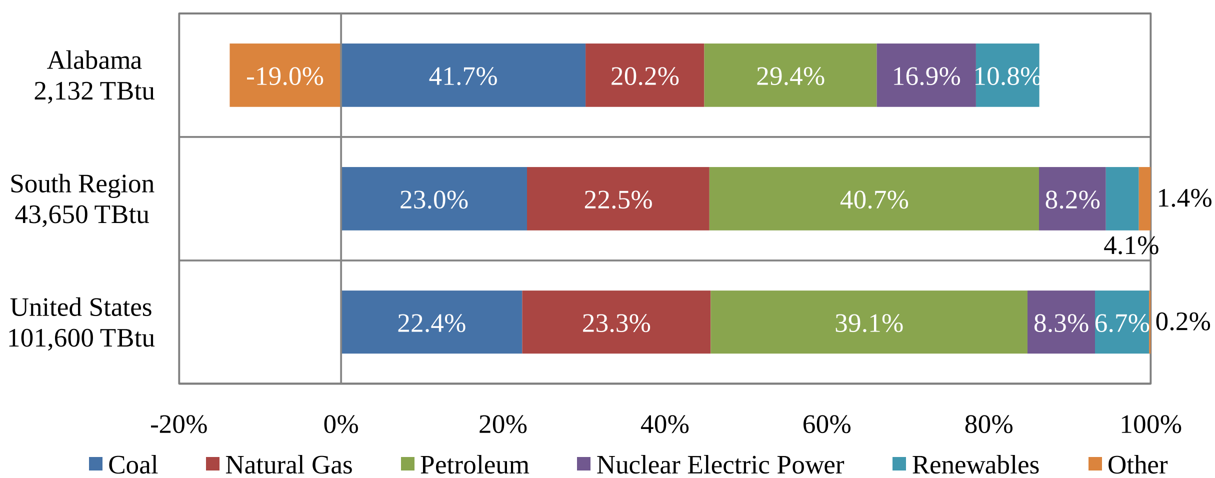


Figure 3: Energy Consumption in Alabama, the South, and the U.S. by Fuel Type, 2007

Alabama has a number of energy-efficiency policies and education programs already in place. For instance, it has a mandatory energy code for the construction of state government buildings and has just passed legislation enabling the adoption of mandatory energy codes for residential and commercial buildings, and home weatherization and school retrofit programs. The State also offers a local government energy loan program and an industrial energy efficiency program for small and medium sized firms to improve their productivity by reducing their energy costs. The state is currently establishing a $25 million energy revolving loan program that will provide low interest rate loans for the installation of renewable energy systems and the implementation of energy efficiency measures for existing industries in Alabama.

To meet the needs of public entities for renewable energy system and energy efficiency improvements, Alabama's Local Government Energy Loan Program offers zero-interest loans to local governments and schools as well as public colleges and universities. [4, 5]

Nevertheless, the *2009 State Energy Efficiency Scorecard* from the American Council for an Energy Efficient Economy (and other studies of the State and region) 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 Alabama 48th 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. [6] However, with the recent passage of energy code legislation, the state's rating could improve in 2010.

Chandler and Brown reviewed Alabama's energy-efficiency studies in the *Meta-Review of Efficiency Potential Studies and Their Implications for the South* (2009). According to this meta-review, estimates of "maximum achievable" potential electricity savings range from 8 to 27% of projected consumption in 2020. Alabama'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. [7]

Energy Efficiency Potential by Sector

The State's total energy consumption (residential, commercial, industrial, and transportation sectors) is projected to increase 3% from 2010 to 2030. This profile describes the ability of nine energy policies to accelerate the adoption of cost-effective energy-efficient technologies in the residential, commercial, and industrial sectors of Alabama. Altogether, these policies offer the potential to reduce Alabama's energy consumption by approximately 14% of the energy consumed by the State in 2007 (300 TBtu in 2030) (Figure 4). With these policies, Alabama's energy consumption could drop to well below its 2010 levels by 2030. For complete policy descriptions, refer to *Energy Efficiency in the South by* Brown et al. (2010).

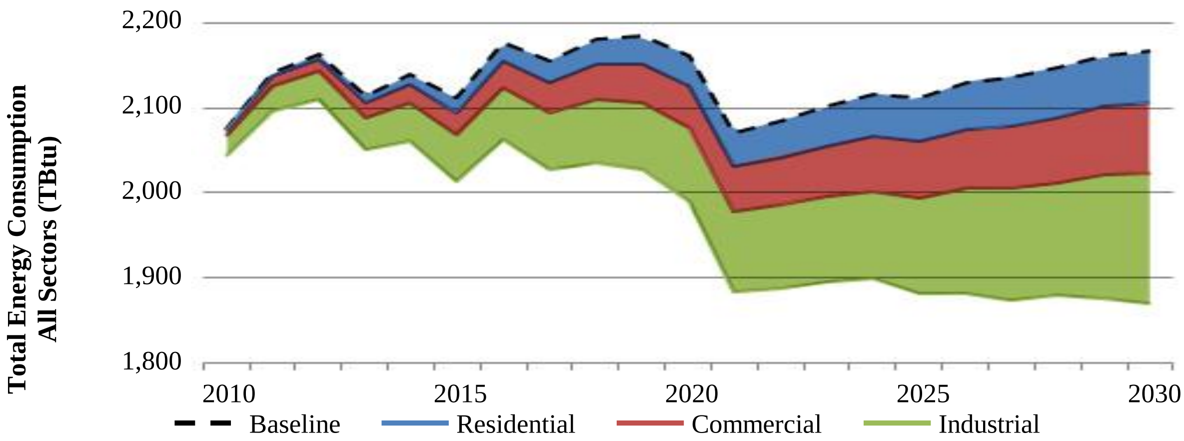


Figure 4: Energy Efficiency Potential in Alabama[13, 16]

The industrial sector offers the greatest energy efficiency potential in Alabama (Figure 5). In 2020, savings from all three sectors is about 8% (170 TBtu) of the total energy consumed by the State in 2007. Electricity savings constitute 120 TBtu of this amount. The energy efficiency savings from the three sectors decrease the total projected consumption for the state by 9% in 2020 and 14% in 2030. With these policies, the electricity generated by four 500-MW power plants in 2020 and seven such power plants in 2030 could be avoided. [8]

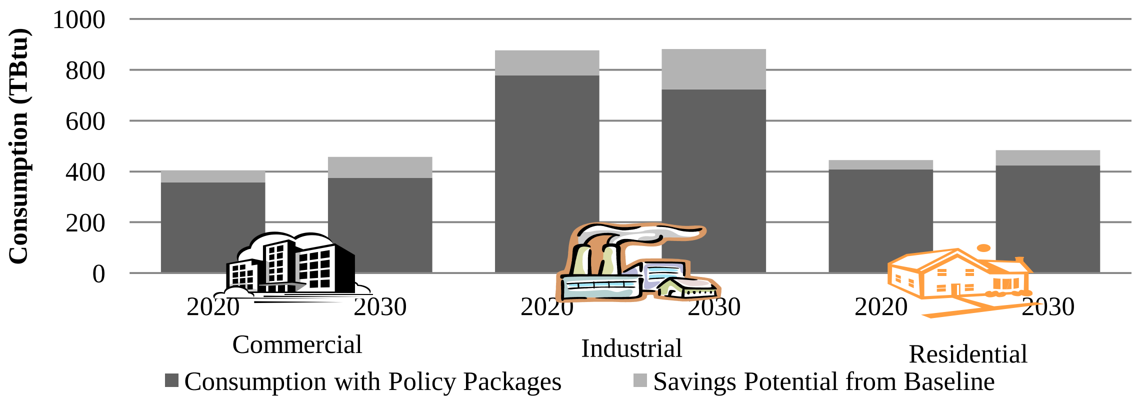
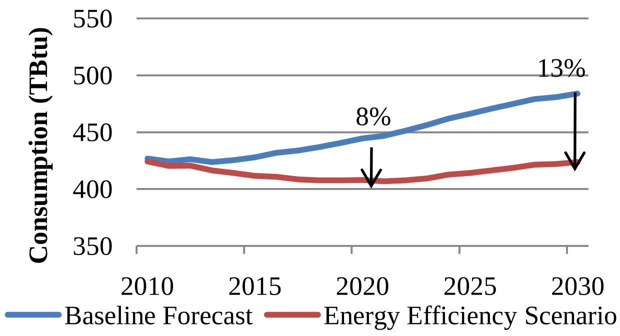


Figure 5: Energy-Efficiency Potential by Sector in Alabama, 2020 and 2030

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 Alabama's projected residential consumption by about 8% (36 TBtu) in 2020 and 13% (60 TBtu) in 2030 (Figure 6).



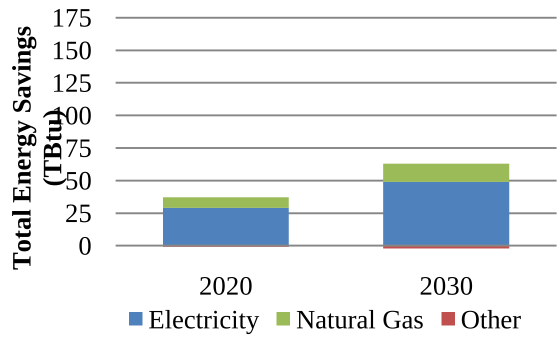


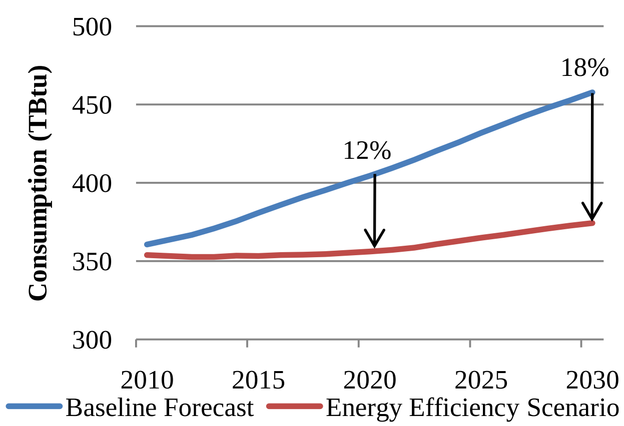
Figure 6: Residential Sector Savings

Figure 7: Residential Sector Savings by Fuel Type

In 2020, the residential energy required by 163,000 households in Alabama could be avoided (yielding annual bill savings of about $250 per household). The principal energy savings are from electricity, but significant natural gas savings could also occur (Figure 7). With these policies, residential energy consumption could remain largely unchanged over the next two decades.

Commercial Sector

The implementation of appliance standards and retrofit policies in Alabama's commercial sector could reduce projected energy consumption in 2020 by approximately 12%, and by 18% in 2030 (Figure 8). In 2020, the commercial sector could save about 48 TBtu, which is equivalent to the amount of energy that 1,370 Wal-Mart stores spend a year. Each retail enterprise could save $15,000 on average.[9] The principal energy savings are from electricity, with natural gas and other fuels providing additional savings (Figure 9). The rapid growth of commercial energy consumption forecast for Alabama could be constrained to only modest growth with these two energy efficiency policies.



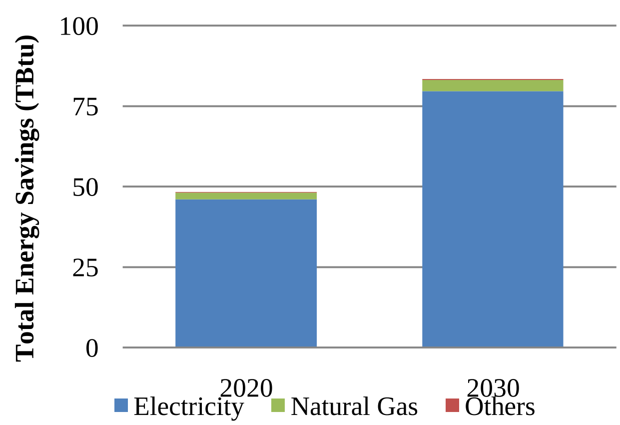


Figure 8: Commercial Sector Savings

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 Alabama's industrial sector can reduce projected consumption by about 11.2% (98 TBtu) in 2020 and 17.9% (158 TBtu) in 2030 (Figure 10). The industrial energy required by about 141 average industrial facilities is avoided in 2020, or about $114,000 average annual savings per industrial facility. The principal energy savings are from electricity, but significant natural gas 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 and drop the state's energy consumption to below its 2010 levels by 2030.

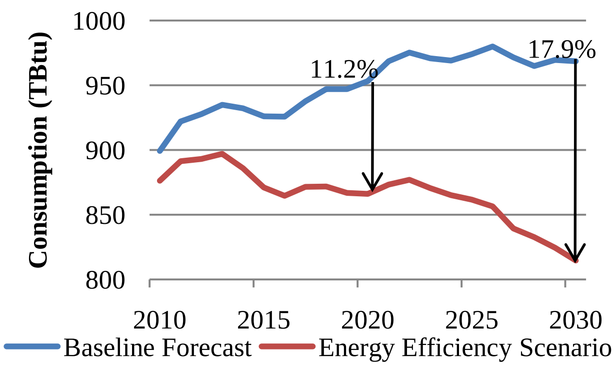


Figure 10: Industrial Sector Savings

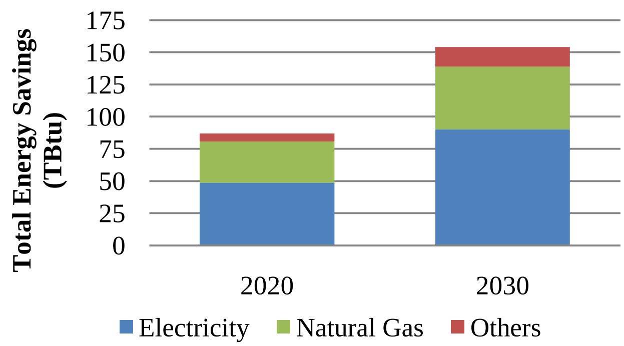


Figure 11: Industrial Sector Savings by Fuel Type

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

Emerging residential products can provide greater energy savings without sacrificing performance. For instance, currently available heat pump water heaters can cut annual energy costs for water heating from 50-62% and pay back upfront costs within three years. [10]

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. [11]

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.[12]

These technologies are illustrative. In 2007, DOE announced the successful operation of the first generation super boiler at the specification rubber products plants. Please refer to *Energy Efficiency in the South* by Brown et al. for additional technology descriptions and examples.

Economic and Financial Impacts

The nine energy efficiency policies evaluated in *Energy Efficiency in the South* could reduce energy costs for Alabama consumers and could generate jobs in the State (Table 1). Residential, commercial and industrial consumers could benefit from total energy savings of $1.3 billion in 2020 ($0.9 billion of which is specific to electricity), and $2.4 billion in total energy savings in 2030. In comparison, the State spent $6.7 billion on electricity in 2007.[13]

Table 1: Economic and Employment Impacts of Energy Efficiency

Indicator	2020	2030
Public Sector Policy Financial Incentives (in million $2007)	368	569
Private Sector/Household Productive Investment (in million $2007)	357	376
Change in Electricity Costs (in million $2007)	-886	-1,609
Change in Natural Gas Costs (in million $2007)	-385	-676
Annual Increased Employment (ACEEE Calculator)	12,800	17,300
Change in Gross State Product (in million $2007)	-16	-7

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 Alabama would experience a net gain of 12,800 jobs in 2020, growing to 17,300 in 2030. In comparison, there were 224,000 unemployed Alabamians at the end of 2009.[14]

While the South's economy would grow more rapidly as a result of the energy-efficiency policies, Alabama’s Gross State Product would grow by $16 million less in 2020, and by $7 million less in 2030. This change is a small fraction of the State’s $165 billion economy; the loss is due to the lower-than-average economic multiplier associated with energy-efficiency manufacturing and construction activities in Alabama.[15]

Conclusions

The energy efficiency policies described in this profile could set Alabama 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 sustained and concerted effort to use energy more wisely, Alabama 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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