ENERGY EFFICIENCY IN THE SOUTH

APPENDIX G

STATE PROFILES OF ENERGY EFFICIENCY OPPORTUNITIES IN THE SOUTH: MISSISSIPPI

Marilyn A. Brown,[1] Joy Wang,[1] Matt Cox, [1] Youngsun Baek,[1] Rodrigo Cortes,[1] Benjamin Deitchman, [1] Elizabeth Noll, [1] Yu Wang, [1] Etan Gumerman,[2] Xiaojing Sun[2]

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[1]Georgia Institute of Technology
[2]Duke University

A Profile of Energy-Efficiency Opportunities in Mississippi

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?" This profile characterizes the opportunity for cost-effective energy-efficiency improvements in the residential, commercial and industrial sectors of Mississippi. 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 2.9 million people[2], the State represents about 1.0% of the U.S. population, 0.6% of the nation's Gross Domestic Product (GDP), and 3.1% of U.S. energy consumption[3] (Figure 1). Thus, compared to the rest of the nation, Mississippi has a higher-than-average level of energy intensity (that is, it consumes more energy per dollar of economic activity than most other states).

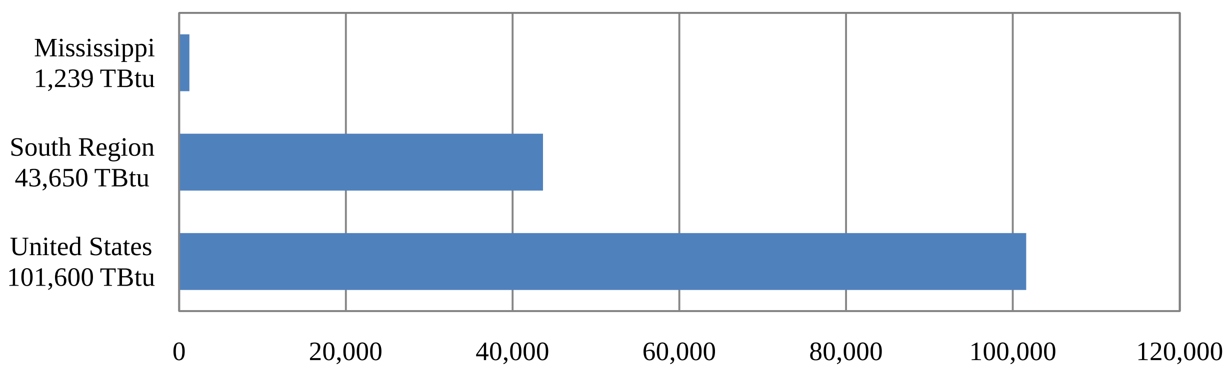

Figure 1: Energy Consumption in Mississippi, the South, and the U.S., 2007

Mississippi's consumption of transportation energy as a percentage of its overall energy budget exceeds that of the nation and the rest of the South, whereas the state's residential and commercial energy consumption is lower. The transportation and industrial sectors account for nearly 70% of the state's energy consumption (Figure 2).

Mississippi consumes proportionally more natural gas than the nation and other states in the South. On the other hand, it consumes relatively less coal and nuclear (Figure 3). The state produces a small portion of the natural gas consumed in the state, but has one of the largest natural gas processing plants in the U.S., which serves the growing offshore supplies brought in from federally administered wells on the outer continental shelf.[4, 5]

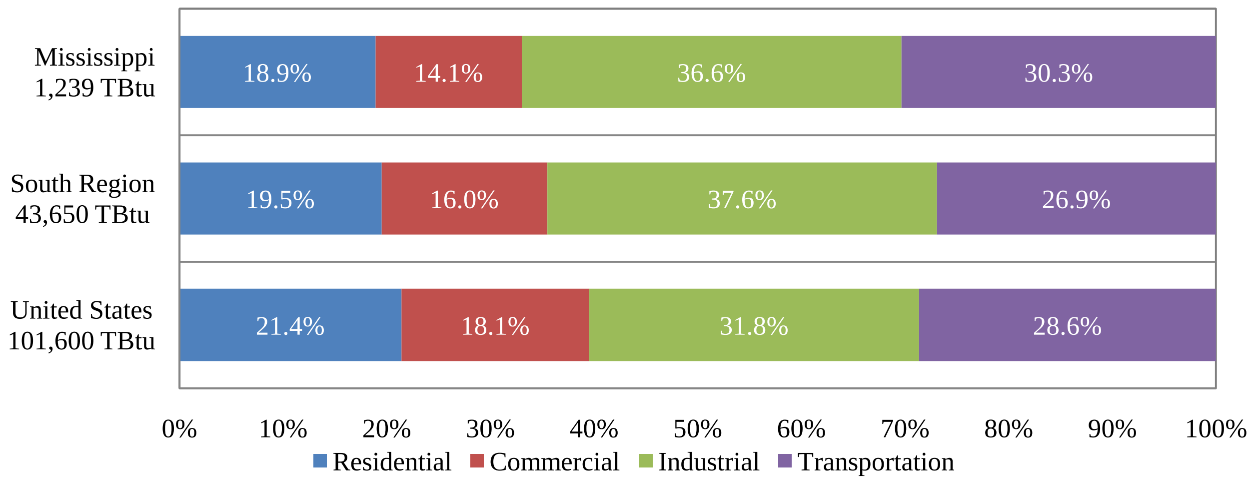

Figure 2: Energy Consumption in Mississippi, the South, and the U.S. by Sector, 2007

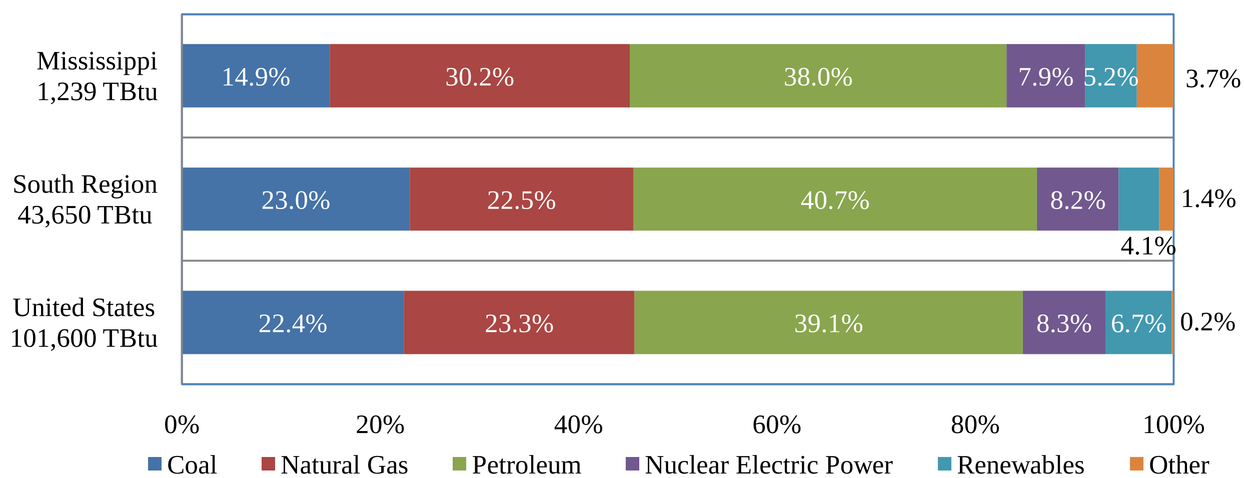

Figure 3: Energy Consumption in Mississippi, the South, and the U.S. by Fuel, 2007

Mississippi already has a number of energy efficiency policies in place. For example, the State Energy Management Law amended in 1998 promotes development and implementation of a state energy management plan pertaining to all buildings and facilities owned or leased by the State. In the industrial sector, energy assessment centers funded by the U.S. Department of Energy conduct energy audits for manufactures and small businesses and provide consultancy services for reducing energy consumption in the production processes. In the residential sector, a weatherization assistance program provides funds for insulating low-income households and training for 18 community action agencies that implement the weatherization program for 82 counties. [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 Mississippi 49th 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]

In the *Meta-Review of Efficiency Potential Studies and Their Implications for the South*, Chandler and Brown (2009) reviewed six energy-efficiency studies that covered Mississippi. According to this meta-review, estimates of "maximum achievable" potential electricity savings range from 9-27% of projected energy consumption in 2020. Mississippi'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

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 Mississippi. The state's total energy consumption (residential, commercial, industrial, and transportation sectors) is projected to increase 3% from 2010 to 2030. Altogether, these policies offer the potential to reduce Mississippi's energy consumption by approximately 15% of the energy consumed by the State in 2007 (180 TBtu in 2030) (Figure 4). With these policies, Mississippi's energy consumption could drop to below its 2010 levels by 2030. For complete policy descriptions, refer to *Energy Efficiency in the South by* Brown et al. (2010).

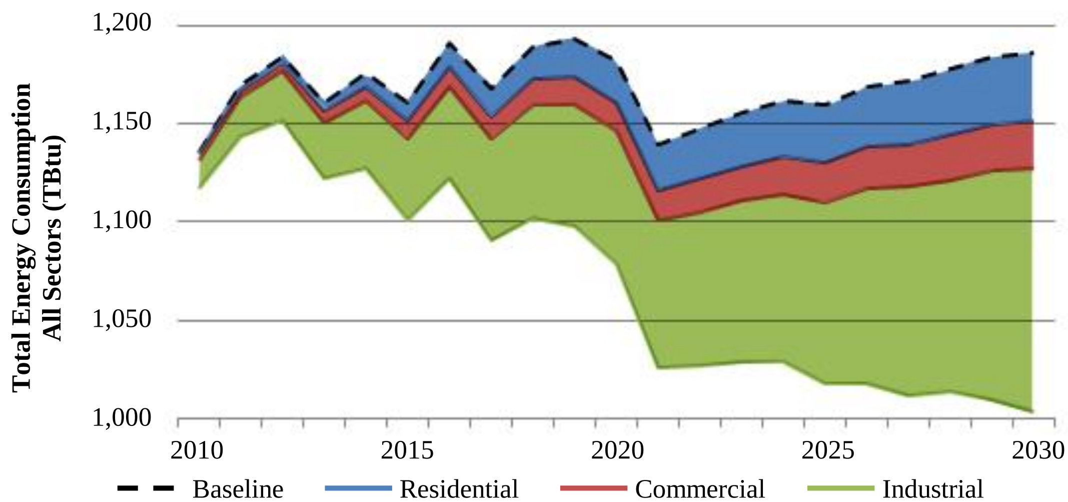

Figure 4: Energy Efficiency Potential in Mississippi[13, 16]

The industrial sector offers the greatest energy efficiency potential in Mississippi (Figure 5). In 2020, the savings potential from all three sectors is about 8.4% (100 TBtu) of the total energy consumed by the State in 2007. Electricity savings constitute 55 TBtu of this amount. The energy-efficiency savings from the three sectors could decrease the total projected consumption for the state by 10% in 2020 and 18% in 2030. With these policies, the electricity generated by two 500-MW power plants in 2020 and four such power plants in 2030 could be avoided. [8]

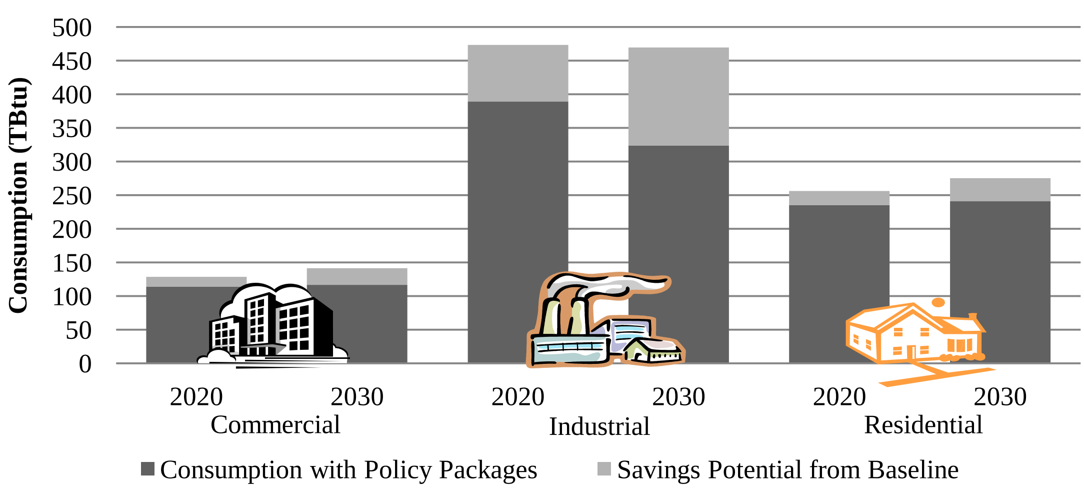

Figure 5: Energy Efficiency Potential by Sector in Mississippi, 2020 and 2030

Residential Sector

Four residential energy efficiency policies were examined: building codes with third party verification, appliance standards and incentives, expanded Weatherization Assistance Program, and retrofit incentives with equipment standards. Their implementation could reduce

Mississippi's projected residential consumption by about 8% (21 TBtu) in 2020 and 12% (34 TBtu) in 2030 (Figure 6). In 2020, the residential energy required by about 96,000 Mississippian households could be avoided or about $240 per household.

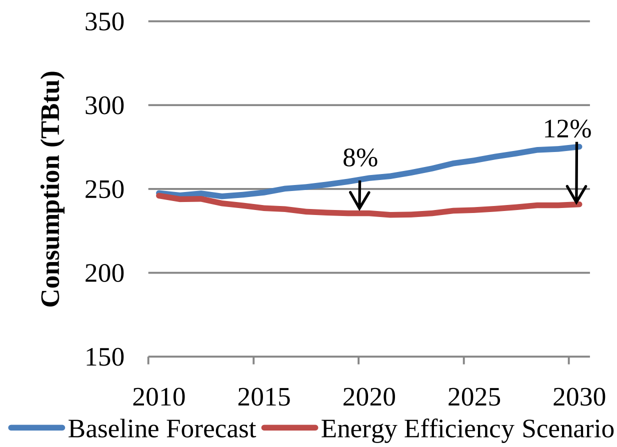

Figure 6: Residential Sector Savings

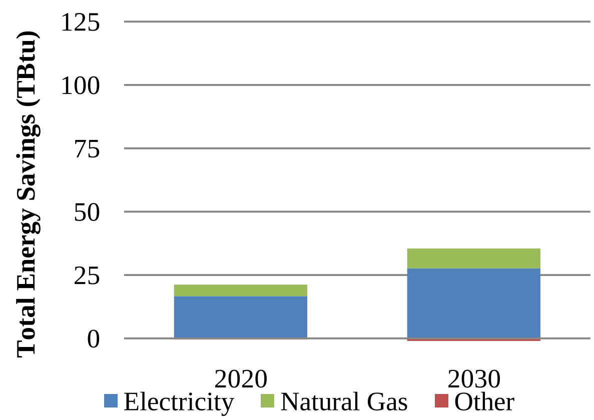

Figure 7: Residential Sector Savings by Fuel Type

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 Mississippi's commercial sector could reduce projected energy consumption in 2020 by about 11% (15 TBtu), and by about 18% (25 TBtu) in 2030 (Figure 8). In 2020, the commercial sector could save about 25 TBtu, which is equivalent to the amount of energy that 416 Wal-Mart stores spend a year. Each retail establishment in Mississippi could save about $15,000.[9] The principal energy savings are from electricity, with natural gas and other fuels providing additional savings (Figure 9). The gradual growth of commercial energy consumption forecast for Mississippi could be constrained to almost no growth with these two energy-efficiency policies.

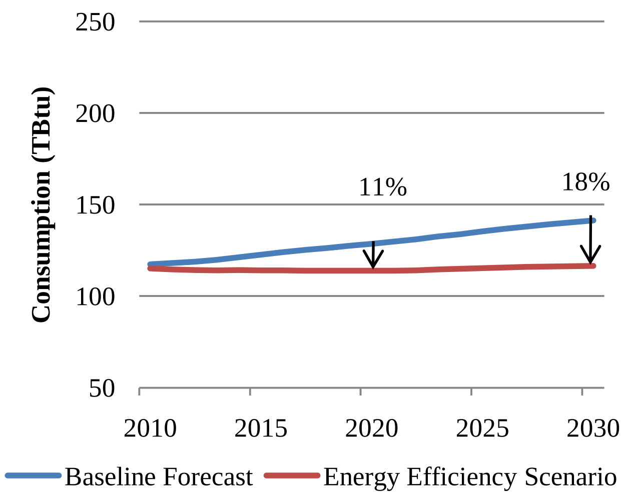

Figure 8: Commercial Sector Savings

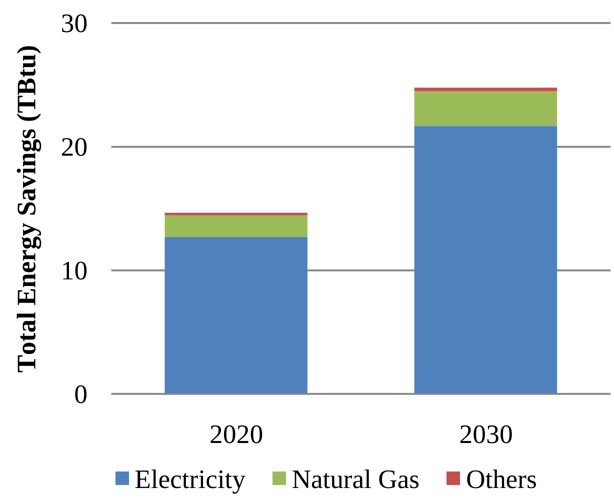

Figure 9: Commercial Sector Savings by Fuel Type

Industrial Sector

The implementation of plant utility upgrades, process improvements, and combined heat and power policies in Mississippi's industrial sector can reduce projected consumption by about 18% (84 TBtu) in 2020 and 31% (146 TBtu) in 2030 (Figure 10). The industrial energy required by about 121 average industrial facilities could be avoided in 2020, or about $97,600 average annual savings per industrial facility. The principal energy savings are from natural gas and electricity savings but other fuels could also be saved, reflecting the diversity of fuels used by the state's industries (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.

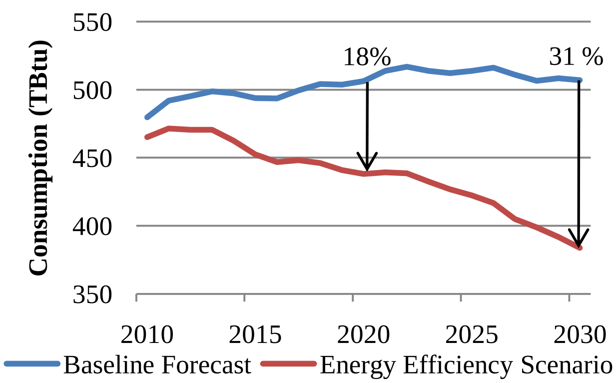

Figure 10: Industrial Sector Savings

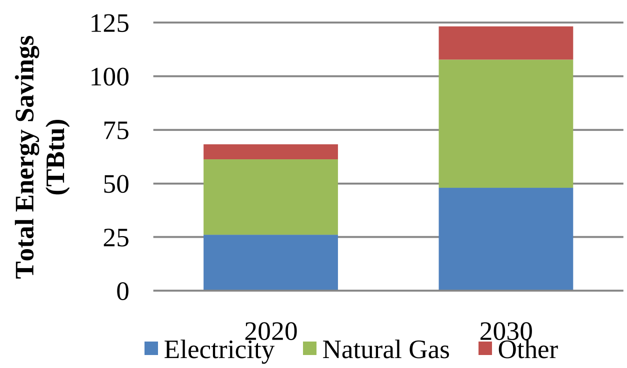

Figure 11: Industrial Sector Savings by Fuel Type

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. [10]

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.

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.

These technologies are illustrative. Please refer to *Energy Efficiency in the South* by Brown et al. for additional technology descriptions and examples. [12]

Economic and Financial Impacts

The nine energy efficiency policies evaluated in *Energy Efficiency in the South* would reduce energy costs for Mississippi consumers and would generate jobs in the State (Table 1). Residential, commercial and industrial consumers could benefit from total energy savings of $0.7 billion in 2020 ($0.5 billion of which is specific to electricity), and $1.2 billion in total energy savings in 2030. In comparison, the State spent $3.8 billion on electricity in 2007.[13]

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 Mississippi would experience a net gain of 6,900 jobs in 2020, growing to 9,500 in 2030. In comparison, there were 135,900 unemployed Mississippians at the end of 2009.[14]

While the South's economy would grow more rapidly as a result of the energy-efficiency policies, Mississippi’s Gross State Product would grow by $65 million less in 2020, and by $102 million less in 2030. This change is a small fraction of the State’s $88 billion economy; the loss is due to the lower-than-average economic multiplier associated with energy-efficiency manufacturing and construction activities in Mississippi.[15]

Table 1: Economic and Employment Impacts of Energy Efficiency		
Indicator	**2020**	**2030**
Public Sector Policy Financial Incentives (in million $2007)	214	324
Private Sector/Household Productive Investment (in million $2007)	191	197
Change in Electricity Costs (in million $2007)	-485	-880
Change in Natural Gas Costs (in million $2007)	-190	-330
Annual Increased Employment (ACEEE Calculator)	6,900	9,500
Change in Gross State Product	-65	-102

Conclusions

The energy efficiency policies described in this profile could set Mississippi 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, Mississippi could grow its economy, created new job opportunities, and reduce its environmental footprints.

For more information on the methodology used to derive this state profile, please see *Energy Efficiency in the South*. [1]

Acknowledgements

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Footnotes and References

1. Marilyn A. Brown, Etan Gumerman, Xiaojing Sun, Youngsun Baek, Joy Wang, Rodrigo Cortes, and Diran Soumonni. (2010). Energy Efficiency in the South, Retrieved from http://www.seealliance.org/.
2. Census Bureau (2009). Retrieved from: http://www.census.gov
3. Energy Information Administration. (2009). State Energy Data System. Retrieved from: http://www.eia.doe.gov/emeu/states/_seds.html
4. Southern States Energy Board. (2009). Digest of Climate Change and Energy Initiatives in the South
5. National Association of State Energy Officials (2009). State Energy Program and Activity Update

6. American Council for an Energy-Efficiency Economy. (2009). The 2009 State Energy Efficiency Scorecard. Retrieved from http://aceee.org
7. Chandler, J. and M.A. Brown. (2009). Meta-Review of Efficiency Potential Studies and Their Implications for the South. Retrieved from the Georgia Institute of Technology School of Public Policy website at: www.spp.gatech.edu/faculty/workingpapers/wp51.pdf
8. A power plant is approximated as a 500 MW power plant as defined by Koomey, J. et al. (2009). Defining a standard metric for electricity savings. Environ. Res. Lett. 4 (2009)
9. The Wal-Mart equivalencies are calculated using information from Courtemanch, A. and L. Bensheimer. (2005). Environmental Impacts of the Proposed Wal-Mart Supercenter in Potsdam. Conservation Biology
10. Energy Star. (2009). Save Money and More with ENERGY STAR Qualified Heat Pump Water Heaters. Retrieved from: http://www.energystar.gov/index.cfm?c=heat_ pump.pr_savings_benefits
    HD-Supply. (2009). HD Supply Utilities offers new GE® hybrid water heater with energy efficiency and demand response capability. Retrieved from: http://www.hdsupply.com/pressroom/downloads/ HD%20Supply%20GE% 20Press%20Release.pdf
11. Energy Efficiency and Renewable Energy. (2008). Benefits of Geothermal Heat Pump Systems. Retrieved from: http://www.energysavers.gov/your_home/space_heating_cooling/index.cfm/ mytopic=12660
12. Energy Efficiency and Renewable Energy, Industrial Technologies Program. (2008). Super Boiler: A Super Hero of Steam Generation. http://www1.eere.energy.gov/industry/bestpractices/ energymatters/archives/winter2008.html#a265
13. Energy Information Administration. (2009). State Energy Data System. Retrieved from: http://www.eia.doe.gov/ emeu/states/_seds.html.
14. Bureau of Labor Statistics. (2010) Civilian labor force and unemployment by state and selected area, seasonally adjusted (Last modified: January 22, 2010, Accessed: March 9, 2010). http://www.bls.gov/news.release/laus. t03.htm
15. 2007 GSP in 2007$: Bureau of Economic Analysis. (2008). GDP by State. Retrieved from: http://www.bea.gov/ newsreleases/regional/gdp_state/gsp_newsrelease.htm.
16. Jagged industrial energy consumption, particularly natural gas, in the East South Central division causes the baseline forecast to fluctuate.