



**ENERGY EFFICIENCY IN THE SOUTH**

**APPENDIX G**

**STATE PROFILES OF ENERGY EFFICIENCY OPPORTUNITIES IN THE SOUTH:**

**ARKANSAS**

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**A Profile of Energy-Efficiency Opportunities in Arkansas**

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 cost-effectively?” This profile addresses the opportunity for cost-effective energy efficiency improvements in the residential, commercial and industrial sectors of Arkansas. 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 studypresents 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]](#endnote-1)

With a population of about 2.8 million people,[[2]](#endnote-2) Arkansas represents about 0.9% of U.S. population, 0.7% of the nation’s GDP, and 1.1 % of U.S. energy consumption (Figure 1). Thus, compared to the rest of the nation, Arkansas has a higher-than-average level of energy intensity (i.e., it consumes more energy per dollar of economic activity).

**Figure 1: Energy Consumption in Arkansas, the South, and the U.S., 2007**[[3]](#endnote-3)

Arkansas’ industrial energy consumption as a percentage of its overall energy consumption exceeds that of the nation and the rest of the South (Figure 2). This is one reason that Arkansas ranks 15th nationally in per capita energy consumption, well above the national average.[[4]](#endnote-4)

The state is rich in natural gas, which generates 21% of its electricity. Half of its electricity is generated from coal.4 With one nuclear power plant, the state consumes a larger share of nuclear power than the national average (Figure 3). Arkansas is also a national leader in deriving energy from renewable sources, especially its electricity from hydropower. 4 The state spent a small portion (1.8%) of its primary energy to generate electricity to be sold to adjacent states in 2007.

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

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

Arkansas has a number of energy efficiency policies already in place. For instance, it has green building standards and energy and natural resources conservation requirements for public buildings. State agencies, including high education institutions, are required to use LEED and Green Globes rating systems in conducting and funding public building projects. The state has adopted the 2003 IECC building code for residential buildings and ASHRAE 90.1-2001 for commercial buildings.4, [[5]](#endnote-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 Arkansas 41st 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]](#endnote-6)

Chandler and Brown reviewed Arkansas’s energy-efficiency studies in the *Meta-Review of Efficiency Potential Studies and Their Implications for the South* (2009). Energy savings range from 14-47% from projected energy consumption under a moderate pursuit of achievable savings in these studies.[[7]](#endnote-7) Arkansas’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.

**Energy Efficiency Potential by Sector**

The State’s total energy consumption (residential, commercial, industrial, and transportation sectors) is projected to increase 2% 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 Arkansas’ energy consumption by approximately 12% of the energy consumed by the State in 2007 (136 TBtu in 2030) (Figure 4). With these policies, Arkansas’ energy consumption could decrease significantly below the 2010 level. For complete policy descriptions, refer to *Energy Efficiency in the South by* Brown et al. (2010).

**Figure 4: Energy Efficiency Potential in Arkansas**

The industrial and commercial sectors offer the greatest energy efficiency potential in Arkansas (Figure 5). In 2020, this study projects that savings from all three sectors could cost-effectively save about 8% (92 TBtu) of the total energy consumed by the State in 2007. Electricity savings constitute 65 TBtu of this amount. With these policies, the generation of electricity from the equivalent of two 500-MW power plants in 2020 and three such power plants in 2030 could be avoided.[[8]](#endnote-8)

**Figure 5: Energy Efficiency Potential by Sector in Arkansas, 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 Arkansas’ projected residential energy consumption by about 10% (23 TBtu) in 2020 and 14% (36 TBtu) in 2030 (Figure 6).

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| **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). In 2020, the residential energy required by about 110,000 Arkansas households could be avoided, yielding annual energy bill savings of $300 per household.

***Commercial Sector***

The implementation of appliance standards and retrofit policies in Arkansas’ commercial sector could reduce projected energy consumption in 2020 by approximately 13%, and by 19% in 2030 (Figure 8).  In 2020, the commercial sector could save about 24 TBtu, which is equivalent to the amount of energy that 692 Wal-Mart stores spend a year. Each retail establishment in Arkansas could save $21,000 on average.

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| **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 Arkansas’ industrial sector can reduce projected industrial electricity and natural gas consumption by about 13% (45 TBtu) in 2020 and 19% (61 TBtu) in 2030 (Figure 10). The industrial energy required by about 64 average industrial facilities could be avoided in 2020, or about $185,000 in annual energy savings per industrial facility. The principal energy savings are from natural gas and electricity (Figure 11). The 2030 baseline energy consumption is projected to drop a little below 2010 level. With these three energy efficiency policies, energy demand by Arkansas’ industrial sector could drop significantly below the 2010 level.

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| **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.

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.[[9]](#endnote-9)

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 savings.[[10]](#endnote-10)

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 fire tubes 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. [[11]](#endnote-11)

These technologies are illustrative. Please refer to *Energy Efficiency in the South* for additional technology descriptions and examples.

**Economic and Financial Impacts**

The nine energy efficiency policies evaluated in *Energy Efficiency in the South* would reduce energy costs for Arkansas consumers and would generate jobs in the State (Table 1). Residential, commercial and industrial consumers could benefit from total energy savings of $1.2 billion in 2020 ($0.6 billion of which is specific to electricity), and $1.7 billion in total energy savings in 2030. In comparison, state consumers spent $3.2 billion on electricity in 2007.[[12]](#endnote-12)

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 Arkansas would experience a net gain of 8,700 jobs in 2020, growing to 11,700 in 2030.  In comparison, there were over 104 thousand unemployed residents of Arkansas at the end of 2009. [[13]](#endnote-13)

While the South's economy would grow more rapidly as a result of the energy-efficiency policies, Arkansas’ Gross State Product would grow by $60 million less in 2020, and by $86 million less in 2030.  This change is a small fraction of the State’s $95 billion economy; the loss is due to the lower-than-average economic multiplier associated with energy-efficiency manufacturing and construction activities in Arkansas.[[14]](#endnote-14)

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| **Table 1: Economic and Employment Impacts of Energy Efficiency**  |
| **Indicator** | **2020** | **2030** |
| Public Sector Policy Financial Incentives (in million $2007) | 256 | 364 |
| Private Sector/Household Productive Investment (in million $2007) | 248 | 226 |
| Change in Electricity Costs (in million $2007) | -560 | -994 |
| Change in Natural Gas Costs (in million $2007) | -277 | -491 |
| Annual Increased Employment (ACEEE Calculator) | 8,700 | 11,700 |
| Change in Gross State Product (in million $2007) | -60 | -86 |

**Conclusions**

The energy-efficiency policies described in this report could set Arkansas on a course toward a more economically sustainable and prosperous energy future. If utilized effectively, the State’s substantial energy-efficiency resources could reverse the long-term trend of growing energy consumption. With a concerted effort to use energy more wisely, Arkansas 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*.

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