



# ENERGY EFFICIENCY IN THE SOUTH

## APPENDIX G

### STATE PROFILES OF ENERGY EFFICIENCY OPPORTUNITIES IN THE SOUTH: MARYLAND

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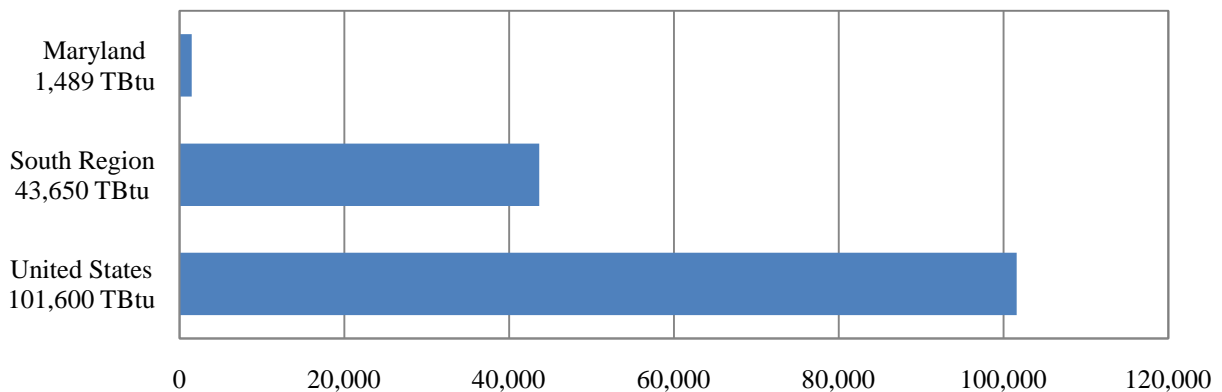
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## A Profile of Energy-Efficiency Opportunities in Maryland

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 addresses the opportunity for energy-efficiency improvements in Maryland’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 SNUG-NEMS (National Energy Modeling System).<sup>1</sup>

With a population of 5.6 million people,<sup>2</sup> the State represents about 1.9% of the U.S. population, 1.9% of the nation’s Gross Domestic Product (GDP), and 1.5% of U.S. energy consumption (Figure 1). Thus, compared to the rest of the nation, Maryland has a lower-than-average level of energy intensity (i.e., it consumes less energy per dollar of economic activity).

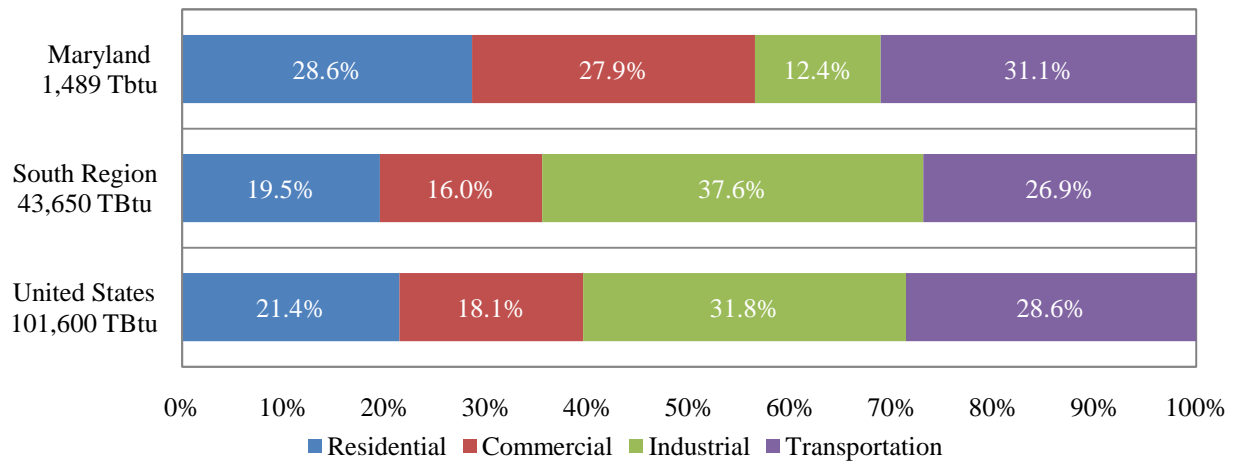


**Figure 1: Maryland, South, and United States Energy Consumption, 2007<sup>3</sup>**

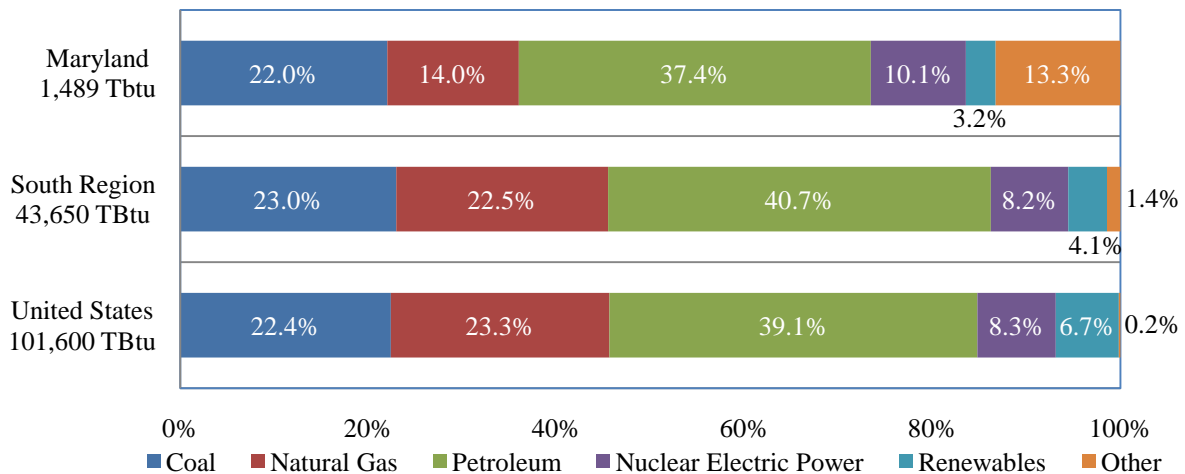
Maryland’s consumption of energy in the residential and commercial sectors is considerably higher than that of the South and the U.S., but the industrial sector represents a smaller amount of the State’s energy budget as shown in Figure 2. Maryland consumes more energy from out of state (the “other” category in Figure 3) than other states in the South. On the other hand, it consumes relatively less natural gas. With its relatively small industrial sector, Maryland has the 10<sup>th</sup> lowest per capita energy consumption of the states.<sup>4</sup>

Maryland has a restructured electricity market and the entire state is part of the PJM Interconnection. The source of the majority of Maryland’s electrical consumption comes from coal at nearly 60%, followed by nuclear at almost 30%. Maryland has enormous wind potential

in the Chesapeake Bay, Atlantic Ocean and Appalachian Mountains; however, the State currently produces a negligible amount of electricity from renewable resources.<sup>5</sup>



**Figure 2: Maryland, South, and United States Energy Consumption by Sector, 2007<sup>6</sup>**



**Figure 3: Maryland, South, and United States Energy Consumption by Fuel Type, 2007<sup>7</sup>**

The EmPOWER Maryland Act of 2008 sets the statewide goal of reducing both peak demand and consumption 15% by 2015.<sup>8</sup> Maryland also participates in the Regional Greenhouse Gas Initiative (RGGI), which is a cap and trade program among 10 Northeastern and Mid-Atlantic states and several Canadian provinces intended to reduce carbon emissions from power plants. Almost \$72 million in revenue have been generated through auctions since September of 2008.<sup>9</sup>

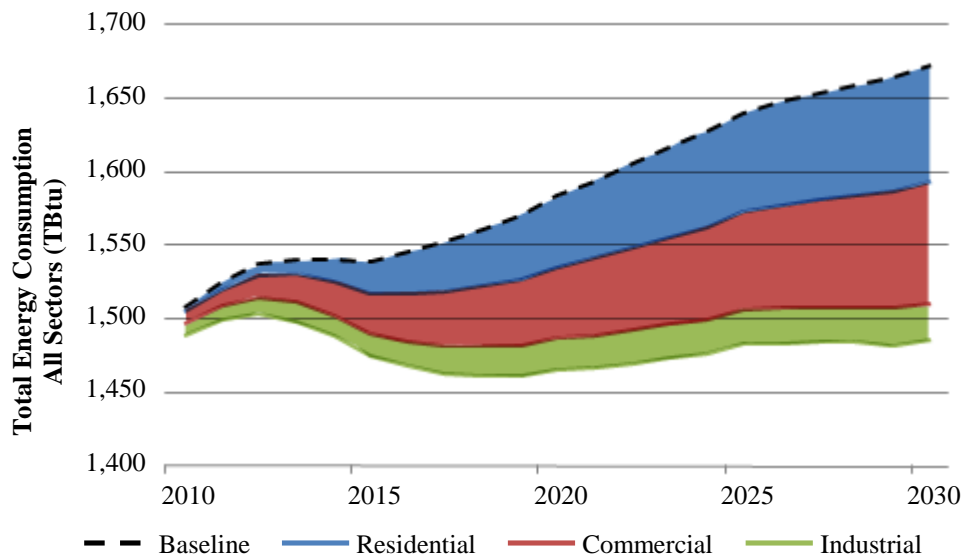
The 2009 *State Energy Efficiency Scorecard* from the American Council for an Energy Efficient Economy (and other studies of the State and region) suggests that additional policy initiatives could be implemented in the State to encourage households, businesses, and industries to utilize energy more effectively. Specifically, the ACEEE study rated Maryland 11th of the 50 states

and DC for its adoption and implementation of energy-efficiency policies.<sup>10</sup> 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.

Chandler and Brown reviewed Maryland’s energy-efficiency studies in the Meta-Review of Efficiency Potential Studies and Their Implications for the South (2009). Under the maximum achievable scenario, Maryland could reduce about 11.7% of the projected EIA Annual Energy Outlook 2009 electricity consumption for 2020. Maryland was unique among the South Atlantic states in that it could decrease its residential and commercial sectors below 2007 levels by 2020, but the number of studies about Maryland reviewed was limited.

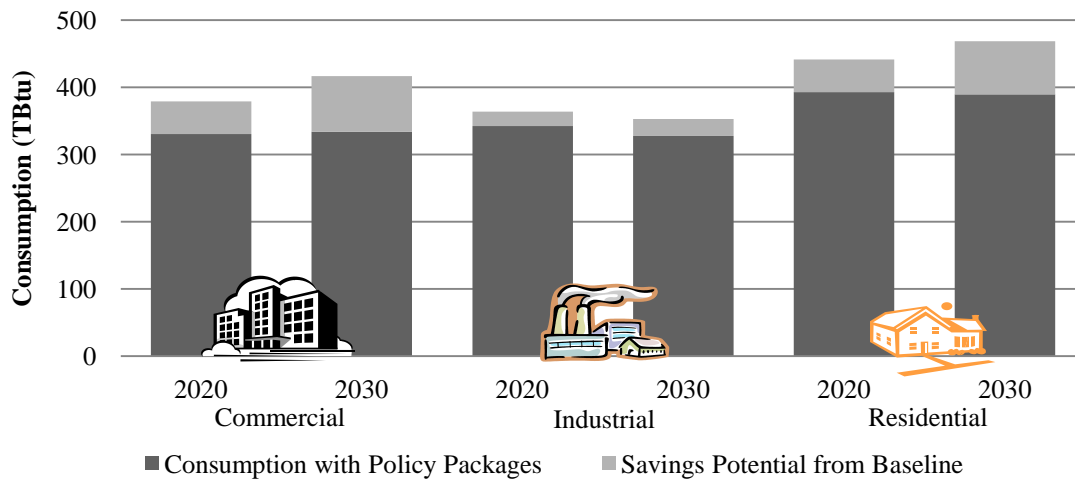
**Energy Efficiency Potential by Sector**

The State’s total energy consumption (residential, commercial, industrial, and transportation sectors) is projected to increase 11% 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 Maryland. Altogether, these policies offer the potential to reduce Maryland’s energy consumption by approximately 12% of the energy consumed by the State in 2007 (187 TBtu in 2030) (Figure 4). With these policies, Maryland’s energy consumption could drop 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 Maryland**

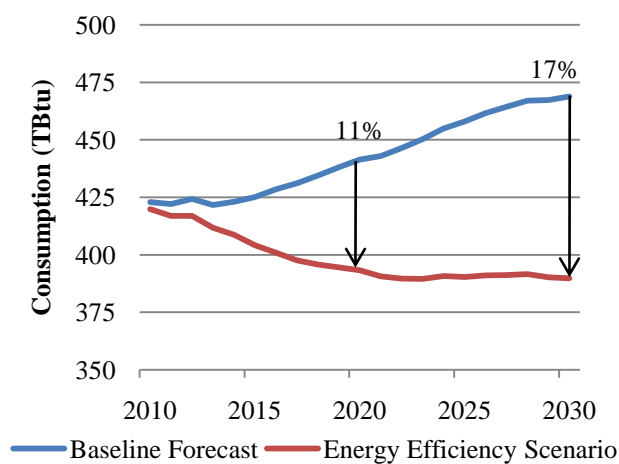
The commercial and residential sectors offer the greatest energy efficiency potential in Maryland (Figure 5). In 2020, savings from all three sectors is about 8% (118 TBtu) of the total energy consumed by the State in 2007. Electricity savings constitute 93 TBtu of this amount. The energy-efficiency savings from the three sectors decrease the total projected consumption for the state by 7.5% in 2020 and 11.2% in 2030. With these policies, planners could avoid the construction of almost three 500-MW power plants to meet growing demand by 2020.<sup>11</sup>



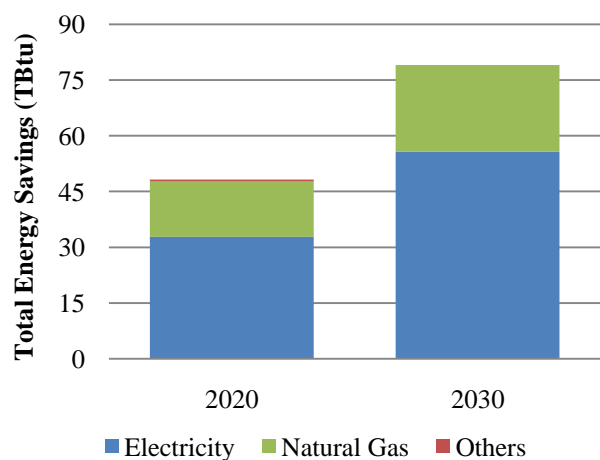
**Figure 5: Energy Efficiency Potential by Sector in Maryland, 2020 and 2030**

### Residential Sector

Four residential energy efficiency policies were examined: more stringent building codes with third party verification, improved appliance standards and incentives, an expanded Weatherization Assistance Program, and retrofit incentives with increased equipment standards. Their implementation could reduce Maryland’s projected residential consumption by about 11% (48 TBtu) in 2020 and 17% (79 TBtu) in 2030 (Figure 6).



**Figure 6: Residential Sector Savings**

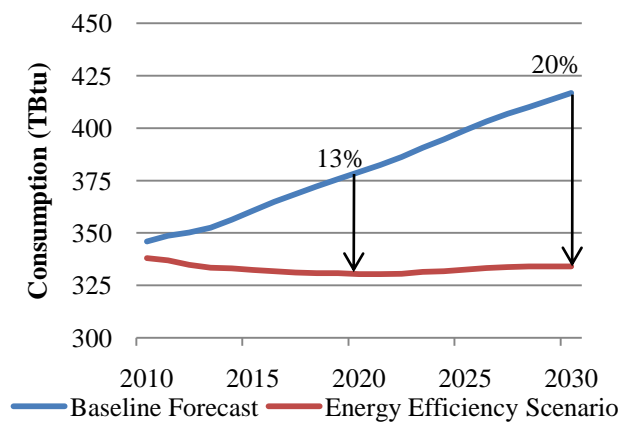


**Figure 7: Residential Sector Savings by Fuel Type**

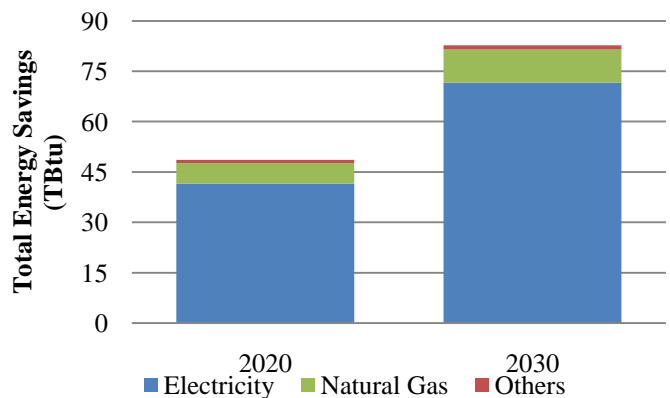
In 2020, the residential energy required by about 405,000 Maryland households could be avoided by these policies, representing about \$310 in annual energy savings per household. The principal energy savings are from electricity, but significant natural gas savings could also occur (Figure 7). With these policies, residential energy consumption could decrease over the next two decades.

**Commercial Sector**

The implementation of appliance standards and retrofit policies in Maryland’s commercial sector could reduce projected energy consumption in 2020 by approximately 13%, and by 20% in 2030 (Figure 8). In 2020, the commercial sector could save about 49 TBtu , which is equivalent to the amount of energy that 1,380 Wal-Mart stores spend a year.<sup>12</sup> Each business in Maryland could save \$65,600 on average. 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 Maryland could be constrained with these two energy efficiency policies.



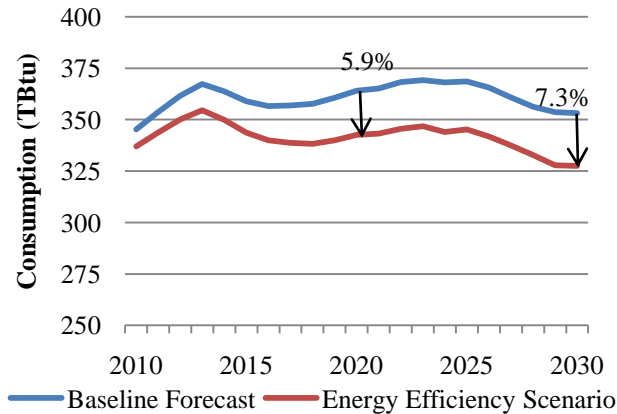
**Figure 8: Commercial Sector Savings**



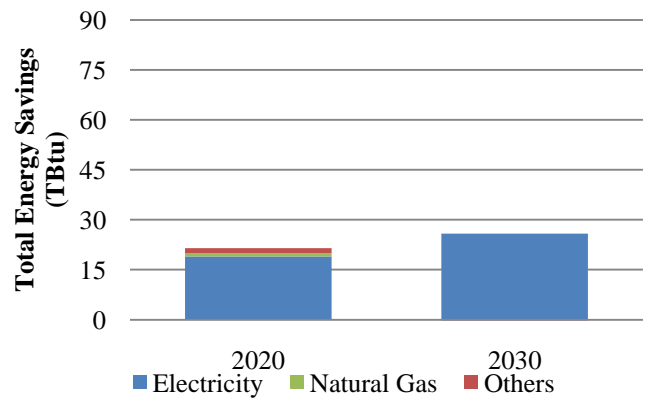
**Figure 9: Commercial Sector Savings by Fuel Type**

**Industrial Sector**

The implementation of plant utility upgrades, process improvements, and combined heat and power policies in Maryland’s industrial sector can reduce projected consumption by about 5.9% (21 TBtu) in 2020 and 7.3% (26 TBtu) in 2030 (Figure 10). The industrial energy required by about 31 average industrial facilities could be avoided in 2020, roughly \$37,000 in annual energy savings per industrial facility. The principal energy savings are almost entirely from electricity (Figure 11). These three energy efficiency policies could further reduce the declining baseline consumption projected for the industrial sector over the next two decades.



**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.<sup>13</sup>

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.<sup>14</sup>

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.<sup>15</sup>

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

### Economic and Financial Impacts

The nine energy efficiency policies evaluated in *Energy Efficiency in the South* could reduce energy costs for Maryland consumers and could generate jobs in the State (Table 1). Residential, commercial and industrial consumers could benefit from total energy savings of \$2.1 billion in

2020 (\$1.1 billion of which is specific to electricity), and \$3.6 billion in total energy savings in 2030. In comparison, Maryland spent \$7.5 billion on electricity in 2007.<sup>16</sup>

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 Maryland would experience a net gain of 19,000 jobs in 2020, growing to 25,300 in 2030. In comparison, there were 217, 300 unemployed residents of Maryland at the end of 2009.<sup>17</sup>

As is true for the South at large, the policies would also lead to an increase in Maryland's economic activity. Specifically, its Gross State Product would increase by an estimated \$157 million in 2020 and by \$256 million in 2030. This change is a small fraction of the Maryland's \$262 billion economy.<sup>18</sup>

<b>Table 1: Economic and Employment Impacts of Energy Efficiency</b>		
<b>Indicator</b>	<b>2020</b>	<b>2030</b>
Public Sector Policy Financial Incentives (in million \$2007)	495	710
Private Sector/Household Productive Investment (in million \$2007)	173	191
Change in Electricity Costs (in million \$2007)	-1,096	-2,000
Change in Natural Gas Costs (in million \$2007)	-166	-255
Annual Increased Employment (ACEEE Calculator)	19,000	25,300
Change in Gross State Product (in million \$2007)	157	256

### **Conclusions**

The energy efficiency policies described in this profile could set Maryland 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, Maryland 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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