



ENERGY EFFICIENCY IN THE SOUTH

APPENDIX G

STATE PROFILES OF ENERGY EFFICIENCY OPPORTUNITIES IN THE SOUTH: DISTRICT OF COLUMBIA

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A Profile of Energy-Efficiency Opportunities in the District of Columbia

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 Washington DC’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).¹

With a population of 590,000 people,² the District represents about 0.19% of the U.S. population, 0.63% of the nation’s Gross Domestic Product, and 0.18% of U.S. energy consumption (Figure 1). Thus, compared to the rest of the nation, the District has a lower-than-average level of energy intensity (that is, it consumes less energy per dollar of economic activity than most other states).

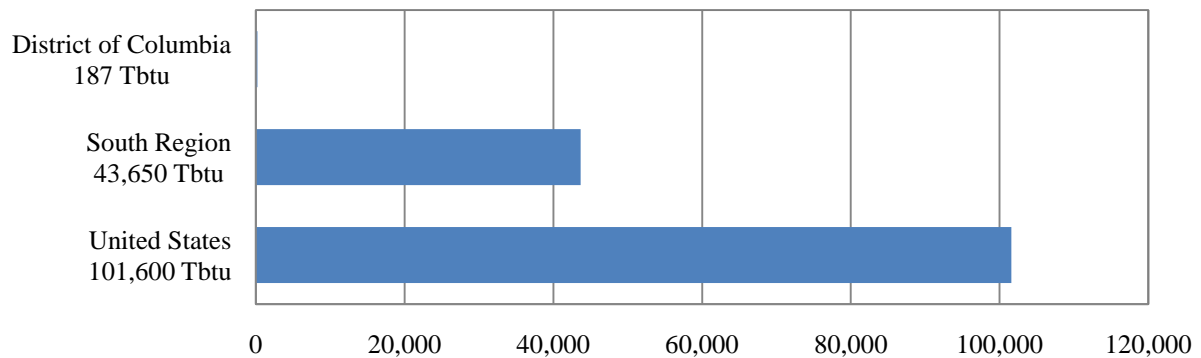


Figure 1: District of Columbia, South, and United States Energy Consumption, 2007³

DC’s commercial consumption of energy as a percentage of its overall energy budget far exceeds that of the nation and the rest of the South. On the other hand, like most major American downtown urban areas, DC does not have a significant industrial sector and the energy consumption from transportation is lower than the national average (Figure 2). Most energy consumed in the District of Columbia is produced outside the district, which is represented by the “other” category in Figure 3. DC’s per capita energy consumption is slightly lower than that of the nation as a whole.⁴

The District has a restructured electricity market and the area is part of the PJM Interconnection. Almost two-thirds of houses in the city use natural gas for heating. The two generation facilities within the District, Benning and Buzzard Point, use distillate fuel oil to produce power.⁵

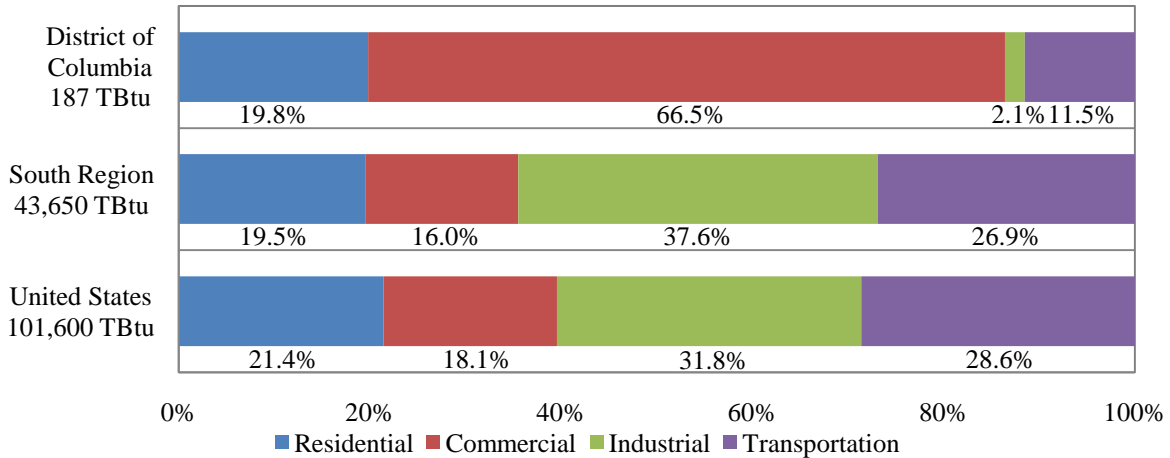


Figure 2: District of Columbia, South, and US Energy Consumption by Sector, 2007⁶

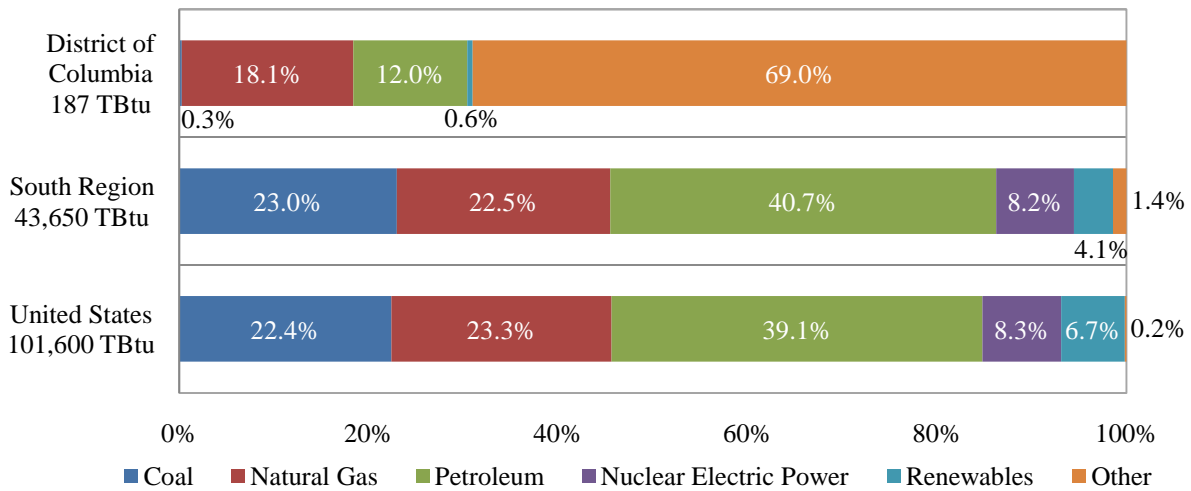


Figure 3: District of Columbia, South, and US Energy Consumption by Fuel Type, 2007⁷

The District of Columbia has renewable portfolio standard requiring 20 percent of retail electricity sales to use renewable energy technologies by 2020. DC is part of the US Department of Energy’s Clean Cities program, which it joined in 1993. The District has several alternative fuel stations within its city limits.⁸

Green Energy DC, the Sustainable Energy Utility created under the Clean and Affordable Energy Act of 2008, is working to expand energy-efficiency programs in the District of Columbia. Its goals include a reduction in per capita energy consumption, decrease in electricity demand, support for energy-efficiency in low-income housing, and an expansion of green jobs.⁹

Chandler and Brown reviewed DC's energy-efficiency studies in the *Meta-Review of Efficiency Potential Studies and Their Implications for the South* (2009). Energy savings in DC are unreflective of the regional potential and are dominated by the commercial sector as depicted in figures 4 and 5.¹⁰

The *2009 State Energy Efficiency Scorecard* from the American Council for an Energy Efficient Economy (and other studies of the District 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 the District of Columbia 20th of the 50 states and DC for its adoption and implementation of energy-efficiency policies.¹¹ This score is based on the district'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.

Energy Efficiency Potential by Sector

The State's total energy consumption (residential, commercial, industrial, and transportation sectors) is projected to decrease 18% 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 the District of Columbia. Altogether, these policies offer the potential to reduce DC's energy consumption by approximately 14% of the energy consumed by the District in 2007 (26 TBtu in 2030) (Figure 4). With these policies, DC could further enhance its already projected decreasing baseline energy consumption, particularly in the commercial sector. For complete policy descriptions, refer to *Energy Efficiency in the South* by Brown et al. (2010).

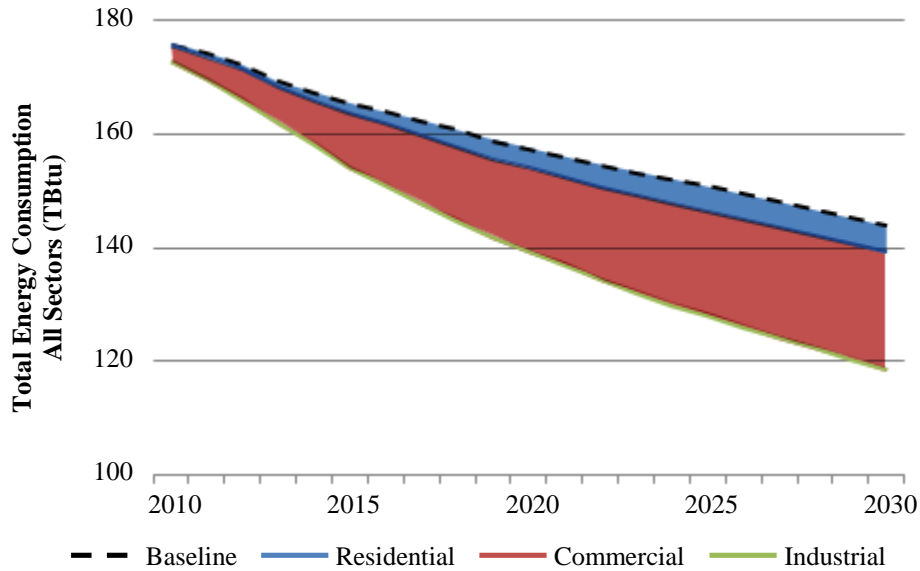


Figure 4: Energy Efficiency Potential in District of Columbia

The commercial sector offers the greatest energy efficiency potential in the District of Columbia. (Figure 5). In 2020, savings from all three sectors is about 9.7% (18 TBtu) of the total energy consumed by the District in 2007. Electricity savings constitute 15 TBtu of this amount. The energy efficiency savings from the three sectors decrease the total projected consumption for the state by 11.5% in 2020 and 17.7% in 2030. With these policies, planners could avoid the construction of half a new power plant to meet growing demand by 2020.¹²

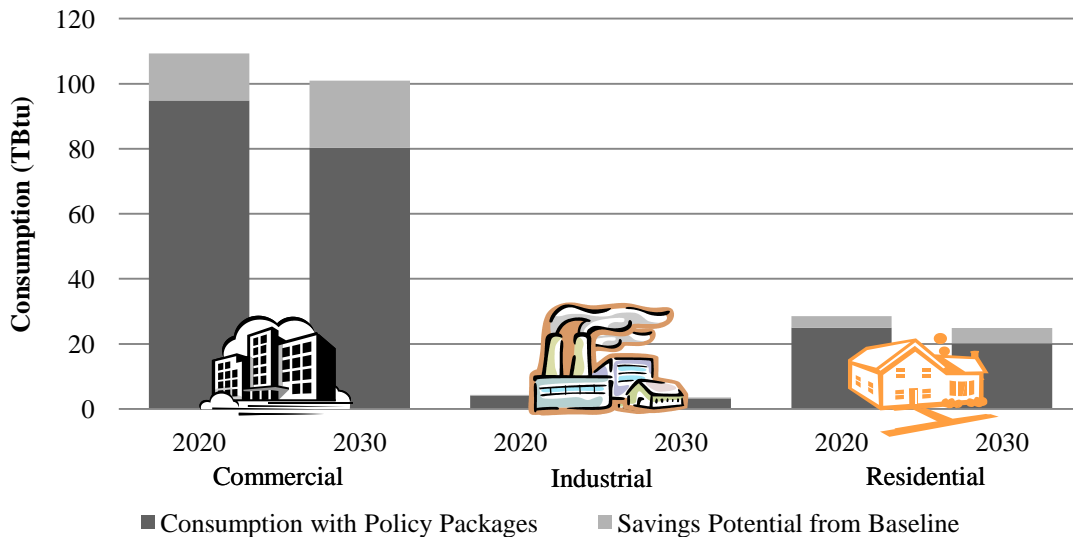


Figure 5: Energy Efficiency Potential by Sector in District of Columbia, 2020 and 2030

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. The implementation of these policies could reduce DC’s projected residential consumption by about 12% (3.5 TBtu) in 2020 and 19% (4.7 TBtu) in 2030 (Figure 6).

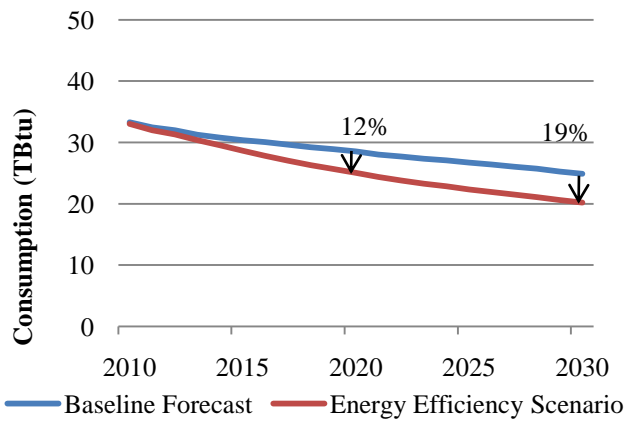


Figure 6: Residential Sector Savings

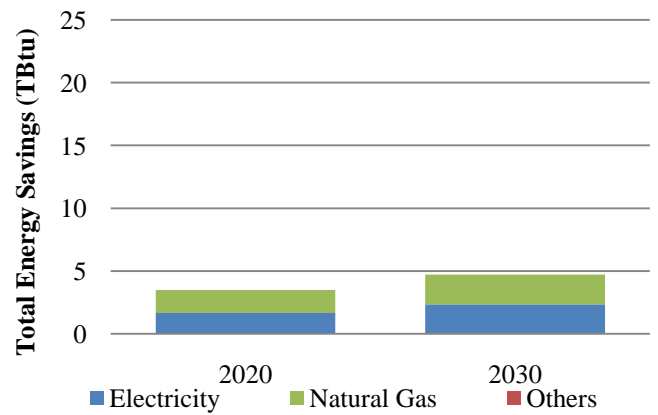


Figure 7: Residential Sector Savings by Fuel Type

In 2020, the residential energy required by about 24,000 DC households could be avoided by these policies, representing about \$170 in annual energy savings per household. The principal energy savings are from electricity and natural gas (Figure 7). The baseline projection for DC shows a decrease in energy consumption with a projected decreasing population. These policies will bring about a further decline from the baseline projections.

Commercial Sector

The implementation of appliance standards and retrofit policies in DC’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 14 TBtu, which is equivalent to the amount of energy that 411 Wal-Mart stores spend a year.¹³ Each business in DC could save \$193,000 on average. The principal energy savings are from electricity (Figure 9). Under these policies there could be a significant decrease from the baseline projection in DC’s commercial sector.

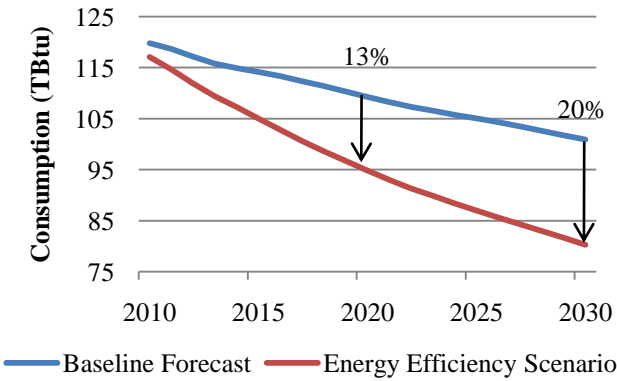


Figure 8: Commercial Sector Savings

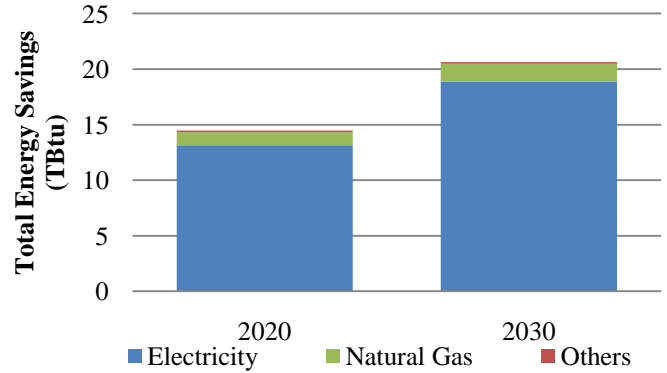


Figure 9: Commercial Sector Savings by Fuel Type

Industrial Sector

The industrial sector is not a significant part of the District of Columbia’s economy and thus there is limited potential for savings from enhanced industrial energy efficiency policy in this small jurisdiction.

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 savings.¹⁵

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* could reduce energy costs for District of Columbia consumers and could generate jobs in the District (Table 1). Residential, commercial and industrial consumers could benefit from total energy savings of \$405 million in 2020 (\$167 million of which is specific to electricity), and \$597 million in total energy savings in 2030. In comparison, DC spent \$1.4 billion on electricity in 2007.¹⁶

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 DC would experience a net gain of 4,100 jobs in 2020, growing to 4,900 in 2030. In comparison, there were 39,500 unemployed DC residents at the end of 2009.¹⁷ As is true for the South at large, the policies would also lead to an increase in DC's economic activity. Specifically, its Gross State Product would increase by an estimated \$52 million in 2020 and by \$72 million in 2030. This change is a small fraction of the District's \$1.4 billion economy.¹⁸

Table 1: Economic and Employment Impacts of Energy Efficiency

Indicator	2020	2030
Public Sector Policy Financial Incentives (in million \$2007)	54	58
Private Sector/Household Productive Investment (in million \$2007)	18	27
Change in Electricity Costs (in million \$2007)	-167	-257
Change in Natural Gas Costs (in million \$2007)	-17	-24
Annual Increased Employment (ACEEE Calculator)	4,100	4,900
Change in Gross State Product (in million \$2007)	52	72

Conclusions

The energy efficiency policies described in this profile could set DC 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, DC 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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Footnotes and References

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