

# AN ECO-FRIENDLY ALABAMA

Certified Public Manager® Program  
CPM Solutions Alabama 2018



**SummaSource**  
at AUBURN MONTGOMERY

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## INTRODUCTION

The 1960s and 1970s marked the birth of the environmental movement when passage of federal environmental legislation brought public awareness of the impact of the general population on the environment to the forefront. This initial legislation was passed and provided the foundation for environmental accountability. A number of green initiatives have followed over the years all in efforts to strengthen and broaden this environmental awareness. However, the question remains, how far have we come as a country and, more specifically, as a state in addressing the concerns surrounding our current environmental issues and mitigating our future environmental impact? The personal finance website, WalletHub®, published a study in 2017 titled *2017's Greenest States* which ranked the state of Alabama 46<sup>th</sup> in the nation for eco-friendly behaviors<sup>1</sup>. The CPM Solutions Eco-Friendly Alabama Team was tasked with answering several questions raised by this study to include determining why Alabama is ranked so low, what strategic initiatives have been implemented, and how Alabama citizens are reducing their negative impact on the environment. Further, the team was tasked with recommending strategies that would allow Alabama to become more eco-friendly.

## BACKGROUND

WalletHub® utilized a methodology inclusive of several factors to rank the states in the 2017 study. Each factor could gain full weight (~3.18 points) totaling a maximum point value of 35 points that were then ranked for all 50 states. The factors on which WalletHub® chose to rank the states' eco-friendly behaviors include:

- Green Buildings per Capita
- Total Capacity of Solar Photovoltaic (PV) Systems Installed per Household
- Share of Energy Consumption from Renewable Sources
- Energy Consumption per Capita
- Gasoline Consumption (in gallons) per Capita
- Daily Water Consumption per Capita
- Alternative-Fuel Vehicles per Capita
- Alternative-Fuel Stations per Capita
- Green Transportation
- Average Commute Time by Car
- Share of Recycled Municipal Solid Waste<sup>1</sup>

While all the factors listed play a part in eco-friendly behavior, the factors in which Alabama fell considerably behind the other states include green transportation, energy consumption, and recycling of municipal solid waste and, as such, became the focus points for the team's research and subsequent recommendations. Green transportation encompasses several related areas including alternative-fuel stations, alternative-fuel vehicles, and gasoline consumption while energy consumption includes green buildings, Leadership in Energy and Environmental Design (LEED) certified buildings, and solar energy.

According to a WalletHub® analyst, the data for this study was collected from well-known sources, mostly governmental, and the methodology was developed in conjunction with academic experts in the field. The metrics were chosen based on the insight of these academic experts as well as the availability of the data. While WalletHub® would not disclose their proprietary formulas, the team's research found alternate, credible research that supports the general findings of the WalletHub® study<sup>2</sup>. Notably, Forbes Magazine published a study in 2007 ranking Alabama as 48<sup>th</sup> in the nation based on carbon footprint, air quality, water quality, hazardous waste management, policy initiatives and energy consumption<sup>3</sup> indicating that not much has changed (even in the last decade) concerning Alabama's eco-friendly behavior.

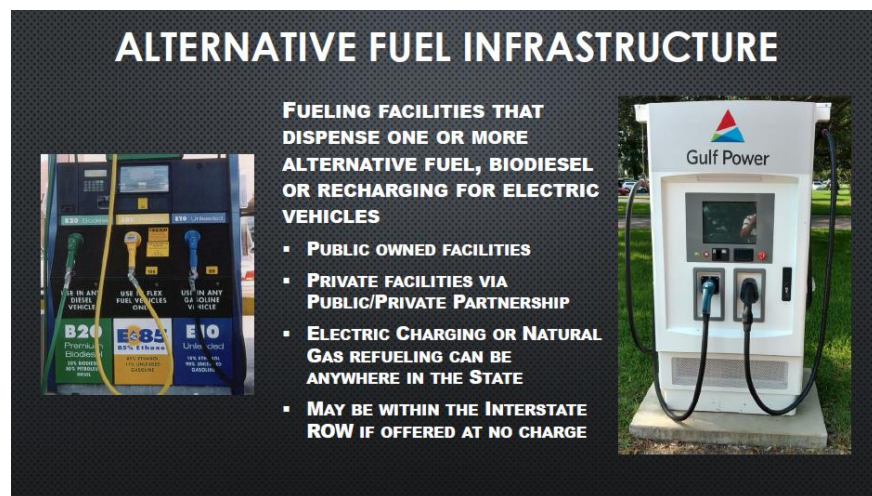
## FINDINGS

To fully understand why Alabama ranks so low in eco-friendly behavior it is important to grasp not only what it means to be "green" in these areas, but also what roadblocks the state faces in the effort to achieve this. The team's findings are divided by those factors in which Alabama scored the lowest, beginning with green transportation.

### GREEN TRANSPORTATION | ALTERNATIVE-FUEL STATIONS

The aspects of green transportation on which this project is focused include alternative-fuel stations, alternative-fuel vehicles, and gasoline consumption. As background, the Energy Policy Act (EPA) of 1992 set goals, created mandates, and amended utility laws to increase clean energy use and improve overall energy efficiency in the United States. The Act consists of twenty-

seven titles detailing various measures designed to lessen the nation's dependence on imported energy, provide incentives for clean and renewable energy, and promote energy conservation in buildings. Under Title V of the EPAct of 1992 (Public Law 102-468), Section 503 requires information on (1) the number of each type of alternative-fueled vehicle (AFV) likely to be in use in the United States; (2) the probable geographic distribution of such vehicles; and (3) the amount and distribution of each type of replacement fuel. The responsibility for collecting this data was



given to the U.S. Energy Information Administration (EIA) in 1994. The data is used to satisfy public requests for information on AFVs and alternative transportation fuels, and to provide Congress with a measure of the extent to

which the objectives of the Act are being achieved. Further, the Energy Independence and Security Act of 2007 (EISA) requires 36 billion gallons of renewable fuel be blended into domestic transportation fuels each year by 2022.

WalletHub® utilized data from the EIA showing that in 2017 Alabama had 6.74 public alternative-fuel stations available per 100,000 residents ranking Alabama 33rd out of 50 states for this metric<sup>1</sup>. According to the US Department of Energy, one of the largest “deployment barriers” for the utilization of alternative-fuel usage for transportation is fueling infrastructure<sup>4</sup>. Depending on perspective this may be a classic case of “which came first the chicken or the egg?” According to manufacturers, there is a need for more fueling stations that compare well against gasoline consumption equivalent to help provide for the buyer and to make good economic sense. However, fueling companies require a higher number of alternative-fuel vehicles on the road to warrant the construction of additional alternative-fuel stations. The US Department of Energy also states there are additional barriers such as uncertainties around fuel availability, market size, fueling needs, and siting considerations. Alabama may be making progress in this area.



According to the US Department of Energy, since 2009, Alabama has saved the burning of more than 34.4 million gallons of petroleum by utilization of cleaner burning alternatives<sup>4</sup>. However, the question remains for Alabamians, how do we advance the growth of alternative-fuel stations and usage of alternative-fuel vehicles to move Alabama in a positive direction toward more eco-friendly behavior?

To mitigate some of these issues, funds are passed down to local Metropolitan Planning Organizations (MPO) to find and implement projects that help reduce air emissions including the construction of new alternative-fuel stations in Alabama. These MPOs are funded by the Alabama Department of Transportation, who receives funds from several federal programs including, the Surface Transportation Program, the Congested Mitigation and Air Quality Improvement Program (CMAQ), and the Transportation Alternative Program<sup>5</sup>. According to the Federal Highway Transportation CMAQ Database, Alabama has never funded any projects relating to alternative-fuel infrastructure/ stations<sup>6</sup>.

Based on current and past studies of eco-friendly behaviors, other states with traits similar to Alabama rank higher in offering alternative-fuel stations and in being more “green” overall. Two states that compare well to Alabama and can serve as a platform to model ourselves after in helping make our state more eco-friendly are Tennessee and Minnesota.

Tennessee is similar to Alabama in size, population, and proximity in the United States. Tennessee has been very aggressive in offering incentives to its citizens related to the use of alternative-fuel vehicles, stations, etc. according to the US Department of Energy Alternative-fuels Data Center<sup>4</sup>. These incentives include:

- Natural Gas and Propane Vehicle Grant Program
- Biofuel Fueling Infrastructure Grants
- Natural Gas Station Property Tax Reduction
- High Occupancy (HOV) Lane Exemption
- Idle Reduction Weight Exemption

Minnesota also shares similarities to Alabama in size and population and was ranked by WalletHub® in 2017 as 5th out of 50 states in eco-friendly behavior. Minnesota achieved this



ranking in several ways, including concentration on the growth of new alternative-fuel stations. According to a December 2017 American Lung Association article, Minnesota added 40 new high ethanol content fuel (85%) stations in 2017, for a new total of 372 public and private stations in Minnesota, more than any other state. One hundred eighty-two stations in Minnesota added a new fast growing 88 octane fuel in 2017 for a total of 245 stations offering this fuel. Minnesota has also increased the biodiesel content in most of the diesel fuel sold in 2016 to 10% in the summer and 5% in the winter with a 20% content which was to start being sold May 1, 2018. In 2017, Minnesota had 286 public electric charging stations for vehicles. A program titled Drive Electric Minnesota (partnership of businesses, utilities, non-profits, and state and local governments) promotes and supports the advancement and use of electric vehicles in the state (inclusive of vehicles and charging stations). In 2017, Lakeville Independent School District 194 became the first in the state to operate an all-electric school bus. Governor Mark Drayton signed executive Order 12-17, which directs state agencies to reduce fossil fuel consumption of state owned vehicles by 30% by 2027. The State has also added 323 hybrid vehicles and 15 electric vehicles to its fleet<sup>7</sup>.

The Twin Cities Clean Cities Coalition is one of the sub-awardees of a \$4.9 million, three-year Department of Energy grant to promote the use of alternative-fuels on I-94 from Moorhead, Minnesota to Port Huron, Michigan. Twin Cities Clean Cities also has its own Department of Energy grant to promote electric vehicles. Minnesota has added more electrification stations through this program and has grown the number of vehicles in the state that operate on electricity. However, the colder climate reduces the efficiency of the vehicles and more concerns are expressed by consumers of electric vehicles in Minnesota than in states with more temperate climate<sup>8</sup>.

Comparatively, when focusing only on alternative-fuel vehicle stations as strategic initiatives in Alabama to help reduce the impact on the environment, Alabama (at the state level) is not specifically doing much to move this forward. According to the US Department of Energy's Alternative-fuels Data Center, Alabama has very few incentives and regulations regarding AFV fueling stations. The Alabama Clean Fuels Coalition serves as the principal coordinating point for

clean, alternative-fuel and advanced technology vehicle activities in Alabama. The Clean Cities program was established in 1993 by the US Department of Energy to facilitate voluntary public/private partnerships around the country to create viable markets for clean, alternative-fuel vehicles. Alabama also has a program called AlabamaSaves™<sup>9</sup>. This program is sponsored by the Alabama Department of Economic and Community Affairs Energy Division. It funds participating interests in qualified third-party loans provided to finance Alabama commercial, industrial, and non-profit businesses for lighting, HVAC, controls, process improvement upgrades, solar photovoltaic systems, and other distributed generation systems, alternative fleet conversions and idle mitigation systems. AlabamaSaves™ has subsidized over \$56 million in funding for 102 loans, and the energy improvements made with these funds are responsible for an estimated annual energy savings of 82.2 million kilowatt hours (kWh) and an estimated annual reduction in greenhouse gas emissions of 148,000 metric tons<sup>9</sup>.

## GREEN TRANSPORTATION | ALTERNATIVE-FUEL VEHICLES

How much good does an increase in alternative-fuel stations do if the state isn't utilizing the vehicles that need them? According to the *Southeast Regional Alternative-fuels Market Initiatives Program, Alternative-fuels Readiness Workbook, Summer 2014 edition*, there is growing interest in the United States for alternatives to petroleum-based transportation<sup>10</sup>. Rising and unstable gasoline and diesel prices strain the economy while the continued turmoil in the Middle East leaves the United States' oil supply vulnerable. In addition, vehicle emissions, particularly from older model vehicles, contribute to poor air quality thereby contributing to various health problems. The employment of AFVs into the marketplace would help alleviate dependence on foreign oil, offer more cost-effective transportation options, as well as reduce harmful pollutants into the environment. The low-cost fuels utilized by AFVs such as propane and natural gas are abundant here in the United States and have a lower carbon content than gasoline or diesel.

As previously mentioned, the EIA collects data regarding the number of AFVs used, however, they mainly collect data from fleets. These fleets include federal agencies, state agencies, transit agencies and fuel providers. The EIA does not collect information regarding local governments,

private fleets or privately owned AFVs<sup>11</sup>. Determining the usage of such vehicles in the state of Alabama is difficult at best with most statistics again being geared toward alternative-fuel. Alabama's incentives appear to be tied to alternative-fuel usage as well rather than the alternative vehicle usage itself.

There are, however, many examples of state and local agencies in Alabama converting fleets to utilize alternative-fuels successfully in order to both "go green" and save money. Some of Alabama's conversions include:

City of Trussville, Alabama – On March 20, 2013, Trussville opened a publicly accessible Compressed Natural Gas (CNG) fuel station, becoming the fifth public station to open in Alabama. Trussville began by converting four police cars for (CNG) use. The city converted 34 Chevrolet Tahoes to CNG with 32 of those used by the police department and two by the fire department. The vehicles will be bi-fuel, meaning they can still run on gasoline.

Birmingham-Jefferson County Transit Authority, Birmingham, Alabama - In August of 2013, BJCTA unveiled 30 CNG fueled buses. The expected savings from the usage of these buses was about 10% on fuel related costs in addition to a federal incentive of 50 cents for each gallon of compressed natural gas used.

City of Tuscaloosa, Alabama – The Tuscaloosa City Board of Education approved of buying a fleet of new school buses, of which 63 are propane fueled. These propane fueled buses are quieter and do not generate as much heat. Each bus drives approximately ninety miles per day, making a significant reduction in the amount of harmful emissions. These buses are over 50% quieter than the diesel buses and make it easier for the drivers to hear what is going on with the students riding the bus.

City of Hoover, Alabama - Hoover has a fleet of 212 flex fuel vehicles (FFV) that have traveled more than 20 million miles using E85, a high-level ethanol-gasoline blend containing 51% to 83% ethanol. Hoover has also adopted other alternative-fuels, including biodiesels, and electricity. In all, 88% of the city's vehicles run on alternative-fuels. The City of Hoover has developed a city-wide vegetable oil recovery effort to not only reduce city sewer maintenance cost but to provide

biodiesel to supplement diesel fuel usage by city owned vehicles. Since switching the fleet over, the city has implemented a residential recycling program for used cooking oil. Residents drop off used cooking oil at any fire station in Hoover, and it's taken by an outside company to be processed into biodiesel. Hoover has two trolley vehicles and several other vehicles that often make appearances for community events that are powered from the residents' cooking oil biodiesel.

Alabama Department of Corrections (ADOC) – The ADOC has purchased 10 E350 Ford 15-passenger vans and converted them to propane. The vans and a refueling station are used at the Loxley Work Release Center. The purchase cost for the 10 vans (including conversion) was \$355,000, and the dispensing station cost roughly \$51,000. The department began using the vans in January 2014 and has experienced significant fuel savings. With the low cost of propane (\$1.63 per gallon in mid-December), the department stands to recoup the conversion and infrastructure costs in less than one year.

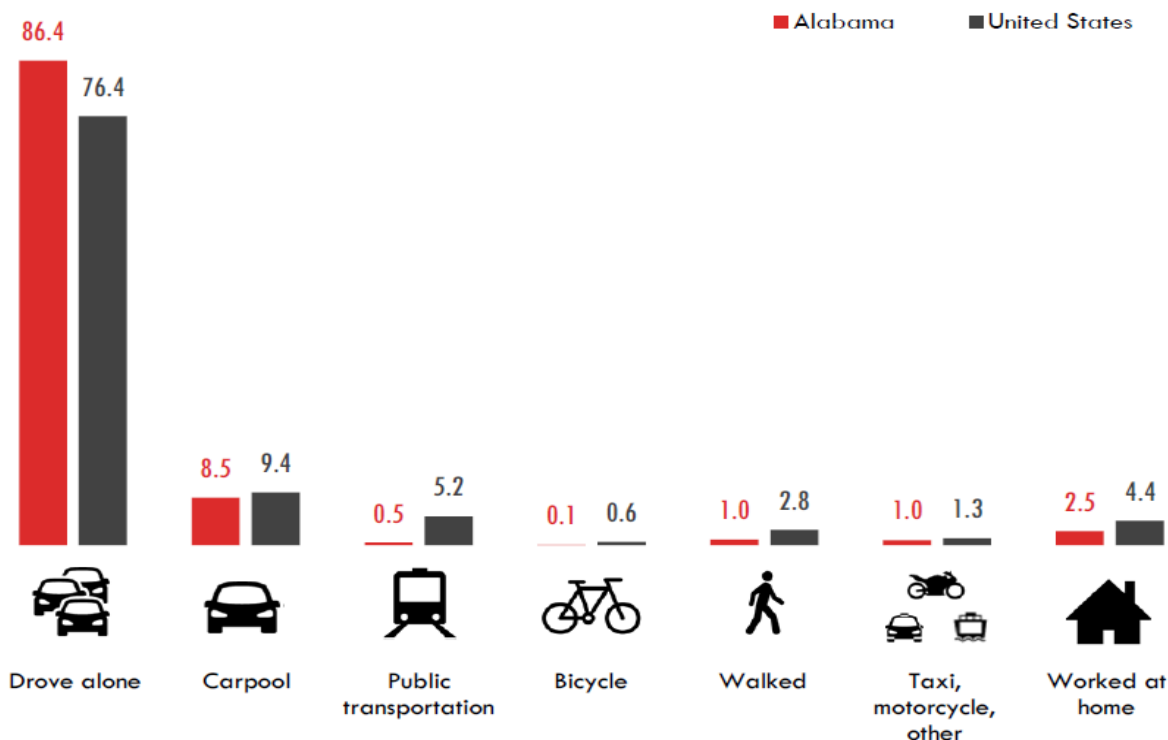
#### GREEN TRANSPORTATION | GASOLINE CONSUMPTION

Finally, regarding gasoline consumption, according to the 2017 WalletHub® study, Alabama ranks 45<sup>th</sup> in the nation<sup>1</sup>. The state of Alabama is vastly rural which suggests that motor vehicle usage would be higher as compared to those more urban and developed states in the country. This is due to the fact that carpooling, public transportation, and green alternatives such as sidewalks and bike lanes would not be economically feasible in most areas of Alabama. Many citizens commute into work from far reaching areas of their cities along with many citizens being located outside the city limits in which they work, including crossing county lines.

As evidenced by this U.S. Department of Transportation chart<sup>12</sup>, Alabama has a measurement of 86% of citizens that drive to work alone verses 76% nationally. Additionally, Alabama measures

## HOW RESIDENTS GET TO WORK

Percentage of workers over age 16, 2013



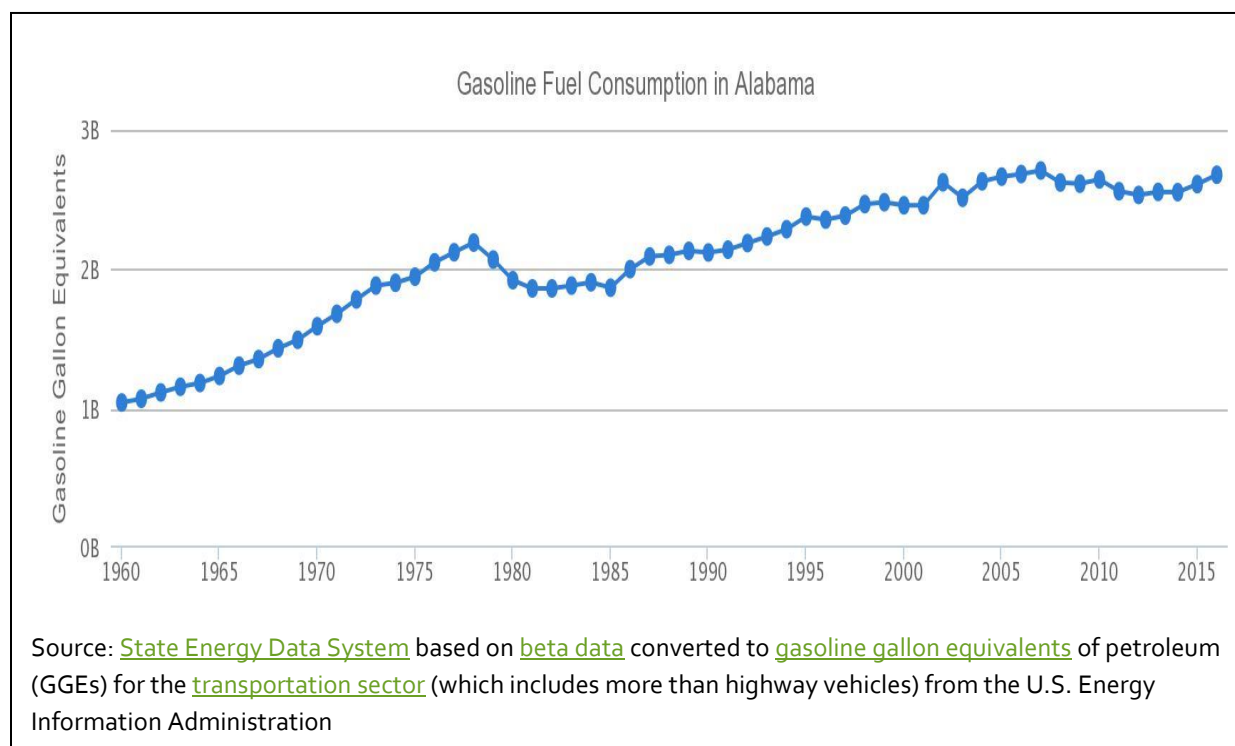
lower in carpooling, public transportation, use of bicycles, walking, and using taxis or motorcycles to commute to work when compared to the US average. It can also be noted that the average Alabamian drives more miles per day than the US average. To accommodate this amount of usage of motor vehicles, Alabama must supply citizens with motor gasoline.

The state of Alabama has a wealth of natural resources, including a small amount of crude oil. Although it is a minor amount comparatively to other states, Alabama has crude oil production from the northwestern part of the state and on the coast in the southwestern portion of the state. According to the EIA, Alabama has produced 510,000 barrels of crude oil since January 2018, ranking 17<sup>th</sup> out of 31 states that have crude oil production.

To derive petroleum products from this crude oil, Alabama currently has three petroleum refineries located throughout the state: Shell Refinery, located in Mobile; Hunt Refinery, located

in Tuscaloosa; and Goodway Refinery, located in Atmore. The rate of production is dependent not only on Alabama's crude oil production ability, but also on the importation of crude oil both domestically and internationally. These three refineries have a capacity of 131,675 barrels/calendar day. Alabama has 42 gasoline terminals (2% total of US), 6,480 miles of product pipeline (1% of total US), and 0% production of ethanol or use of bio-refineries<sup>13</sup>.

As evidenced by the following chart, the consumption of gasoline fuel in Alabama has been an increasing trend since 1960.



Of the compounds emitted by gasoline-powered vehicles, volatile organic compounds (VOCs) are of particular interest due to the environmental and health impacts associated with their release. VOCs can cause serious health problems, including memory loss and irritation of the respiratory track, while some are also well-known carcinogens. Gasoline is known to have benzene rings that have also been classified as carcinogenic agents. In addition, VOCs and nitrogen oxides (NOx), in the presence of sunlight, are precursors of ozone.

According to the Environmental Protection Agency (EPA), Alabamians living, working, or attending schools near roadways tend to have an increased incidence of health-related problems that have been associated with exposure to air pollution from roadway traffic. Children, older adults, lower socioeconomic people, and people with jeopardized cardiac and/or respiratory conditions are at higher risk for negative impacts to their health such as:

- Higher rates of asthma onset and aggravation;
- Cardiovascular disease;
- Impaired lung development in children;
- Pre-term and low-birthweight infants;
- Childhood leukemia; and
- Premature death<sup>14</sup>.

Alabama has over 5,000 motor gasoline stations currently operating. According to the EIA, in comparison, Alabama has only 63 electricity stations, 23 ethanol stations, and 15 compressed natural gas and other alternative-fueling stations.

## ENERGY CONSUMPTION|SOLAR ENERGY

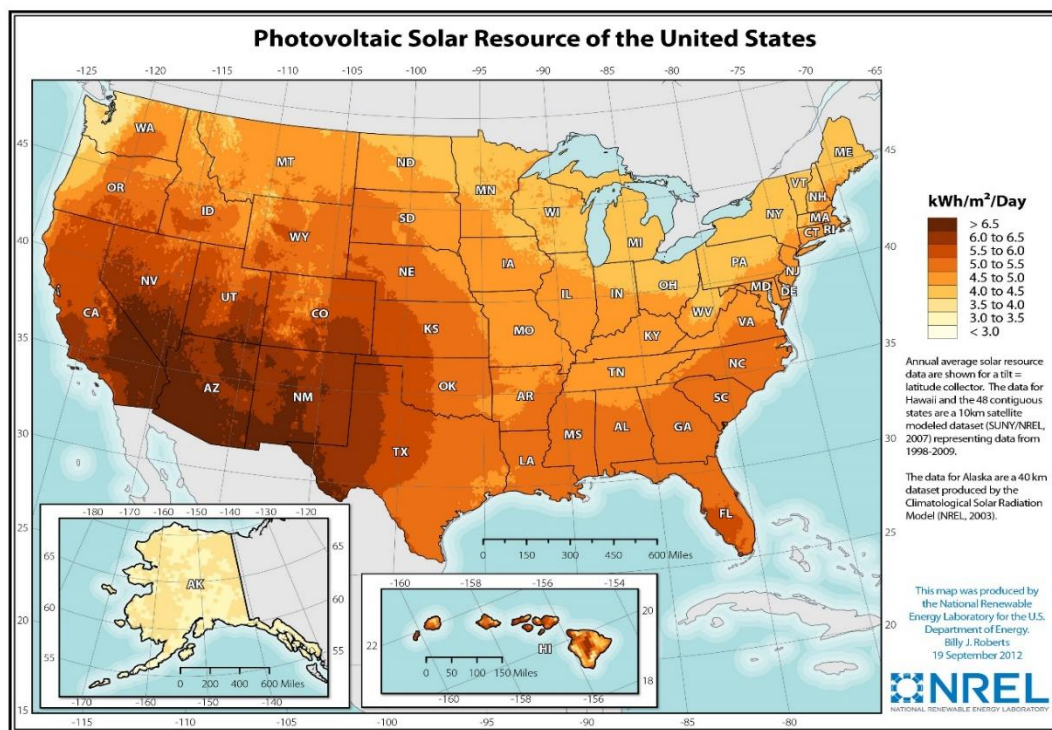
Green transportation is not the only area in which Alabama fell short regarding eco-friendly behaviors. The energy consumption metric was also ranked low in the 2017 WalletHub® study<sup>1</sup>. According to a 2017 report titled “Solar in the Southeast” that was issued by CleanEnergy.org, Alabama ranked last in the southeast in solar power generation. This study lists the Southeast average solar watts per customer at 208 in 2017. Alabama generated only 29 watts per customer in that time period. That number is less than half the watts per customer of any other state in the region.

The study breaks down these statistics even further by listing out the watts per customer generated by each of the utility companies in the Southeast. Though Alabama averaged 29 watts per customer in 2017 overall, Alabama Power Company only generated 7 watts per customer in 2017. This number is half the next highest-ranking utility company, over 350 less watts per customer than Georgia Power, and over 1000 less watts per customer than the leader in the report, Duke Energy Progress from the Carolinas.



Because of increased solar investment by Alabama Power, the report does project that these numbers should rise relatively significantly for Alabama by 2021. By that year, Alabama is projected to average 203 watts per customer. Though this is a fairly significant increase, this number is still below the projected Southeast average for 2021 of 523 watts per customer.

In general, the entire Southeast can improve on the availability of solar power generation. The report states that the “Southeast has tremendous solar potential (second only to the desert southwest) and has been experiencing near exponential solar growth for the last five years.” This statement is supported by research conducted by the National Renewable Energy Laboratory (NREL). The following map was produced by the NREL illustrating solar potential for each state in the United States. According to the map, Alabama’s solar potential is similar to that of leading southeast states Georgia and the Carolinas and, as such, has the potential to not only become a more eco-friendly state itself, but also a leader in its own right in the southeast for solar power generation.



Another study with similar results to those listed above is the Corporate Clean Energy Procurement Index: State Leadership & Rankings that was conducted in 2017 by the Retail Industry Leaders Association (RILA), the Information Technology Industry Council (ITI), and Clean Edge Inc.<sup>15</sup> This study ranks states based upon the ease with which companies can procure renewable energy for their operations within each state. The study ranks Alabama last of all 50 states, with an index score of 1.82 out of 100. The next closest score was a 13.6. This ranking reflects how difficult it is for large retailers and corporations, who are interested in utilizing renewable energy resources for their operations, to gain access to renewable energy resources in Alabama. Much of the focus for this study was on solar power generation. According to an article from al.com relating information from Andrew Rector, a market analyst for Clean Edge, some of the factors hurting Alabama's ranking in the study include a lack of solar power purchase agreements and a lack of policies allowing third party ownership of solar panels. The article also cites a fixed fee charged by Alabama Power for solar deployment. This fee was put in place by Alabama Power to fund the costs of providing back-up power to customers that generate their own power. The utility company currently charges solar customers \$5 per kilowatt, which is the highest fee listed in the report making solar deployment cost prohibitive in Alabama<sup>16</sup>.

### ENERGY CONSUMPTION|GREEN/LEED CERTIFIED BUILDINGS

Solar energy is not the only contributing factor to Alabama's low energy consumption score, Alabama is also behind the curve regarding eco-friendly buildings. Buildings have a vast impact on the natural environment, human health, and the economy. In the United States, buildings account for:

- 39% of total energy use
- 12% of the total water consumption
- 68% of total electricity consumption
- 38% of the carbon dioxide emissions<sup>17</sup>

Buildings consume land, energy and material resources, and create emissions, effluent and contribute to landfills and locating them determines other infrastructure needs, which comes with its own impacts. For these reasons, buildings are both a determinant and barometer of

sustainability. In order for buildings to contribute to sustainability, they must be designed, constructed and used in a manner that reduces ecological impacts<sup>18</sup>.

Green building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation, and deconstruction. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. New technologies, materials, knowledge, and ratings systems, such as the U.S. Green Buildings Council's LEED™ Green Building Rating System, are helping to support the development of green buildings around the world.

The United States Green Building Council (USGBC), a national non-profit entity, developed the LEED Green Building Rating System to rate new and existing commercial, institutional, and high-rise residential buildings according to their environmental attributes and sustainable features. The LEED system utilizes a list of 34 potential performance based “credits” worth up to 69 points, as well as seven prerequisite criteria, divided into six categories. LEED allows the project team to choose the most effective and



appropriate sustainable building measures for a given location and/or project. These points are then tallied to determine the appropriate level of LEED certification, of which there are four levels. The general perception is that LEED is becoming the standard for US green building design. Although imperfect and still evolving, LEED has rapidly become the largest and most widely recognized green building design and certification program in the US, and probably in the world<sup>19</sup>. Perhaps due to this perception, LEED certified buildings per capita was another contributing factor to the low 2017 WalletHub® rating for Alabama<sup>1</sup>. LEED buildings save energy, water,

resources, generate less waste, and support human health. As of October 2017, there were 65,427 registered LEED projects in the U.S. according to Statista<sup>20</sup>, however, according to the U.S. Green Council (USGC) of Alabama there are only 173 LEED certified buildings in the state of Alabama<sup>21</sup>.

As the demand for more sustainable building options increases, green construction is becoming increasingly profitable and desirable within the international construction market. In the United States alone, buildings account for almost 40% of national carbon dioxide (CO<sub>2</sub>) emissions and out-consume both the industrial and transportation sectors, but LEED-certified buildings have 34% lower CO<sub>2</sub> emissions, consume 25% less energy and 11% less water, and have diverted more than 80 million tons of waste from landfills.

Between 2015 and 2018, LEED-certified buildings in the United States are estimated to produce \$1.2 billion in energy savings, \$149.5 million in water savings, \$715.2 million in maintenance savings and \$54.2 million in waste savings<sup>22</sup>. Green buildings in the form of retrofitting increase the value of the property by 4% with an expected return on cost within seven years. With only 173 LEED certified buildings in the entire state, Alabama is not benefiting from these potential savings.

## RECYCLING | MUNICIPAL SOLID WASTE

Finally, concerning the recycling of municipal solid waste (MSW), it was discovered that Americans produce approximately 254 million tons of municipal solid waste per year according to the EPA. This tonnage of municipal solid waste, also known as trash, excludes construction and demolition debris, wastewater treatment sludges, and non-hazardous industrial wastes. In 2013, only 34.3% of this tonnage was recovered through recycling. This was a slight decrease from the overall recovery rate of 34.7% in 2011, which seemed to be when the efforts peaked. There are a number of reports that have evaluated the success of recycling using different methodologies and broader MSW definitions which present large variation in the waste generation estimates and lower recovery rates. In Alabama, that recovery rate is much lower.

In 2014, Alabamians disposed of approximately 91% of that material as MSW and recycled (recovered) only about 9% according to a Columbia University survey. This appears to be the result of the production, use, and disposal of most consumer goods and production raw materials, as well as the by-products or residuals from goods manufacturing and the use of traditional disposal practices, such as landfilling, being prevalent in many states. Based on the data collected, several states have not been as successful in their efforts to improve their recovery rate. To address the recovery shortfall, many of those states, such as Texas, have created material management plans which detailed how to progress towards the national average<sup>23</sup>.

The state of Alabama, in 2008, followed this trend when the Solid Wastes and Recyclable Materials Management Act (SWRMMA) passed. Under the act, the following goals were established:

- A statewide waste reduction/recycling program, goal and measurement methodology;
- A stable funding source for the solid waste and recycling programs;
- A grants program for local recycling efforts; and
- Fiscal resources to remediate unauthorized dumps/illegal disposal sites<sup>24</sup>.

The act reiterated the 25% recycling goal set in the 1991 Solid Waste Management plan and developed a strategy to accurately evaluate the Alabama Department of Environmental Management's (ADEM) efforts. The Alabama Recycling Fund (ARF) to assist local governments in the initiation or expansion of local recycling and waste minimization programs and educational outreach related to these activities has doubled the State's Recycling rate<sup>25</sup>.

ADEM, through the ARF, has conducted educational outreach to cultivate a culture of reuse and recycling to achieve the 25% goal throughout the State. As a part of the ADEM Recycling program, citizens of Alabama are educated on the environmental and economic impact of recycling. In 2012, ADEM completed an evaluation of the economic impact of recycling, which indicated approximately two million dollars were being lost as a result of not recycling<sup>26</sup>.

***Value of Recyclable Materials Disposed of in Alabama During 2011***

Group	Material	Average Percent Composition	Tons Disposed	Price Per Unit	Total Material Value
<b>Paper</b>	Newspaper	4.9%	116,113	132.30/ton	\$15,361,750
	Corrugated Cardboard	11.3%	267,772	154.48/ton	\$41,365,419
	Office	3.5%	82,938	241.67/ton	\$20,043,626
	Magazine/Glossy	2.8%	66,351	147.50/ton	\$9,786,773
	Mixed (Other Recyclable)	3.4%	80,569	127.92/ton	\$10,306,386
<b>Plastic</b>	#1 PET	1.3%	30,806	31/lb	\$19,099,720
	#2 HDPE	1.1%	26,066	.29/lb.	\$15,118,280
<b>Glass</b>	Clear	1.8%	42,654	25.08/ton	\$1,069,762
	Green	0.5%	11,848	5.01/ton	\$59,358
	Amber	1.2%	28,436	18.08/ton	\$514,123
<b>Metal</b>	Steel Cans	1.3%	30,806	264.15/ton	\$8,137,405
	Aluminum Cans	0.6%	15,218	.88/lb.	\$26,783,680
	Other Ferrous	3.0%	71,090	350.00/ton	\$24,881,500
<b>Inorganics</b>	Computers	0.1%	2,370	.20/lb.	\$948,000
<b>Total Recyclable Material Percentage and Tonnage Utilized for Study Purposes</b>		<b>36.8%</b>	<b>873,037</b>		
				<b>Total Material</b>	<b>\$193,475,782</b>

According to a recent Pew Research Center survey, most Americans have the ability to recycle, however, due to huge program variances and recycling social norms, local recycling success is often not comparable. In areas where social norms encourage recycling, success can be evaluated through the awareness of recycling rules, recycling options, and the reduction in waste being landfilled<sup>27</sup>.

Although through its programs ADEM is striving to reduce waste being landfilled, the state's landfill usage rate continues to have a larger environmental footprint in the state as well as the Southeast. Currently, Alabama takes waste from at least 26 of the 50 states for disposal in Alabama landfills in addition to the state's own waste.

## RECOMMENDATIONS

Through the review of the research conducted, various solutions were identified that could potentially mitigate these issues relating to the lack of eco-friendly behaviors in Alabama. These include offering tax incentives and grants as well as providing education and communication to

increase environmental awareness, but these solutions, however appropriate, require funding to accomplish. While the municipal solid waste component appears to have the fewest innovative solutions, it also appears to lead to a possible unidentified revenue source that could be the turning point for Alabama by funding awareness, outreach, and program implementation in all these eco-friendly behavior areas.

Alabama is a dumping ground for many other states that pay Alabama to take their trash, but the charge is minimal. Public and private landfill operations charge a per ton rate to dispose of the waste received. Those rates include the state tipping fee of one dollar per ton as established in the 2009 SWRMMA (Code of Alabama §22-27-17(a)(2) & (3), (4) & (5)). The state tipping fee is earmarked to cover programmatic costs, funding ADEM's recycling education and outreach efforts, and sustaining the Alabama Recycling Fund grant programs. The National Solid Wastes Management Association (NSWMA) collects data from private landfill members including existing tipping fee rates and according to Ed Repa, Director of Environmental Programs for NSWMA, there is a wide disparity of tipping fees in states across the country. He also indicated that, based on history, tipping fees should rise at a rate of around \$1.25 per ton per year<sup>28</sup>. Alabama has one of the lowest average rates and has not increased the state portion of the tipping fee since 2009, creating a significant source of untapped revenue for the state.

To obtain this revenue, ADEM would initiate a change to the Code of Alabama which would allow for systematic inflation adjustments to the state portion of the tipping fee. Around six million tons of solid waste is processed in the state each year for disposal in landfills across the state so a minimal increase to \$2 per ton with the proposed periodic adjustments would generate approximately 8 million dollars of revenue each year. In addition, a higher tipping rate of \$5 per ton for out of state waste could yield an additional 18 million dollars of revenue per year. The out of state fee differential would allow for the majority of the increased funding to come from the other states using Alabama's landfills. This funding, in turn, would be earmarked to create eco-friendly tax incentives, credits, and enhance the recycling outreach/education and grant programs.



Once the proposed funding is implemented, Alabama could focus on executing numerous solutions for each of the low scoring eco-friendly behaviors discussed in the findings, however, creating and funding programs alone will not solve these issues. Once the additional funding is in place, the state must establish an education and public outreach program to help shape an environmentally responsible culture. Education, communication, and awareness are key components in resolving issues with the behaviors in which Alabama is lacking. As technology unceasingly moves forward, Alabama must create and provide easier ways for its citizens to become informed consumers. A statewide kickoff campaign entitled “It Ain’t Easy Being Green!” to communicate everyday things that can be done to help our eco-friendly rating should be implemented. This educational outreach program could serve as a clearinghouse of information regarding programs that are available to citizens, private industry, and the public sector in all behaviors associated with eco-friendliness. In turn, Alabama would eventually become a more desirable location for businesses and individuals with an eco-friendly mindset.

Limited programs and funding already exist in the area of green transportation in Alabama. With elevated funding, Alabama could increase the reach of these programs beyond the most urban areas to a statewide level. While not every program works in every area of Alabama, every area can potentially benefit from being made aware of the impact on the environment simply from the transportation choices being made. State funded agencies, departments, boards and commissions should play a part as a role model toward the citizenry in the initiative to become greener in terms of transportation by considering retrofitting fleet vehicles and installing alternative-fuel stations for those vehicles statewide.

Energy consumption in Alabama needs far more improvement than green transportation. Solar power will not be utilized to its full capacity in Alabama until Alabama Power, the largest power generation company in the state, reevaluates its per kilowatt charge for backup power for solar customers. This charge has effectively barred Alabama’s citizens from committing to a more efficient and eco-friendly alternative. Similar charges were removed in Georgia when the state’s Public Service Commission forced the power company to eliminate them thereby making it easier for citizens to begin exploring the use of solar energy. A complaint regarding this charge is

currently pending with the Alabama Public Service Commission thereby creating an opportunity for change. Not only as a service to the public but for the good of the state, Alabama's Public Service Commission should take this opportunity to have these charges reevaluated and lowered, if not eliminated. Once this is accomplished, use of the campaign's clearinghouse of information will be a resource that citizens and businesses alike can use to determine how to understand and begin to use solar power.

Additionally, with the increased funding, incentives can be put in place to encourage businesses to build LEED certified or, at the very least, green buildings. While LEED certified buildings cost more on the front end, the return on investment is substantial and enduring. Again, state funded agencies, departments, boards, and commissions should lead the way by example with a mandate to acquire LEED certification on all new construction. The Alabama Army National Guard and the State Military Department have this policy in place already and can serve as a role model and lead for other state agencies to follow.

Solutions regarding recycling of municipal solid waste mostly consist of expanding programs that are currently in place. Additional funding is needed to increase education outreach efforts in order to encourage greater participation throughout the state and to facilitate this participation the number of recycling processors must be increased. This can be accomplished through the use of tax incentives, grants, and credits which are funded by the newly found revenue source. ADEM currently has programs in place to provide education and outreach but they need to be expanded so they can reach more of the citizens of Alabama. Once again, to set an example, state funded entities should place recycling bins throughout the buildings in which they are located and encourage employee participation.

## CONCLUSION

Although the environmental movement has been in place for over 50 years the fact remains that Alabama is falling behind the other states in the country in terms of eco-friendly behaviors.

Ultimately, there is cost to “go green” and the Eco-Friendly Alabama team believes it has not only recommended solutions to mitigate these issues but has also recommended an avenue to pay for those solutions. Much of being environmentally friendly is a vicious circle composed of lack of funding, lack of awareness, and lack of capability. By creating the funding source, this team believes that through increased awareness and environmentally responsible behavior modeled by our State government, the awareness and capabilities will follow. Once those are in place and as the citizens of Alabama become aware of the impact of their everyday actions, they will strive to keep this great state *Alabama the Beautiful* for years to come.

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## 2017's Greenest States

Apr 18, 2017 | John S Kiernan, Senior Writer & Editor

**E**co-friendliness and personal finance are essentially cousins. Not only are our environmental and financial necessities aligned — providing ourselves with sustainable, clean drinking water and nutritious sustenance, for example — but we also spend money on both the household and government levels in support of environmental security.

Then there's climate change. We've already seen a rise in powerful land-bearing storm systems and extreme droughts. But that's just the beginning, as storm surges and other bad weather are expected to cause more than [\\$500 billion](#) in property damage by the year 2100. Climate change will also have a direct impact on our military industrial complex, as nearly all of our East Coast air and naval installations are [vulnerable to sea-level rise](#).

In the meantime, we can all try to do our part to save the world for future generations. In order to highlight the greenest states and call out those doing a poor job of caring for the environment, WalletHub's analysts compared each of the 50 states in terms of 20 key metrics designed to illustrate each state's environmental quality and the eco-friendliness of its policies. Our data set ranges from LEED-certified buildings per capita to share of energy consumption from renewable resources. Read on for our findings, expert commentary and our full methodology.

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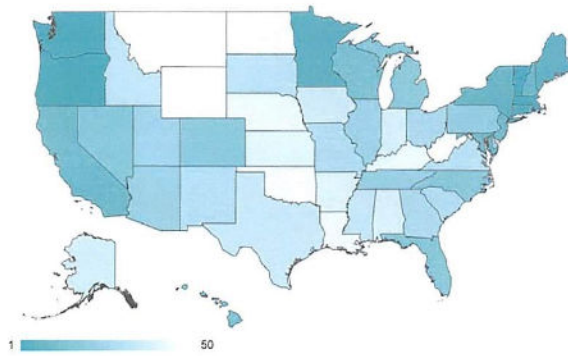
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## Main Findings


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### Greenest States

Overall Rank	State	Total Score	'Environmental Quality' Rank	'Eco-Friendly Behaviors' Rank	'Climate-Change Contributions' Rank
1	Vermont	78.88	1	2	9
2	Massachusetts	71.39	4	12	6
3	Oregon	71.25	9	1	24
4	Washington	70.23	3	7	20
5	Connecticut	68.96	7	22	3
6	Maine	68.77	11	6	10
7	Minnesota	68.23	2	5	31
8	New York	67.14	12	11	5
9	New Hampshire	66.29	29	10	2
10	Rhode Island	65.72	15	16	4
11	Maryland	64.59	24	14	8
12	New Jersey	64.31	33	13	7
13	California	64.17	43	4	12
14	Hawaii	64.07	49	3	13
15	Wisconsin	63.68	5	25	26
16	Florida	63.06	17	26	11
17	North Carolina	62.01	21	21	17
18	Michigan	61.29	8	41	18
19	Nevada	61.28	35	17	14
20	Colorado	59.84	28	9	29
21	Pennsylvania	59.59	31	24	22
22	Tennessee	59.54	23	28	19

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Overall Rank	State	Total Score	'Environmental Quality' Rank	'Eco-Friendly Behaviors' Rank	'Climate-Change Contributions' Rank
23	Delaware	59.49	45	27	1
24	Illinois	59.34	13	29	25
25	Arizona	57.88	42	20	21
26	Utah	57.53	19	30	28
27	Ohio	57.40	26	31	27
28	Georgia	57.39	37	34	16
29	South Carolina	57.03	16	42	23
30	Missouri	56.52	10	32	34
31	Virginia	54.55	46	39	15
32	New Mexico	53.27	40	8	39
33	South Dakota	53.08	6	18	45
34	Idaho	51.13	38	19	38
35	Mississippi	50.75	22	48	30
36	Texas	50.60	39	37	32
37	Alaska	49.80	25	35	41
38	Iowa	49.21	14	23	43
39	Indiana	48.84	32	42	35
40	Alabama	48.02	34	46	33
41	Arkansas	47.06	44	36	36
42	Kansas	46.47	18	33	44
43	Kentucky	43.83	41	45	42
44	Nebraska	41.46	30	40	47
45	Louisiana	41.15	47	50	37
46	Oklahoma	40.63	48	47	40
47	North Dakota	39.18	20	38	48
48	West Virginia	38.69	27	49	46
49	Montana	36.28	50	15	50
50	Wyoming	35.78	36	44	49

## Highest Air Quality

1. Wyoming
2. North Dakota
3. Vermont
4. New Mexico
- T-5. Montana
- T-5. South Dakota



Best State  
vs  
Worst State

3x Difference

## Lowest Air Quality

46. Ohio
47. Indiana
48. Illinois
49. Pennsylvania
50. California

## Highest Water Quality

1. Connecticut
2. Washington
3. Minnesota



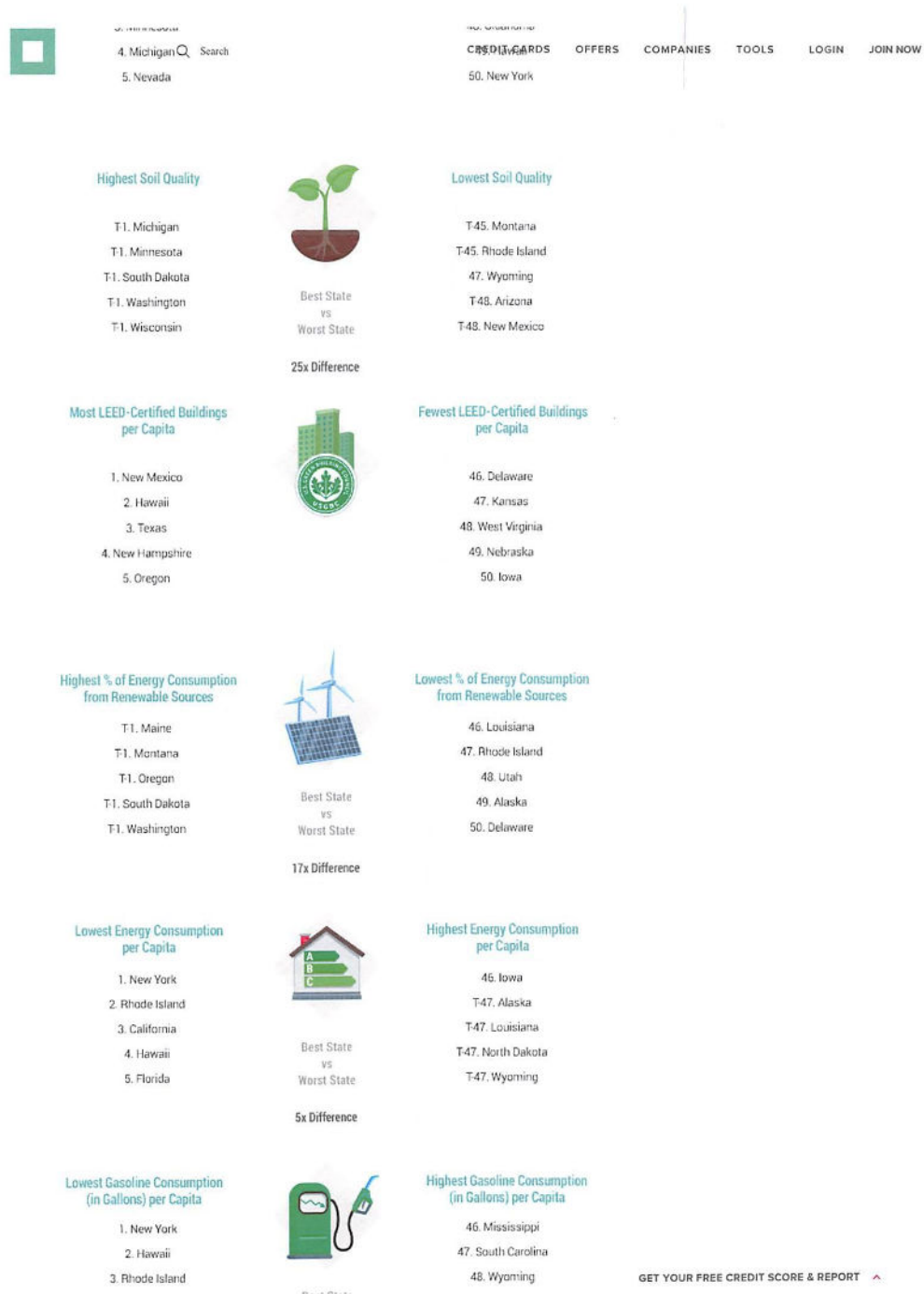
## Lowest Water Quality

46. Maryland
47. Oregon
48. Oklahoma

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4. Illinois  
5. Alaska



Best State  
vs  
Worst State

49. Maine  
50. North Dakota

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#### Highest % of Recycled Municipal Solid Waste

1. Maine
2. Minnesota
- T3. Arkansas
- T3. California
5. New Hampshire



Best State  
vs  
Worst State

48x Difference

#### Lowest % of Recycled Municipal Solid Waste

- T45. Arizona
- T45. Mississippi
- T47. Alaska
- T47. Oklahoma
49. Utah
50. Louisiana

#### Lowest Total Municipal Solid Waste per Capita

1. Missouri
2. Vermont
3. Utah
4. New Hampshire
5. Rhode Island



Best State  
vs  
Worst State

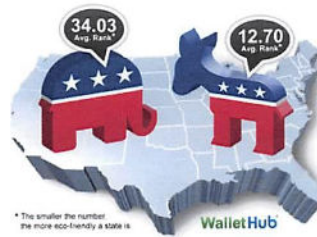
3x Difference

#### Highest Total Municipal Solid Waste per Capita

46. Montana
47. California
48. Virginia
49. Arkansas
50. Hawaii

## Red States vs. Blue States

Blue States Are More  
Eco-Friendly



## Ask the Experts

For more insight into eco-friendliness at the household, government and global levels, we posed the following questions to a panel of environmental and economic experts. Click on the experts' profiles to read their bios and thoughts on the following key questions:

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1. What policies can state and local authorities pursue to make their communities more environmentally friendly?

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2. Is there an inherent tradeoff between protecting the environment and promoting economic growth?
3. How might states be affected by the Trump administration's EPA policies?
4. How would you prioritize the following environmentally friendly activities: driving an electric car; recycling; lower water consumption; installing solar panels on the home; refraining from using fertilizers/pesticides; others?



**Giri Venkataramanan**  
Professor in the College of Engineering at University of Wisconsin - Madison



**Martin Pasqualetti**  
Senior Sustainability Scientist at Julie Ann Wrigley Global Institute of Sustainability and Professor in the School of Geographical Sciences and Urban Planning at Arizona State University



**Paul Komor**  
RSE Programs Founder and Faculty Affiliate of Environmental Studies (ENVS) at University of Colorado - Boulder

### Giri Venkataramanan

Professor in the College of Engineering at University of Wisconsin - Madison



**What policies can state and local authorities pursue to make their communities more environmentally friendly?**

Tax high levels of carbon to promote greener state

- Large and luxury affordable high der



**Valerie Thomas**  
Anderson Interface Professor of Natural Systems at Georgia Institute of Technology



**Supriya Lahiri**  
Professor of Economics at University of Massachusetts Lowell



**Nathan E. Hultman**  
Director of the Center for Global Sustainability and Associate Professor in the School of Public Policy at University of Maryland



**Laura Stanley**  
Associate Professor and Graduate Program Coordinator in the Mechanical & Industrial Engineering Department at Montana State University and Director & Founder of the Human Factors Engineering Lab at the Western Transportation Institute



**Kaitlin T. Raimi**  
Assistant Professor at the Ford School of Public Policy, University of Michigan



**Grant MacIntyre**  
Clinical Assistant Professor of Law and Director of the Environmental Law Clinic in the School of Law at University of Pittsburgh

- Unproductive lawns: use revenue to landscaping;
- Multiple car garages: use revenue to
- Commuting distance: use revenue to
- Food from far away: use revenue to
- Factory farmed meat and produce: use healthy produce consumption;
- Carbon tax: use revenue to promote
- Advertisements that promote consumer cultural programming, education and limit
- Manufactured goods from far away: limit production;
- Water use in agriculture: use revenue systems;
- Waste: use revenue to promote recycling

Team with faith-based organizations (church) simplicity and limit consumption.

**Is there an inherent trade-off between protecting the environment and promoting economic growth?**

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**Gordon McCord**

Assistant Professor of  
Economics in the School of  
Global Policy and Strategy at  
University of California - San  
Diego

Search

**Billy Pizer**

Professor in the Sanford  
School of Public Policy at  
Duke University

**Ben Ruddell**

Senior Sustainability Fellow  
and Associate Professor at  
Arizona State University

**Warren Palmer**

Professor of Economics at  
Beloit College

The trade-off is between the current generation  
between sustaining and growing high-level consumption at the expense of subsistence in the future.

**How might states be affected by the Trump**

Many states themselves are not doing much  
from my perch in Wisconsin. Will certainly affect  
the frontlines.

**What is the single most impactful thing an individual can do to reduce effect on the environment?**

Reduce miles traveled.

**Methodology**

In order to determine the greenest states, WalletHub's analysts compared the 50 states across three key dimensions: 1) Environmental Quality, 2) Eco-Friendly Behaviors and 3) Climate-Change Contributions.

We evaluated those dimensions using 20 relevant metrics, which are listed below with their corresponding weights. Each metric was graded on a 100-point scale, with a score of 100 representing the highest level of eco-friendliness.

We then calculated the overall score for each state based on its weighted average across all metrics and used the resulting scores to construct our final ranking.

**Environmental Quality – Total Points: 35**

- Total Municipal Solid Waste per Capita: Full Weight (~7.00 Points)
- Air Quality: Full Weight (~7.00 Points)  
Note: This metric measures the average exposure of the general public to particulate matter of 2.5 microns (PM2.5) or less in size.
- Water Quality: Full Weight (~7.00 Points)
- Soil Quality: Full Weight (~7.00 Points)  
Note: This metric measures the median soil pH level.
- Energy-Efficiency Score: Full Weight (~7.00 Points)

**Eco-Friendly Behaviors – Total Points: 35**

- Green Buildings: Full Weight (~3.18 Points)  
Note: This metric measures the number of LEED-certified buildings per capita.

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#### • Total Capacity of Solar PV Systems Installed per Household: Full Weight (~3.18 Points)

Note: "PV" is an acronym for photovoltaic.

- Share of Energy Consumption from Renewable Sources: Full Weight (~3.18 Points)
- Energy Consumption per Capita: Full Weight (~3.18 Points)
- Gasoline Consumption (in Gallons) per Capita: Full Weight (~3.18 Points)
- Daily Water Consumption per Capita: Full Weight (~3.18 Points)
- Alternative-Fuel Vehicles per Capita: Full Weight (~3.18 Points)  
Note: Energy Information Administration (EIA) provides data for the number of alternative-fuel vehicles for these four fleets only: federal government agencies, state government agencies, transit agencies and fuel providers.
- Alternative-Fuel Stations per Capita: Full Weight (~3.18 Points)
- Green Transportation: Full Weight (~3.18 Points)  
Note: This metric measures the percentage of the population who walk, bike, carpool, take public transportation or work from home.
- Average Commute Time by Car: Full Weight (~3.18 Points)
- Share of Recycled Municipal Solid Waste: Full Weight (~3.18 Points)

#### Climate-Change Contributions – Total Points: 30

- Carbon-Dioxide Emissions per Capita: Full Weight (~7.50 Points)
- Methane Emissions per Capita: Full Weight (~7.50 Points)
- Nitrous-Oxide Emissions per Capita: Full Weight (~7.50 Points)
- Fluorinated Greenhouse-Gas Emissions per Capita: Full Weight (~7.50 Points)

*Sources: Data used to create this ranking were collected from the U.S. Census Bureau, American Chemistry Council, America's Health Rankings, County Health Rankings, International Plant Nutrition Institute, American Council for an Energy-Efficient Economy, Green Building Council, National Renewable Energy Laboratory, Bureau of Transportation Statistics, Department of Energy, Environmental Protection Agency, Energy Information Administration, World Resources Institute and U.S. Geological Survey.*

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No

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