

This Mississippi State Summary educates policymakers and the public about EERE investments and their positive impacts in Mississippi.

Mississippi

The U.S. Department of Energy (DOE) is pursuing an all-of-the-above approach to developing every source of American energy. The Office of Energy Efficiency and Renewable Energy (EERE) leads DOE efforts to build a strong clean energy economy, a strategy that is aimed at reducing our reliance on foreign oil, saving families and businesses money, creating middle-class jobs, and reducing pollution.

This strategy will position the United States as the global leader in clean energy, increasing our nation's competitiveness. In 2012, \$268 billion was invested globally in clean energy, a 500% increase since 2004.⁴ Trillions of dollars will be invested in the coming decades. Clean energy represents one of the most important economic development races of the 21st century. We face a stark choice—the clean energy technologies of tomorrow can be invented and manufactured in Mississippi and the rest of the United States for domestic use and export around the world, or we can cede global leadership and import those technologies from China, India, Germany, and elsewhere.



Mississippi's Clean Energy Resources and Economy

- Clean Economy Jobs (2010): 20,900+
- Average Annual Growth Rate of Clean Economy Jobs (2003–2010): 1.8%
- Average Annual Wage of Clean Economy Jobs (\$2009): \$31,053¹

Tremendous opportunity to increase the amount of renewable energy generated in Mississippi exists, as well as to improve the energy efficiency of Mississippi's homes, buildings, and factories. Mississippi generated 2.8 percent of its electricity from renewable energy resources during 2010, with wood and wood waste accounting for almost all of the state's electricity generation from renewable energy.² Mississippi also produces biodiesel and ethanol from its biomass resources.

Mississippi's Public Service Commission (PSC) received a \$99,000 grant from the National Association of Regulatory Utility Commissioners (NARUC), funded by the American Recovery and Reinvestment Act of 2009 (ARRA), to develop energy efficiency standards for its utilities.³



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



EERE and Mississippi

EERE helps create Mississippi’s clean energy economy today, developing and delivering innovative, market-driven solutions for the following:

- **Sustainable transportation** – making transportation cleaner and more efficient through solutions that put electric drive vehicles on the road and replace oil with clean domestic fuels
- **Renewable electricity generation** – reducing the cost of renewable energy through solutions that squeeze more usable power from sustainable resources and improve the economics of manufacturing and installation
- **Energy-saving homes, buildings, and manufacturing** – developing cost-effective energy-saving solutions that help make our country run better through increased efficiency—promoting better plants, manufacturing processes, and products; more efficient new homes and improved older homes; and other solutions to enhance the buildings in which we work, shop, and lead our everyday lives.

EERE Investments in Mississippi

EERE invests in Mississippi through a broad range of clean energy projects, from energy efficiency to biofuels and other technologies. Through the research, demonstration, and deployment activities we conduct with Mississippi and its businesses, universities, nonprofits, and local governments, EERE supports cities, communities, and families to develop innovative, cost-effective energy solutions.

Sustainable Transportation



Alternate Fuel Cell Membranes at the University of Southern Mississippi



Hattiesburg, Mississippi
EERE investment: \$1.9M

Researchers at the **University of Southern Mississippi** studied structure-property relationships in order to develop fuel cell membranes capable of operating at high temperatures. As fuel cells must be able to withstand stresses and temperatures up to 120°C at low relative humidity, this research provided a greater understanding of how humidity and temperature variations within the fuel cell degrade the membrane. The research’s overall focus has been to evaluate different aromatic hydrocarbon polymers and how they can improve the durability of these types of fuel cells, thereby increasing the lifetime of the fuel cell and reducing its overall cost. The University contributed \$483,000 to this project.

MSU Students Gain Real World Engineering Experience through Nationwide Competition



Starkville, Mississippi
EERE investment: About \$1M

Mississippi State University (MSU) is participating in EERE’s most recently launched advanced vehicle competition, EcoCAR 2. MSU’s team has 84 members who are pursuing degrees in 16 major study areas. They will be competing against 15 other universities across North America in a three-year engineering competition to construct and demonstrate vehicles that reduce fuel consumption, lifecycle greenhouse gas emissions, and other harmful tailpipe emissions relative to conventional gasoline vehicles, while still maintaining consumer acceptance in the areas of performance, utility, and safety. The team must also develop business and marketing and education strategies for their vehicles.

Students will gain hands-on experience designing and building these advanced vehicles, using the same hardware and software tools as professional vehicle manufacturing engineers. The MSU team designed their 2013 Chevrolet Malibu to be a plug-in hybrid electric vehicle (PHEV) fueled by electricity and E85 (a fuel blend consisting of up to 85% ethanol).

Sponsors of the EcoCAR 2 competition provide mentorship to students as well as access to components and systems that might otherwise be unavailable or too expensive. Since EERE-supported advanced vehicle competitions began in 1988, more than 16,500 students have graduated and gone on to work in the automotive industry all over the world.



The ElectraTherm Green Machine generates electricity from the waste water discharged by oil and gas production. *Photo from ElectraTherm, Inc.*



Renewable Electricity Generation



“Green Machine” Extracts Energy from Previously Useless Waste Water



Laurel, Mississippi
EERE investment: \$981K

In part because of funds from EERE, **ElectraTherm, Inc.** was able to successfully demonstrate its “Green Machine” at a Mississippi oil field. The Green Machine is an innovative generator that can produce electricity from the waste water discharged by oil and gas production—fluid that until now was considered too cool to be a useful geothermal resource. The results of this six-month demonstration will inform future, similar development projects elsewhere in the country, enabling reduced installation times, more efficient maintenance, and increased energy output.

Free Flow Power to Deploy Turbines on the Mississippi



Various Locations on the Mississippi River
EERE investment: \$1.3M

Free Flow Power, assisted by an investment from EERE, has demonstrated their hydrokinetic SmarTurbine. This technology will use the natural flow of the Mississippi river to turn submerged turbines, producing power without the need to build a dam. Free Flow Power plans to deploy the SmarTurbine in numerous locations on the Mississippi River, including some on the Mississippi-Louisiana border.



Hydrokinetic turbine generator deployed on floating mount in Mississippi River. *Photo from Free Flow Power Corporation.*

Energy-Saving Homes, Buildings, and Manufacturing



Appliance Rebate Program Benefits Thousands of Mississippians



Statewide
EERE investment: \$2.8M

In 2010, EERE provided the State of Mississippi with American Recovery and Reinvestment Act (ARRA) funds to implement a residential appliance rebate program. The **Mississippi Development Authority** offered rebates ranging from \$50 to \$250 for the purchase of ENERGY STAR® qualified appliances to replace less energy efficient air conditioners, dishwashers, heat pumps, freezers, and water heaters. The program was intended to help Mississippi residents reduce their electric utility bills by replacing old, inefficient appliances with new, energy-efficient models. Since the launch of the program in April 2010, 34,000 ENERGY STAR-qualified appliances have been purchased. These new, efficient appliances will help Mississippi reduce carbon dioxide emissions by roughly 22,500 metric tons over the lifetime of the new appliances.⁵

State Cost Reports on the Economics of Residential Building Energy Codes



Statewide

EERE recently conducted a comprehensive analysis of the potential benefits to Mississippi, should the state adopt building codes based on the 2012 version of the International Energy Conservation Code (IECC). Under a Mississippi version of the 2012 IECC, the average Mississippi homeowner would save a net \$5,400 in energy costs over 30 years, or an average of \$180 per year.⁶

Deploying Clean Energy Solutions in Mississippi Communities

EERE invests in the deployment of energy efficiency and renewable energy projects in communities across Mississippi. These investments catalyze economic development, create jobs, generate clean energy, and reduce utility bills. Many of these investments are a result of the ARRA. Of the nearly \$107 million in ARRA funds allotted to the State of Mississippi from EERE for deployment projects, more than 97% has been spent to date through the Energy Efficiency and Conservation Block Grant Program, State Energy Program, and Weatherization Assistance Program.



Building Clean Energy Infrastructure

With financial and technical support from EERE, energy officials at the state level and in 23 communities have selected and overseen the completion of hundreds of projects that are delivering the benefits of clean energy to citizens throughout Mississippi. EERE allocated more than \$57 million in ARRA funds to support activities that resulted in the following:

- Contributed to increased energy efficiency of nearly 1,550 buildings (nearly 21 million square feet) through building retrofits
- Installed nearly 400 kilowatts in renewable energy capacity from wind, solar energy, solar thermal energy and geothermal energy systems
- Funded more than 150 workshops to educate approximately 25,000 people to perform energy audits and upgrades and install renewable energy systems
- Installed more than 450 energy-efficient traffic signals.

Weatherizing Homes for Lower Income Families

Mississippi has spent almost 94% of the more than \$49 million in ARRA funds it received to weatherize more than 6,100 homes, surpassing the state’s weatherization goals under ARRA by 12%. This resulted in annual energy savings of nearly 177,000 British thermal units and has averted more than 16,000 metric tons of carbon pollution to date—the equivalent of taking more than 3,100 passenger vehicles off the road for a year. The projects have enabled income-eligible families to save hundreds of dollars per year on heating and cooling bills by improving their homes’ energy efficiency as well as the health and safety of home environments.⁷

Deployment Project Examples

Renewable Energy Systems Reduce Business’ Natural Gas Demand



Perkinston, Mississippi
EERE investment: \$700K

Sanderson Farms, a chicken processing plant in Perkinston, installed renewable energy systems that have reduced the facility’s natural gas demand by approximately 80%. The plant has a large waste lagoon that produces a large amount of methane, which was previously flared off. This investment paid for the installation of piping to bring the methane from the lagoon to a small out-building, where it is stripped of water, pressurized, and piped up to the main boiler room to produce steam for use throughout the plant.

Energy Management Systems at Hospital Reduces Energy Waste



Whitfield, Mississippi
EERE investment: \$300K

The **Mississippi State Hospital** installed 96 current transformers at various points throughout MSH’s 90-building campus. This equipment allows the hospital to monitor campus-wide energy consumption of buildings and identify where energy is being wasted. The project has led to more efficient energy use, and promotes more efficient operation and maintenance of the facility.



Mississippi State Hospital’s administration building, Building 21, is the first building visitors see after entering the MSH campus. *Photo from Steve Walker, Mississippi State Hospital Staff Photographer.*

HVAC and Renewable Energy Systems Help Bakery Reduce Emission Footprint and Energy Use



Meridian, Mississippi
EERE investment: \$550K

Earthgrains Baking Co.’s Meridian facility—which serves Mississippi, Arkansas, and parts of Tennessee, Georgia, and Florida and is one of the company’s largest production plants—installed numerous upgrades to help reduce the facility’s emission footprint. Earthgrains replaced inefficient window and through-wall HVAC units, and upgraded its air compressor system by installing a large, secondary storage tank, lossless condensate traps, and a new control system. Earthgrains also installed a system that uses hot air from the bread ovens to preheat hot water for other processes in the plant, reducing energy consumption and saving on costs. Finally, the firm replaced two steam boilers with high-efficiency models.



Lower Energy Bills for Low-Income Families across Mississippi



Southern Mississippi

The **Mississippi South Central Community Action Agency, Inc. (SCCAA)**, supported by EERE funds provided to the State of Mississippi, weatherized more than 1,400 homes in eight counties, creating nearly 100 jobs. At the third annual Residential Energy Efficiency Awards for Weatherization in 2011, the SCCAA was recognized by State and Local Energy Report and the National Association of State Community Services Programs for its work to make Mississippi homes more energy efficient and cut energy costs for Mississippi residents.

Funding the State's First Landfill Gas-to-Electricity Facility



Starkville, Mississippi
EERE Investment: \$300K

The **Golden Triangle Regional Solid Waste Management Authority** installed the state's first landfill gas-to-electricity project at a facility that serves 155,000 Mississippi residents. The project has resulted in a total average monthly energy cost savings of \$87,000 and the production of enough electricity to power 600 homes and prevent more than 30,000 metric tons of greenhouse gas emissions. The project was nominated for a 2012 Landfill Gas Utilization Excellence Award from the Solid Waste Association of North America and was awarded an Environmental Protection Agency "Landfill Methane Outreach Program Project of the Year" Award.

References

¹"Sizing the Clean Economy: A National and Regional Green Jobs Assessment." The Brookings Institution and Battelle, July 2011. <http://www.brookings.edu/research/reports/2011/07/13-clean-economy>; <http://www.brookings.edu/-/media/Series/Clean%20Economy/28.PDF>.

²"Mississippi State Profile and Energy Estimates." Energy Information Administration, 2012. <http://www.eia.gov/state/state-energy-profiles.cfm?sid=MS>.

³"Bentz Announces \$99,000 Grant Awarded to PSC For Energy Efficiency Program Development." Mississippi Public Service Commission, 2010. [http://www.psc.state.ms.us/commissioners/northern/press%20releases/2010/Presley%20Announces%20PSC%20Awarded%20\\$99000%20Grant%20for%20Energy%20Efficiency%20Program%20Development%20062110.pdf](http://www.psc.state.ms.us/commissioners/northern/press%20releases/2010/Presley%20Announces%20PSC%20Awarded%20$99000%20Grant%20for%20Energy%20Efficiency%20Program%20Development%20062110.pdf).

⁴"New Investment in Clean Energy Fell 11% in 2012." Bloomberg New Energy Finance, 2013. <http://about.bnef.com/2013/01/14/new-investment-in-clean-energy-fell-11-in-2012-2/>.

⁵"State Energy Efficient Appliance Rebate Program." Mississippi Development Authority, 2010. <http://www.mississippi.org/index.php?id=752>.

⁶"Mississippi Energy and Cost Savings for New Single- and Multifamily Homes. EERE, 2012. <http://www.energycodes.gov/sites/default/files/documents/MississippiResidentialCostEffectiveness.pdf>.

⁷"Residential Energy Consumption Survey." U.S. Energy Information Administration, 2009. <http://www.eia.gov/consumption/residential/>.

⁸"Retrospective Benefit-Cost Evaluation of U.S. DOE Vehicle Combustion Engine R&D Investments: Impacts of a Cluster of Energy Technologies." DOE, May 2010. http://www1.eere.energy.gov/analysis/pdfs/advanced_combustion_report.pdf.

⁹"Retrospective Benefit-Cost Evaluation of DOE Investment in Photovoltaic Energy Systems." DOE, August 2010. http://www1.eere.energy.gov/analysis/pdfs/solar_pv.pdf.

¹⁰"Retrospective Benefit-Cost Evaluation of U.S. DOE Wind Energy R&D Program." DOE, June 2010. http://www1.eere.energy.gov/analysis/pdfs/wind_bc_report10-14-10.pdf.

¹¹National Research Council. *Energy Research at DOE: Was It Worth It? Energy Efficiency and Fossil Energy Research 1978 to 2000*. Washington, DC: National Academies Press, 2001.

¹²"DOE Hydrogen and Fuel Cells Program Record #12020." DOE, September 27, 2012. http://hydrogen.energy.gov/pdfs/12020_fuel_cell_system_cost_2012.pdf. Based on projections to high-volume manufacturing.

¹³"Retrospective Benefit-Cost Evaluation of DOE Investment in Photovoltaic Energy Systems." DOE, August 2010. http://www1.eere.energy.gov/analysis/pdfs/solar_pv.pdf.

¹⁴"Retrospective Benefit-Cost Evaluation of U.S. DOE Wind Energy R&D Program." DOE, June 2010. http://www1.eere.energy.gov/analysis/pdfs/wind_bc_report10-14-10.pdf.

¹⁵"Weatherization Assistance Program." EERE, May 2009. http://www1.eere.energy.gov/wip/pdfs/wap_factsheet.pdf.

¹⁶"Building Technologies Program: History and Impacts." EERE, 2013. http://www1.eere.energy.gov/buildings/appliance_standards/history_and_impact.html.

¹⁷"Energy Technology Solutions: Public-Private Partnerships Transforming Industry." EERE, December 2010. http://www1.eere.energy.gov/manufacturing/pdfs/itp_successes.pdf.

¹⁸"Facilitating Cost-Effective Federal Energy Management." EERE, December 2012. http://www1.eere.energy.gov/femp/pdfs/femp_fs.pdf.



A Proven Track Record

Snapshot of National Outcomes from EERE Investments

EERE's Return on Investment for Clean Energy Technologies

- EERE's \$931 million investment in vehicles combustion engine R&D from 1986 to 2007 achieved a net benefit of \$69 billion (2008 dollars) in fuel savings for users of heavy-duty diesel trucks.⁸
- EERE's \$3.7 billion investment in solar photovoltaic R&D from 1975 to 2008 resulted in a net economic benefit of \$15 billion (2008 dollars) due to module efficiency and reliability improvements.⁹
- EERE's \$1.7 billion investment in wind energy R&D from 1976 to 2008 resulted in a net economic benefit of \$8.7 billion (2008 dollars) due to wind turbine efficiency, energy capture, and reliability improvements.¹⁰
- A 2001 National Academy of Sciences analysis found that investments of \$1.6 billion in energy efficiency R&D in the first two decades of DOE's existence from 1978 to 2000 realized a net economic benefit of approximately \$30 billion (1999 dollars).¹¹

Sustainable Transportation

- EERE research has helped reduce production costs of automotive lithium-ion batteries by more than 50% since 2008 and is on track to reach its goal of enabling cost-competitive market entry of plug-in hybrid electric vehicles within the next 10 years.
- EERE's activities to achieve cost-competitiveness for biofuels have resulted in the recent achievement of reaching a modeled cellulosic ethanol production cost of \$2.15 per gallon of ethanol (or \$3.27 per gallon of gasoline equivalent).
- EERE's efforts have reduced the projected costs of automotive fuel cells (assuming high-volume manufacturing) by more than 35% since 2008 and 80% since 2002—doubling the durability of fuel cells from 950 hours of demonstrated operation in 2006 to more than 2,500 hours of operation on the road.¹²

Renewable Electricity Generation

- Without EERE involvement, the average solar photovoltaic (PV) module production cost per watt would have been \$5.27 in 2008, rather than \$1.92. EERE has accelerated solar industry progress by an estimated 12 years.¹³
- Without EERE involvement, cumulative wind power deployment through 2008 would have been less than a third of actual 2008 levels. EERE has accelerated the overall progress of the wind industry by an estimated 6 years.¹⁴

Energy-Saving Homes, Buildings, and Manufacturing

- More than 6,200,000 homes have been weatherized with EERE funding provided to states or leveraged from other sources with EERE support since 1976—creating an average energy savings of \$350 or more per year and avoiding \$1.6 billion in energy costs during winter 2005 alone for all households weatherized.¹⁵
- Due to EERE appliance standards implemented through 2012, a typical household today already saves about \$180 per year off its utility bills. Households can expect to save more than \$300 per year by 2030, as they replace their existing appliances with newer models that use less energy—a cumulative savings to consumers of more than \$900 billion by 2020, and more than \$1.6 trillion through 2030. The cumulative energy savings of these standards phased in through 2012 will be about 70 quadrillion British thermal units (quads) of energy through 2020, and will amount to 120 quads through 2030. (The United States consumes a total of about 100 quads of energy per year.)¹⁶
- EERE and its partners in the manufacturing sector have successfully launched 220 new, energy-efficient technologies, received 78 R&D 100 Awards, and delivered technical assistance to more than 33,000 industrial plants.¹⁷
- Since 2005, EERE has facilitated \$3.1 billion of efficiency investments in federal government facilities from performance-based contracts, which will result in energy cost savings of approximately \$8.5 billion over the life of the energy-saving measures. The savings on utility bills and operation and maintenance created through the facility upgrades will be used to pay for the project over the term of the contract, and the agencies will continue to save money and energy after the contract term has ended.¹⁸

The Office of Energy Efficiency and Renewable Energy is at the center of creating the clean energy economy today. We lead U.S. Department of Energy efforts to develop and deliver market-driven solutions for renewable electricity generation; sustainable transportation; and energy-saving homes, buildings, and manufacturing. To learn more about the activities of the Office of Energy Efficiency and Renewable Energy, visit eere.energy.gov. If you have questions or comments about the information in this document, please contact us at EE.Communications@ee.doe.gov.