

South Carolina Biomass Brief



Information about Biomass in South Carolina

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Introduction to Biomass in South Carolina

Biomass Basics

For thousands of years, people burned wood to cook their food and heat their homes. It was only when the Industrial Revolution began that the use of fossil fuels increased, eventually dominating as the world's primary source of energy. When burned, fossil fuels emit carbon dioxide and other substances into the air. The millions of tons of these emissions released into the atmosphere each year adversely impact our environment.

Biomass is one of many different renewable energy and energy efficiency strategies designed to reduce fossil fuel emissions and utilize energy more effectively. Biomass refers to any plant mass harvestable for conversion to fuel, as well as any animal and human wastes convertible to solid or gaseous fuels. Thus, it includes a broad range of materials, biological in nature, such as agricultural and forestry products, farm and wood waste products, selected garbage, and manure and other animal wastes.

Biomass is plentiful in South Carolina and relatively inexpensive compared to other alternative energy resources. Since South Carolina has no uranium, coal, oil, or natural gas reserves, the progressive use of biomass for energy has immense economic potential in the state and reduces the state's dependence on foreign or out-of-state sources of energy.

This report is not intended to showcase biomass over other sources of renewable energy, but rather to highlight all of the existing and future opportunities for biomass.

Current Consumption

According to the US Department of Energy, the majority of energy consumption in South Carolina comes from fossil fuels (65 percent).¹ Of this percentage, petroleum provides 31 percent, coal provides 24 percent, and natural gas accounts for 10 percent. Nuclear energy contributes 30 percent of the total energy consumption in the state.

Renewable energy provides 5 percent of the total, and approximately half of that is biomass energy primarily derived from wood residues and ethanol.² In 2009, ethanol and biodiesel comprised 1.3 percent of the motor fuel consumed in the state.³

These numbers could be much more significant since South Carolina has an abundance of biomass resources. However, biomass must first become more economically viable with traditional sources of energy. This could be achieved through a variety of means including incentives, renewable energy requirements, and greenhouse gas emission limits. In this report are some brief examples of current biomass activities in South Carolina.

¹ US Department of Energy, Energy Information Administration (August 26, 2010) available at http://www.eia.gov/state/state_energy_profiles.cfm?sid=SC.

² *Id.*

³ SC Department of Revenue, L-307 Reports, January 2009 – December 2009.



Solid Fuels Activities

In September 2008, the Palmetto Agribusiness Council released a report, which showed that the agriculture and forestry industry is the largest economic cluster in the state, with a direct and indirect impact of almost \$33.9 billion a year and nearly 200,000 jobs in South Carolina.⁴

According to a biomass use inventory produced by the South Carolina Energy Office,⁵ 28 operating facilities currently utilize wood residues as boiler fuel for process steam. The majority of the facilities do not have generators to produce electricity from the steam, but if they did, the equivalent capacity would be over 2,300 MW. Currently only 726 MW of wood residue generators are in operation at Bowater Inc., CoGen South LLC at Mead, International Paper – Eastover Mill, International Paper - Georgetown Mill, Smurfit-Stone Container Corp., and the University of South Carolina.

According to information provided by the facilities, a total of 1,450 jobs are dedicated to operating the biomass energy equipment, with 1,320 of those jobs at the six facilities with generators. Using the assumption that 1.8 workers are required for each MW of generator capacity and each MW costs approximately \$1 million to install, if the remaining 22 facilities install generators, it could result in an additional 2,833 direct jobs and an additional \$1.5 billion in investment.

There are many more opportunities for wood residues in the future including co-firing with coal facilities and dedicated biomass energy plants. According to a 2009 report by the US Forest Service, from \$20-\$30/ton nearly 16.5 million tons of wood wastes are available annually from logging residues, standing residuals, precommercial thinnings, mill residues, and urban wood wastes.⁶ Below is a comprehensive list of announced projects that are currently using or will be using these available wood residues.

Agri-Tech Producers LLC

Torrefaction is a process traditionally used to dry and roast coffee beans with extreme heat. In the next five years, Agri-Tech Producers LLC plans to invest \$40 million dollars in four plants that would use torrefaction to produce compact pellets of biomass.⁷ The pellets can be shipped and stored more cheaply than traditional biomass thereby increasing the viability of biomass as an alternative for coal. According to Agri-Tech CEO Joseph James, each plant would cost \$10 million and create 25 jobs.⁸

⁴ Miley, Gallo & Associates, LLC. September 2008. *The Economic Impact of the Agribusiness Industry in South Carolina*. Prepared for the Palmetto Agribusiness Council.

⁵ South Carolina Energy Office. May 2010. *Combustion Renewable Energy Facilities Inventory* available at <http://www.energy.sc.gov/index.aspx?m=6&t=84>.

⁶ Conner, R.C., Adams, T.O., and Johnson, T.G. October 2009. *Assessing the Potential for Biomass Energy Development in South Carolina*. US Forest Service, Southern Research Station, Research Paper SRS-46.

⁷ Hadaway, C. February 16, 2009. *Biomass at forefront of clean energy in S.C.* Charleston Business Journal.

⁸ *Id.*

Carolina-Pacific LLC

Carolina-Pacific LLC plans to help communities along the I-95 corridor by utilizing switchgrass. Carolina-Pacific has an agreement to supply Europe with SC switchgrass as an alternative to coal. Because switchgrass is native and perennial, environmentally-friendly, drought tolerant and high-yielding, it is a very successful biomass crop. Tens of thousands of acres of switchgrass will need to be planted in the next few years in order to meet growing demand from European utilities.⁹

Carolina-Pacific developed a briquette known as the ROCette, which delivers more than 8,000 BTU per pound. The ROCette is mostly made of Southern Yellow Pine in the Southeast and Northern Pine in New England and Canada. The ROCette has a smaller carbon footprint than a traditional wood pellet based on shipping impacts, since one ton of ROCettes occupies 1.1 cubic meters, while pellets require 1.5 cubic meters for the same amount of energy.¹⁰

Carolina-Pacific, which occupies a 100,000 square foot warehouse at the Port of Georgetown, delivered its first 5,000 ton shipment of briquettes to Europe in March 2010.¹¹

Duke Energy Co-Firing Project

At a June 2010 Office of Regulatory Staff tour of the Lee Steam Station in Belton, Duke Energy gave a presentation about its past and future plans for biomass co-firing at the coal facility.¹² The first co-firing test was performed in the mid-1990s and retested in 2007 in preparation for the NC Renewable Energy Portfolio Standard. In the test burn 1,000+ tons of green and dry wood were used and no operational impacts were detected. In 2009 the Lee Steam Station had a three month production burn generating 1,303 Renewable Energy Certificates (RECs) using ¾" wood chips. In May 2010 Duke began continuous production using biomass primarily from untreated forest residues, non-merchantable material, thinning and unadulterated crates and pallets. Duke generated 1,064 RECs in May and the goal is to blend up to 10% biomass by weight. Unfortunately, REC production is not yet optimal due to the inadequate fuel supply provided by the contractor and equipment limitations.

Duke Energy has also begun a bioenergy crop planting demonstration. The company plans to plant over 1,200 acres with second generation loblolly pine at 1x, 2x, and 3x planting density as well as other tree varieties including sweetgum, hybrid aspen, black willow, cottonwood, and advanced species. There will also be perennial crops of shrubs, grasses and miscanthus.

Loblolly Green Power, LLC

Santee Cooper announced plans in October 2008 to purchase electricity from a 50 MW biomass energy operation to be built by Rollcast Energy in Newberry County. According to Santee Cooper, the utility would have a power purchase agreement (PPA) with Rollcast Energy for 50 megawatts of biomass power, which would significantly increase Santee Cooper's renewable energy from 17 megawatts and open a new phase in its renewable development. Loblolly will

⁹ Carolina-Pacific, LLC. April 16, 2009.

¹⁰ Carolina-Pacific, LLC (August 26, 2010) available at <http://carolina-pacific.com/1.html>.

¹¹ South Carolina Ports. March 5, 2010. *Carolina-Pacific, Port of Georgetown Welcome First Ship* press release.

¹² Tracy Beer, Duke Energy Carolinas. June 23, 2010. "Renewable Energy Strategies and Projects" presentation. Presented to the South Carolina Office of Regulatory Staff and the South Carolina Energy Office.

use area logging residues and urban wood waste, and the biomass plant will produce enough energy to power 25,000 homes. The project will cost \$170 million and will create 25-30 permanent jobs and 200 construction jobs. The plant is expected to be operational by 2011.¹³

Orangeburg County Biomass LLC

In April 2010, Orangeburg County Biomass LLC was reported as seeking an option for 55 acres at the John Matthews Industrial Park in Orangeburg County.¹⁴ The 35 MW dedicated biomass energy facility, which is projected to cost \$98 million, would utilize local wood residues to produce electricity.¹⁵ The power purchase agreement has not been finalized, but talks are underway with several area utilities.

Savannah River Site Waste Wood Boiler

As part of a collaborative process between the US Department of Energy (DOE), the Washington Savannah River Company (WSRC), Ameresco, and the Savannah River Site (SRS), Ameresco will build a new \$795 million biomass cogeneration facility at the Savannah River Site to replace existing coal-fired boilers.¹⁶ The current plant, installed in 1951, is too large for the Site's reduced steam requirements, resulting in venting of excess steam and reduced plant efficiency. The boiler plant is also past its useful life, requiring additional maintenance and repair. In order to save about \$34 million a year in operations and maintenance costs, Ameresco will replace this and two fuel back-up oil boilers with two 120,000 pph biofuel BFB boilers w/ SNCR control, one 100,000 pph packaged fuel oil boiler for backup energy generation only, and one 18 MW condensing turbine.

The Site will use forest residue within the geographic region and it will come to the Site either processed or unprocessed using large high-side trailers (120 cubic yards). The facility will also utilize tires and wood palettes from Three Rivers Landfill. The landfill will provide up to 200 tons of unprocessed tires and 84 tons of palettes per week. The plant will burn 322,000 tons of woody biomass and tires a year.

The benefits of the project include significant energy cost savings, a 15% reduction of energy consumption from the elimination of distribution losses and improved boiler efficiency, new equipment with improved efficiencies and operating lifetime, a significant reduction of carbon monoxide, particulate matter, nitrogen oxide and sulfur dioxide emissions, and a significant renewable energy source through the use of local waste wood residues to generate energy. The plant will lead to a reduction in greenhouse gas emissions by 100,000 tons per year. It will also provide up to 250 construction jobs and 20 permanent jobs. The plant is expected to be operational in December 2011.

¹³ Santee Cooper. October 2, 2008. *Santee Cooper Adding Biomass to Mix. Currently*, Volume 19, Number 22.

¹⁴ Zaleski, Gene. April 12, 2010. *Proposed Power Plan Seeking Customers. The Times and Democrat.*

¹⁵ Sarata, Phil. November 8, 2009. *Company wants to make electricity with wood biomass. The Times and Democrat.*

¹⁶ US Department of Energy, Savannah River Operations Office. May 15, 2009. "DOE Sets Energy Savings Contract in Motion for New Renewable Energy Fueled Plant at SRS," press release.

Sunoco Products/Peregrine Energy

Sonoco's coal-fired boilers are going to be replaced by a \$135 million 50 MW wood biomass-fueled power plant in Hartsville.¹⁷ Peregrine Energy Corporation of Greenville plans to build the plant, which will use logging wood waste. The energy produced at the facility is enough to power about 14,000 homes. The electricity will be sold to Progress Energy Carolinas and the low pressure steam will be sold to Sunoco.¹⁸ The new facility will create 300 construction jobs, 30 full-time workers, and 110 jobs in the gathering, processing and transport of woody biomass to the plant. The plant is expected to be completed in Fall 2012.¹⁹

University of South Carolina

After multiple setbacks including the necessary installation of scrubbers, problems with the plant's steam distribution system, and a bent pipe,²⁰ USC has reopened its woody biomass plant. The plant uses district-energy advanced wood combustion, which is optimal for high-density communities such as downtown Columbia. The plant includes a learning lab and classroom that is being constructed with a \$61,500 matching grant in 2007 from the SC Renewable Energy Grant Program.²¹ USC students can study the innovative technology of the plant in addition to using its power in their dorm rooms. USC expects to save \$2 million each year in energy costs when the plant is operational, while providing 75% of the campus demand for steam (equivalent to powering 1,500 homes), utilizing 21 million tons of wood chips annually, and emitting 20,000 fewer tons of greenhouse gases annually than the natural-gas fired boilers it will replace.²² Additionally, the facility is equipped with a 1.5 MW generator to produce electricity from the waste steam.

¹⁷ Fayssoux, John. July/August 2009. *An Energy-friendly Infrastructure Change*. SC Business Magazine, Vol. 30, No. 4

¹⁸ Staff. April 22, 2009. *Wood biomass plant coming to Sonoco complex*. The State Newspaper.

¹⁹ Phillips, Noelle. June 12, 2009. *Clean energy expands in S.C.* The State Newspaper.

²⁰ Aiken, Ron. June 2, 2009. *Kinks Power Down USC's Biomass Plant*. Free Times.

²¹ SC Energy Office Grant No. MG-08-08. Project period February 2008 – January 2010.

²² University of South Carolina online. *Innovista: Biomass Energy Facility*. Located at <http://innovista.sc.edu/map/noflash/detail.aspx?poi=87> (Accessed September 3, 2010).



Gaseous Fuels Activities

Since 1999, the South Carolina Energy Office (SCEO) has partnered with the US Environmental Protection Agency's Landfill Outreach Program (LMOP) in an effort to reclaim and use landfill gas in the state. Concentrated efforts on the Landfill Gas to Energy (LFGTE) projects have resulted in significant energy and environmental benefits to the state. As trash in landfills decomposes, it produces methane gas which is 17 times more potent than carbon dioxide as a greenhouse gas emission.

BioEnergy Technologies

BioEnergy Technologies is a full-service renewable biomass energy provider that is based in Sumter, SC. The company designs, builds and operates decentralized facilities at farms and processing locations where methane (biogas) is produced from agricultural waste. In January 2010, BioEnergy Technologies announced a strategic partnership with Austrian-based AAT Abwasser (ATT), a worldwide leader in biogas technologies and a member of the Schelling Group. The agreement establishes BioEnergy Technologies as the sole representative for AAT's biogas technology in 44 states in the United States.²³

BMW Landfill Gas

In 2002, the BMW facility in Greer dedicated a landfill gas (LFG) project utilizing methane from Waste Management's Palmetto Landfill to fuel four gas turbine cogeneration units (4.8 megawatt capacity) which recover 72 MMBtu/hr of hot water. The project was coordinated by BMW Manufacturing Co., LLC, Ameresco, Durr Systems, Inc., SCEO, and Waste Management, Inc. At the time, the turbines fulfilled about 25 percent of the plant's electrical needs and nearly all of its thermal needs, primarily for its paint shop. The facility features a 9.5-mile pipeline that crosses a river, two creeks, an interstate, and BMW's test track, delivering about 4,800 scfm of filtered and dehydrated landfill gas.²⁴

In June 2009, BMW announced plans to spend an additional \$12 million to replace the four original turbines with two new gas turbine generators. The more efficient turbines will produce 11 MW of electricity doubling the electrical output, and two of the original turbines will serve as back-up for the new turbines. BMW also plans to add heat recovery boilers and a new treatment system to remove siloxanes from methane, a compound common to landfill gas that can damage gas turbines. BMW has saved about \$5 million each year in energy costs through landfill gas, and with the new turbines, BMW will save about \$7 million each year. The landfill gas project will reduce CO₂ emissions by about 92,000 tons each year.²⁵

Enoree Landfill

In September 2008, the County of Greenville, along with Greenville Gas Producers, LLC, Duke Energy Carolinas, LLC, and Blanchard Machinery Company announced the completion of the Enoree Landfill Gas to Energy Green Power Project.

²³ BioEnergy Technologies. January 21, 2010. *AAT Abwasser and BioEnergy Technologies Announce Strategic Partnership*. Press Release. www.bioenergyglobal.com.

²⁴ BMW Manufacturing Co. May 5, 2006. *BMW to Operate World's First Green Paint Shop*. BMW Press Release. Associated Press, September 26, 2007. *Methane from landfill powers BMW plant*. [The State Newspaper](#).

²⁵ BMW Manufacturing Co. June 10, 2009. *BMW Manufacturing expands methane gas*. BMW Press Release.

Enoree will produce and sell carbon credits on an international market. It is believed to be the first United States-based landfill project validated under the Voluntary Carbon Standard (VCS). VCS certification of a carbon credit provides assurance that the emission reduction project has been independently verified to the global benchmark standard. It ensures that carbon offsets purchased by businesses and consumers can be trusted, having real environmental benefits.

Greenville Gas Producers, LLC has made a \$5 million investment in the project, and Duke Energy is purchasing the electricity produced by two Caterpillar® G3520 engines with a capacity of 3.2 MW.²⁶

FujiFilm Landfill Gas

Methane Credit acquired the rights to broker the gas on the behalf of Greenwood County and in 2007 announced a partnership with FujiFilm. Methane Credit, a renewable energy developer invested approximately \$2 million to install the required infrastructure at the landfill to cap, extract, purify and deliver the gas to FujiFilm over a 10 year period.²⁷ The installation also involved running a pipe approximately 2 miles along existing county road easements. In all, Methane Credit will pipe about 197 billion BTUs of methane-generated energy per year, enough to heat approximately 5,000 homes annually, and will power 40% of FujiFilm's operations. The dedication and grand opening was held in June 2009.²⁸

Kimberly-Clark Landfill Gas

The Three Rivers Solid Waste Authority (TRSWA) constructed and operates via Siemens Building Technologies a landfill gas to energy project in Aiken County. The project extracts, compresses, and conveys gas through a pipeline from the landfill to the Kimberly-Clark Beech Island Facility which manufactures diapers, bathroom and facial tissue.

Kimberly-Clark contracted with TRSWA to purchase the landfill gas over a 15-year term. Kimberly-Clark had minimum take obligations and pays for the landfill gas on a tiered pricing structure that tracks the New York Mercantile Exchange price for natural gas with built-in price controls.

The landfill gas pipeline was built over a 16 mile stretch and was designed, built, and operated by Siemens. TRSWA designed, built, and operates the extraction of landfill gas and delivers it to the Siemens gas processing facility and conveyance system downstream of the blower and flares any excess gas not needed by the industrial customer.

²⁶ Duke Energy. September 4, 2008. *Landfill Gas project turns Enoree Landfill into a Community Asset*. Duke Energy press release.

²⁷ *Fujifilm Greenwood – LFG Factsheet*.

http://www.fujifilmusa.com/shared/resource_center/resources/FujifilmLFC-FactSheet.pdf (Accessed September 3, 2010).

²⁸ FujiFilm. June 25, 2009. *FujiFilm reduces greenhouse gas emissions in U.S. with methane reclamation program*. Press release.

The project began construction in October 2007 and was finalized in April 2008. It has been operating at over 90% availability since. It generates 197,000 decatherms of gas a year and saves Kimberly-Clark approximately \$800,000 a year.²⁹

Renewable Water Resources

ReWa, formerly known as Western Carolina Regional Sewer Authority, in Greenville will spend approximately \$2 million to install co-generators at its Mauldin Road and Pelham Road wastewater treatment plants that will turn methane gas into electricity. Currently gases generated by the anaerobic digesters are being flared into the atmosphere. The project represents a great opportunity to generate energy from this waste product. ReWa received \$500,000 in funding from the SC Energy Office through stimulus funds to install the co-generators which are expected to save \$3.8 million over the course of the equipment's lifespan.³⁰ The project is expected to be completed by December 2011.

Santee Cooper Landfill Gas

In July 2008 Santee Cooper reached a key milestone in energy produced with landfill methane gas—more than 250,000 megawatt-hours had been produced through this renewable energy process. Landfill methane gas-generation is part of Santee Cooper Green, the utility's initiative to "go green," helping its customers "go green," save energy and save money. In 2008, Santee Cooper announced an aggressive goal to generate 40 percent of its energy from non-greenhouse gas emitting resources, biomass fuels, and energy efficiency and conservation by 2020.³¹

Plans are ongoing to bring additional facilities online with up to 45 MWs of generation projected in the future.³² The first Green Power generating facility was built in Horry County in 2001. Santee Cooper now operates five landfill gas-generating facilities for a total of 23.9 MW of capacity. The most recent project was installed at the Georgetown County Landfill in December 2009.³³

Santee Cooper announced in May 2010 its sixth landfill gas project will be completed at the Berkeley County Landfill in Moncks Corner. The project will produce 3 MW of electricity and will also generate carbon offsets through Blue Source, LLC, which will be used by Google's Berkeley County data center. The project is expected to be completed by fall 2010 and will bring its total generation to nearly 27 MW.³⁴

Currently Santee Cooper operates:

- Horry County Landfill Generating Station in Conway – 3.3 MW;

²⁹ Environmental Protection Agency. June 30, 2010. *Kimberly-Clark LFG Energy Project Profile*.

<http://www.epa.gov/lmop/projects-candidates/profiles/kimberly-clark.html> (Accessed September 3, 2010).

³⁰ Cary, Nathaniel. May 3, 2010. *Sewer authority installing generators to turn methane in to usable energy*. The Greenville News.

³¹ Santee Cooper. July 8, 2008. *Santee Cooper Produces More than 250,000 Megawatt-Hours with Landfill Methane Gas Generating Facilities*. Press Release.

³² Ibid.

³³ Strong, Willard. December 30, 2009. *Green Power station underway in Georgetown County*. Currently, Volume 20, Number 26. (Santee Cooper newsletter)

³⁴ Santee Cooper. May 26, 2010. *Berkeley Green Power Project to Provide Renewable Energy and Reduce Greenhouse Gas Emissions*. Press Release.

- Lee County Landfill (Allied Waste) in Bishopville - 10.9 MW;
- Richland County Landfill (aka Screaming Eagle) in Elgin - 5.5 MW;
- Anderson Regional Landfill in Belton – 3.2 MW; and
- Georgetown County Landfill in Georgetown – 1 MW.³⁵

SC Institute for Energy Studies (SCIES) Bioenergy Park

The conversion of agricultural waste and crops to electricity is one of the fastest growing renewable energy industries in Europe. In Germany, 3,500 biogas plants already are producing 1,100 MW with a projected growth to 9,500 MW by 2020. In 2008, the SCIES received a \$200,000 grant from the SC Renewable Energy Infrastructure Development Grant program to coordinate with Santee Cooper and the Connolly Swine Farm to demonstrate a prototype bioenergy park module that:

- Produces utility scale power from a combination of swine waste and energy crops;
- Forms the basis for multi-module, multi-megawatt centralized facilities throughout SC and the U.S. that can produce electricity at near market rates;
- Provides the potential for new jobs and attracts new renewable energy companies to SC;
- Provides additional revenue for SC farmers from existing waste streams and crops; and
- Improves the quality of South Carolina's air and water through the elimination of the odors and methane that are released from existing farm waste treatment facilities.

A third party, Environmental Fabrics, Inc. (EFI) based near Columbia, SC, has agreed to be the project owner/operator and Santee Cooper will provide partial construction financing and purchase the power via a Power Purchase Agreement and a lease agreement has been arranged from EFI for the use of the Connolly Swine Farm. The engine-generator is planned to be operational by spring 2011 and will be the first of its kind in the state.³⁶

³⁵ Santee Cooper online. *Landfill gas*.

http://www.santeecoopergreen.com/portal/page/portal/SanteeCooper_Green/OurCommitment/GreenPowerGeneration/LandfillGas (Accessed September 3, 2010).

³⁶ SC Energy Office Grant No. MG-08-03. Quarterly Report information from April-June 2010.



Liquid Fuels Activities

Alternative transportation fuels are seen as a means to decrease the nation's dependence on foreign oil and increase energy security through domestically produced products. Despite great in-state incentives, the renewable fuels industry has been struggling to gain foothold in South Carolina. In addition to high feedstock prices and other economic factors, in 2009, the European Union imposed a 5-year tariff on imports of U.S. biodiesel to offset the value of federal incentives.³⁷ The industry was dealt another hit on December 31, 2009 when five key federal incentives expired after multiple attempts to extend the credits in Congress. The biodiesel industry was particularly impacted with the loss of the Small Agri-biodiesel Producer Tax Credit of \$.10/gallon for producers, the Biodiesel Mixture Excise Tax Credit of \$1.00/gallon for blenders, and the Biodiesel Income Tax Credit of \$1.00/gallon for the retailer or end user.³⁸ In March 2010, the U.S. Senate passed H.R. 4213, which would reinstate the \$1/gal biodiesel tax credit through 2010.³⁹ However, to date, the U.S. House has not passed similar legislation.

For now, the market remains uncertain for renewable fuel producers but as federal renewable fuels requirements are ramped up, demand is expected to increase, making in-state incentives crucial to determining where future renewable fuel facilities will be installed. In 2009, a total of \$1,862,000 was claimed for the SC Renewable Fuels Property Tax Credit, which included ethanol and biodiesel production, dispensing and storage equipment.⁴⁰ However, in the same period only \$3,840 was claimed for the SC Ethanol or Biodiesel Production Tax Credit for a total of 12,802 gallons of biodiesel produced from waste vegetable oil⁴¹ indicating a substantial reduction in production from 2008 levels. Below is a list of documented biodiesel and ethanol companies either in operation or who have announced plans to build facilities.

Biodiesel Production

Ampa Biofuels

In June 2007, the Morning News reported this North Carolina based biodiesel company was proposing to build a biodiesel facility at Hemingway. The company would use recycled waste cooking oil, oils from cottonseed, soybeans, and other plant sources. The company would create approximately 15 new jobs.⁴² Ampa Biofuels also became a University of South Carolina-Columbia Technology Incubator company in October 2007 for its unique cavitation technique.⁴³

³⁷ Bloomberg. July 7, 2009. *EU Hits U.S. Biodiesel Makers with Five-Year Tariffs*.

<http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aMEeSlftJdR0> (Accessed on September 7, 2010).

³⁸ US Department of Energy. 2010. *Expired Federal Incentives and Laws*.

http://www.afdc.energy.gov/afdc/laws/laws_expired (Accessed on September 7, 2010).

³⁹ Renewable Energy Group. March 9, 2010. *REG applauds U.S. Senate approval of biodiesel tax credit reinstatement, retroactivity*.

<http://members.biodiesel.org/library/membernewsreleases/REG%20applauds%20Senate%20passage%20of%20biodiesel%20tax%20credit.pdf> (Accessed on September 7, 2010).

⁴⁰ South Carolina Energy Office. August 2010. *2010 ETC spreadsheet from records generated by ETC-41 form*.

⁴¹ South Carolina Energy Office. August 2010. *2010 ETC spreadsheet from records generated by ETC-40 form*.

⁴² Green, David, L. June 22, 2007. *Biofuels plant proposed for Hemingway*. *Morning News*.

⁴³ USC Incubator Company List. <http://incubator.research.sc.edu/standardcomp.shtml> (Accessed September 7, 2010).

In 2008, Ampa Biofuels was the recipient of a \$10,000 planning grant from the SC Department of Agriculture to apply for federal funding.⁴⁴

Carolina Soya, LLC/ Ecogy Biofuels, LLC

Carolina Soya, LLC is a soybean processing plant in Estill. Carolina Soya processes soybeans, extracts the crude oil and hulls, and produces soybean meal as feed ingredients in poultry rations and other animal feeds marketed throughout the Carolinas, Georgia, and Florida. The company processes one out of every three bushels of soybeans grown in South Carolina and Georgia.

Currently the facility produces approximately 15,000,000 gallons of crude soy oil a year. Carolina Soya invested \$15 million to add a soybean oil refinery in February 2007.

In late 2006, Carolina Soya had a groundbreaking and announced plans to partner with Ecogy Biofuels, LLC – a division of Knightsbridge. Ecogy built a biodiesel plant across the street with the intent to pipe oil under the road from Carolina Soya. Construction of the Ecogy Biofuels, LLC plant was completed in late 2007 with an annual capacity of between 20-30 million gallons.

Ecogy Biofuels produced fuel through the end of 2008, but stopped production in January 2009 when the European Union issued an import tariff. According to sources,⁴⁵ Ecogy has been collaborating with Greenergy International, whose USA office is based out of Rome, GA⁴⁶, to esterify used cooking oil and ship the refined feedstock to biodiesel facilities England.

Carolina Soya, LLC has been selling oil on the market primarily for food consumption since the market for virgin soy oil by biodiesel companies has diminished.

Coastal Biodiesel Group Inc.

Coastal Biodiesel Group Inc. is a company based out of Conway, SC, that collects used cooking oils and grease trap waste from restaurants to make biodiesel. Currently, Coastal Biodiesel Group has a small reactor they are currently using and making 1,000 – 2,000 gallons a month and the remaining oil is sold to other biodiesel producers. At this time Coastal is building its customer-base and will eventually build smaller satellite facilities around the state to process the oil. The company is also partnering with US Biofuels out of Georgia and exploring opportunities to utilize brown grease as a feedstock.⁴⁷

Evergreen Biodiesel

Formerly known as Carolina Biofuels, the company was sold to Evergreen Global Investments, Ltd. and then acquired by Exousia Advanced Materials, Inc. in January 2010.⁴⁸ The facility began biodiesel production in March 2006 and can produce up to 36 million gallons annually from virgin soy oil. The facility can produce ASTM/EN 14214 grade fuel to meet European

⁴⁴ SC Energy Office Grant No. PG-08-01. Project period February 2008 – February 2009.

⁴⁵ Information provided by Johnny Williamson, owner, Carolina Soya, LLC. September 7, 2010.

⁴⁶ Greenergy International. http://www.greenergy.com/Infrastructure/biofuel_sourcing_operations.html (Accessed September 7, 2010).

⁴⁷ Information provided by Mark Hepfer, owner, Coastal Biodiesel Group Inc. September 8, 2010.

⁴⁸ World Stock Wire via Comtex. July 21, 2010. *Evergreen Biodiesel*. http://investorshub.advfn.com/boards/read_msg.aspx?message_id=52704868 (Accessed September 7, 2010).

Union biodiesel specifications and is BQ-9000 accredited by the National Biodiesel Board. Exousia is based out of Sugar Land, Texas.

Green Valley Bio-Fuels

In March 2007, the former Farmers and Truckers Biodiesel announced plans to start operations in South Carolina. The company since merged with Quality Plus Services Investments.

The company invested \$9 million into the equipment and conversion of a Warrentville clay warehouse which was completed in late 2009, received its ASTM certifications, and began full-scale production in early 2010.⁴⁹ The facility is designed to handle multiple feedstocks including soy oil, peanut oil, waste vegetable oil and animal fats. Green Valley Biofuels, LLC is configured for 10 million gallons a year production but could expand to 35 million gallons a year. At the date of publication, Green Valley Biofuels is idle until the federal tax credits are reinstated.⁵⁰

Greenlight Biofuels, LLC

The Virginia based company plans to expand operations into South Carolina to build a 10 million gallon per year facility in Laurens County near the town of Clinton. The \$8.5 million facility will generate 15 jobs. Greenlight Biofuels will use vegetable oils, animal fats, and recycled restaurant grease to make the biodiesel which will be sold to local retail stations and also used for home heating oil and off-road motors.⁵¹ At the date of publication, the company has not broken ground at its Laurens County property.

Midlands Biofuels LLC

Midlands Biofuels began production in 2009 at a former tire service building in Winnsboro. The facility has a nameplate capacity of 48,000 gallons a year with the opportunity to expand. The company uses waste vegetable oil that it collects from restaurants primarily in the Midlands area and the biodiesel is ASTM certified.

Midlands Biofuels announced a partnership in August 2010 with the City of Columbia to launch the “Southern Fried Fuels” campaign to collect used cooking oil from local residents and has containers at the Public Works facility. The resulting fuel will then be sold back to Columbia to use in a trash truck.⁵²

Midlands Biofuels also received a grant from the US Department of Energy in May 2010 to install a retail fuel pump and biodiesel distribution equipment through the Clean Cities Program and a grant from the SC Research Authority in 2010 to purchase a waste grease collection truck.

⁴⁹ Emerson, LaTina. January 7, 2010. *Warrentville biodiesel plant on hold*. [Augusta Chronicle](#).

⁵⁰ Interview with Chuck Pardue, investor, Green Valley Biofuels, LLC. September 7, 2010

⁵¹ Bell, Rudolph. June 13, 2007. *Biofuel plant coming to Laurens*. [Greenville News](#).

⁵² Free Times staff. August 31, 2010. *Used Cooking Oil Will Fuel City Trash Truck*. [The Free Times](#), Issue #23.35.

Panacea Biofuels LLC

Panacea Biofuels is located in Spartanburg and began operation in March 2009. The facility can produce up to 28,000 gallons a year and uses waste vegetable oil as its primary feedstock. It contracts with local restaurants to off take the used oils. The company used McMillan-Carter Inc. to install the equipment.⁵³

Renewed World Energies

Renewed World Energies is opening a new facility in Georgetown County that will convert cultivated algae into oil. The oil will then be used for diesel fuel and jet fuel production. The facility will be served by Santee Electric Cooperative, create 60 jobs and answer some of the demand for renewable fuels. The facility is expected to cost \$29.3 million to complete and should be fully operational by the end of 2010.⁵⁴

Southeast BioDiesel

In May 2007, Southeast BioDiesel began commercially selling biodiesel made from refined poultry fat in North Charleston. At that time Southeast Biodiesel produced approximately 6 million gallons a year primarily from chicken fats and oils and sold the fuel to a variety of users, including area school buses, OM Biofuels, and local shrimpers and fisherman. The plant cost approximately \$5 million and employed about 10 workers. It produced approximately 10,000 gallons of fuel every eight hours, operating with 2 to 3 shifts.⁵⁵

In January 2009, Southeast Biodiesel stopped biodiesel production due to the high cost of poultry fat and remained idle until early September 2010 when it performed a test run. Southeast Biodiesel will be retrofitting the facility to utilize brown grease. The company plans to begin production again at the end of 2010 and will be producing at approximately 5 million gallons a year.⁵⁶

Ethanol Production

Clemson University Cellulosic Bioethanol Pilot Plant

Clemson University, SC State University, Savannah River National Laboratory, Spinx Corporation, and Fagan Engineering Inc. are members of the BioEnergy Collaborative, which is a research team investigating commercial bioethanol production using feedstocks in South Carolina. The BioEnergy Collaborative will develop new technologies in order to address gaps in the production process and produce ethanol from SC feedstocks at a competitive price. The collaborative will also lead to successful SC commercialization. A bioethanol pilot plant, proposed for Clemson University's Restoration Institute in North Charleston, will allow flexibility in testing new unit operations, the ability to scale-up new technologies developed on the bench scale, and the capability to handle multiple feedstocks.⁵⁷ The process design and

⁵³ South Carolina Energy Office. August 2010. *2010 ETC spreadsheet from records generated by ETC-41 form.*

⁵⁴ South Carolina Department of Commerce. March 20, 2009. *Renewed World Energies Announces New Facility in Georgetown County.* Press Release.

⁵⁵ Hull, Peter. October 27, 2006. *Grease is the word, for now: Company at former Navy base will cook up biodiesel from old frying oil.* *Post and Courier.*

⁵⁶ Information provided by Jim Thompson, co-owner, SE Biodiesel. Interview on September 7, 2010.

⁵⁷ Clemson University. *Cellulosic Bioethanol Pilot Plant Fact Sheet.* www.clemson.edu

process instrument diagrams have been developed. The facility will be compatible with sweet sorghum and switchgrass. As of September 2010, the BioEnergy Collaborative was pursuing funding to build the facility.⁵⁸

East Coast Ethanol

The boards of Atlantic Ethanol, LLC, Mid-Atlantic Ethanol, LLC, Florida Ethanol, LLC and Palmetto Agri-Fuels, LLC, announced in September 2007 that their members recently approved a merger and consolidation of the four companies to form East Coast Ethanol, LLC. East Coast Ethanol, LLC is pursuing the financing, construction, and operation of the four new 110 MGY ethanol production facilities being developed in the Southeast, including a plant in Chester County on a 319-acre property. Fagan Engineering, Inc. will design and build all four of the planned ethanol production facilities. The facilities will utilize biomass energy for the energy plant instead of using natural gas. Each facility will cost approximately \$200 million and create hundreds of new jobs.⁵⁹

Osage Bio Energy

The South Carolina Department of Commerce and Union County Economic Development Board announced in July 2008 that Osage Bio Energy (OBE) planned to locate an ethanol production facility in eastern Union County. The \$161.5 million investment is expected to bring 75 new jobs. OBE will build a barley-based ethanol production facility under the corporate designation Congaree Bio Energy, LLC, and will partner with Carlisle Finishing in Carlisle, SC, to seek operating efficiencies and infrastructure optimization opportunities.

The ethanol will primarily be produced from regionally grown barley and will be an advanced biofuel, as defined by the Renewable Fuel Standard (RFS). Currently, in the Mid-Atlantic and Southeast nearly five million acres per year remain unproductive in winter months. Barley is a winter crop that will be grown for the production of ethanol requiring minimal fertilization. The co-product of barley-based ethanol, a protein meal, is a superior feed supplement for local cattle, poultry, and swine.

Osage Bio Energy is headquartered in Glen Allen, VA, and was founded in January 2007 to pursue the development of the United States' first major barley-to-ethanol production facilities. Osage Bio Energy is the sister company of OSAGE Inc., in Roanoke, VA, the largest independent distributor of motor-fuel-grade ethanol in the Southeast, with current throughput of over 100 million gallons per year.⁶⁰

State of South Carolina Use of Biodiesel 5% Blend Requirement

As of January 1, 2008 all diesel pumps controlled by the state are now required to utilize at least 5% biodiesel blends in the tanks. Many tanks also contain B20 to meet federal regulations. In

⁵⁸ Information provided by Karl Kelly, Director of Corporate Operations, Clemson University. Interview on September 8, 2010.

⁵⁹ East Coast Ethanol, LLC. <http://www.eastcoastethanol.us/v2/company/?pageId=1> (Accessed September 8, 2010).

⁶⁰ SC Department of Commerce. July 8, 2008. *Osage Bio Energy Announces New Ethanol Facility in Union County*. Press Release. <http://sccommerce.com/resources/press-releases-announcements/osage-bio-energy-announces-new-ethanol-facility-union-county> (Accessed September 8, 2010).

2008, the State also passed a goal for all state-owned school buses to use B20. In FY 2009, the state used over 212,000 gallons of B100 as a result of this requirement. However, in order to reduce impact of budget cuts in FY 2010 and FY 2011, the SC General Assembly allowed the Department of Education to choose the least expensive fuel and they are not required to use B5.

Palmetto State Clean Fuels Coalition US Department of Energy Clean Cities Designation

In order to have a sustained effort to promote alternative transportation fuels, the SCEO led the way in organizing the Palmetto State Clean Fuels Coalition (PSCFC), a voluntary partnership of stakeholders working together to reduce energy used for transportation and reduce the impacts of transportation on the quality of life and the environment of South Carolina. The PSCFC received its official designation as a US Department of Energy Clean Cities program in January 2004. There are currently over 60 stakeholders who have committed to expanding the use of alternatives to gasoline and diesel fuel and are promoting alternative fuels in the state.

Publicly-accessible alternative fuel infrastructure

SCEO, in partnership with the PSCFC, has aggressively marketed ethanol and biodiesel in the state. Successes in promoting ethanol infrastructure through education, outreach, and funding opportunities have allowed South Carolina to have the highest concentration of biofuel pumps. As of September 2010 there are a total of 79 publicly-accessible E85 pumps and 7 publicly-accessible B20 pumps.⁶¹

Between January 2009 and December 2009, the SC Department of Revenue reported that approximately 194 million gallons of ethanol (E100) and 209,000 gallons of biodiesel (B100) were sold in South Carolina – the largest quantity by far since alternative fuel tracking began in 2000 and representing 7.7 percent of the motor fuels sold in the state during that timeframe.⁶²

Private alternative fuel infrastructure – E85 and CNG

In addition to publicly accessible refueling stations that both consumers and the government can use, a number of governmental entities have E85 and B20 infrastructure for restricted use by local, state, and federal government entities. The first E85 station came about as a result of the partnership between DHEC, the South Carolina Energy Office, and the PSCFC, as DHEC constructed the first ethanol refueling station in Columbia in 2001. This station, located at the DHEC refueling facility at 2600 Bull Street, allows state and local government fleets to refuel at the site. DHEC currently averages sale of about 30,000 E85 gallons a year at this site. The PSCFC was also involved in the installation of a compressed natural gas (CNG) station built on Flora Street in Columbia and serviced by SC Electric & Gas. The pump is publicly-accessible and primarily utilized by State Fleet vehicles and the Columbia Metropolitan Regional Transit Authority.

Between July 2005 and June 2009 the State of South Carolina used approximately 151,216 gallons of E85, 291,000 gallons of B100, and 3,500 gallons of compressed natural gas.⁶³

⁶¹ An updated list of publicly-accessible and private pumps is available through the US Department of Energy Alternative Fuels Data Center at <http://www.afdc.energy.gov/afdc/locator/stations/>.

⁶² SC Department of Revenue, L-307 Reports, January 2009 – December 2009.

⁶³ Information provided by the South Carolina State Fleet Office for FY06 through FY09.



Biomass Legislation and Organizations

State Legislation

2008 Biomass Energy Legislation

Act No. 261 of 2008, also known as H.3649, the Energy Freedom and Rural Development Act, generated by the recommendations of the SC Biomass Council and the Strategic and Tactical Research on Energy Independence Commission, passed out of the SC General Assembly in June 2008 with improvements to 2007 legislation. Some of the highlights of the legislation include:

- Incentive payments beginning in 2009 for retailers of alternative fuel such as biodiesel and E85 ethanol ranging from \$0.05 to \$0.25 per gallon;
- Incentive payments beginning in 2008 for biomass energy users ranging from \$0.01 per kwh or \$0.30 per therm;
- Income tax credit of up to \$2,000 for plug-in hybrid vehicles purchases;
- Income tax credits of up to \$100,000 for research and development of renewable fuel feedstocks best suited for South Carolina, such as cellulosic ethanol and algae-based biodiesel;
- Creates an additional \$0.10 per gallon tax credit for non-soy and non-corn based biofuels to make South Carolina specific feedstocks more competitive;
- Income tax credit worth up to 25 percent of the cost of the equipment and installation for the construction of a building and equipment used in the intermediate steps of renewable fuel production such as milling, crushing, distillation, and handling of feedstocks; and an
- Income tax credit worth up to 25 percent for the purchase and installation of biomass energy equipment used to create power from a biomass resource including wood and wood waste, agricultural and animal waste, sewage, landfill gas, and other organic materials.

Other relevant acts in the 2008 session include:

- Act No. 203 which required the State of South Carolina to give purchasing preferences to hybrid, plug-in hybrid, biodiesel, hydrogen fuel cell and flex-fuel vehicles when the performance, quality and life cycle costs are comparable to other available motor vehicles.

South Carolina Biomass Energy Potential in South Carolina: A Conspectus of Relevant Information

The SCEO completed an inventory of existing publications, studies and reports relating to the actual or potential use of biomass energy in South Carolina. Over the years, a number of studies have been conducted covering some, but not all, of the information relevant to actual and potential use of various feedstock sources in South Carolina and the Southeast, and barriers found when initially converting to a biomass feedstock resource. *Biomass Energy Potential in South Carolina: A Conspectus of Relevant Information* identifies:

- Existing information useful for developing and implementing biomass energy projects in South Carolina; and
- Information gaps in the knowledge base for developing and implementing biomass energy projects in South Carolina.

The study indicates South Carolina has sufficient information regarding the availability of woody biomass for direct combustion, landfill gas, as well as, soybeans, corn and other agricultural products that can be used to produce ethanol and biodiesel.

South Carolina Climate, Energy & Commerce Advisory Committee

In 2007, Governor Sanford issued Executive Order 2007-04, establishing the South Carolina Climate, Energy & Commerce Advisory Committee (CECAC), because of the recognition of potential implications of global climate change on the economy, environment, and quality of life in South Carolina.

The Committee was composed of members representing a broad range of stakeholders including: industry, environmental groups, government agencies, academic institutions, agriculture, forestry, coastal interests, real estate, tourism, banking, insurance, and other sectors. The non-profit Center for Climate Strategies (www.climatestrategies.us) facilitated the meetings and provided technical support. Additionally, there were five other working groups to provide additional input.

The technical working groups (TWGs) included the Agriculture, Forestry, and Waste Technical Working Group and the Transportation and Land Use Planning Technical Working Group which represented the interests of biomass energy and alternative fuels. For more information, go to www.scclimatechange.us. The final CECEC report was approved and released by Governor Sanford in August 2008.

South Carolina Biomass Council

The South Carolina Biomass Council is another project of the SCEO, bringing together stakeholders interested in achieving significant market penetration of biomass-to-energy technologies. The Biomass Council used committees and working groups to develop and advocate a plan to increase the use of biomass energy in South Carolina.

Each committee and working group analyzed feedstock availability, current energy production and use, economics of energy production from the feedstocks, and environmental costs and benefits, and then determined the barriers to production and use, which culminated in the group's final recommendations. Many of those recommendations have since been incorporated into the aforementioned Energy Freedom and Rural Development Act.

The Council remains active and membership dues for the Council range from \$25 for regular members to \$250 for corporate members. The Council holds quarterly meetings at the Clemson Extension Sandhills Research and Education Center in Columbia. To learn more about the SC Biomass Council or to become a member, please visit www.scbiomass.org.

Strategic and Tactical Research on Energy Independence Commission (STREIC)

The Strategic and Tactical Research on Energy Independence Commission (STREIC), a panel created by state energy legislation in 2006, released its final report in January 2007 to the South Carolina General Assembly. The commission developed recommendations to foster alternative fuel development in South Carolina to help the state become less dependent on imported oil.

The final report titled, *South Carolina's Strategic Energy Roadmap: Breaking the Dependence on Oil and Fueling the Future through Economic Development*, was authored by commission members: Dr. Nicholas C. Rigas, Chair Director, of the South Carolina Institute for Energy Studies; Hugh Weathers, Co-Chair Commissioner, of the South Carolina Department of Agriculture; Ken Driggers, Executive Director, of the Palmetto Conservation Foundation; Neil McLean, Executive Director, of EngenuitySC; E. LeRoy Nettles, Jr., President and CEO, of Pee Dee Electric Cooperative, Inc.; Stewart Spinks, CEO, of the Spinx Company, Inc.; and Johnny Williamson, Managing Partner, of Carolina Soya, LLC.

A copy of the full report can be found on the SC Energy Office website at www.energy.sc.gov.

Biomass Energy Utilization in South Carolina

The SCEO has completed a project titled, *Biomass Energy Utilization in South Carolina – Filling the Information Gaps*, which provided additional research needed to maximize South Carolina's biomass energy potential. The important missing information included data on sewage treatment plants, poultry manure, and yellow grease from food preparation. Additionally, a biomass economic assessment report provided an analysis of potential economic and environmental benefits of biomass energy utilization in South Carolina, therefore giving private and public decision-makers the rationale and motivation needed to make biomass-friendly policy and investments.

The following studies resulted from the project:

- Bioenergy from Municipal Sludge Report – Determined the amount and locations of potentially recoverable useful energy from sewage treatment facilities in South Carolina, along with an analysis of economics and barriers of recovering and utilizing such energy.
- Poultry Manure as Bio-Fuel Feedstock – Determined the amount and locations of potentially recoverable useful energy from manure and litter at chicken and turkey operations in South Carolina, along with an analysis of the economics of and barriers to recovering and utilizing such energy.
- An Assessment of Restaurant Oil and Grease Rendering in South Carolina – Determined the amount and locations of potentially recoverable useful energy from yellow grease produced in food service operations in South Carolina, along with an analysis of the economics of and barriers to recovering and utilizing such energy. Updated in 2010.

To read the full reports, please visit the SC Energy Office website at www.energy.sc.gov.

Biomass Inventories

The SCEO has developed a web-based inventory relevant to biomass energy. The inventory is of all known users of biomass energy in the state. According to these inventories, 28 industrial operations in South Carolina are annually using about 5.5 million tons of woody biomass for energy purposes. The inventory can be viewed by going to www.energy.sc.gov.

National Legislation

Climate Change Legislation



At the federal level, there have been varying pieces of legislation to create a cap-and-trade program and corresponding energy policies. Switching to a lower-impact economy would entail upfront costs, but those costs could be much lower than the long-term costs of climate change. Such long-term costs include but are not limited to damages caused by drought, sea level rise, wildfire and disease. Also, money gained from pollution credit auctions could be used to mitigate energy costs. In terms of biomass in South Carolina, the agricultural and forestry industries could benefit financially from the generation of carbon offsets.

Renewable Electricity Standard and Energy Efficiency Resource Standard

A renewable electricity standard (RES) and an energy efficiency standard (EERS) have been proposed as a means to create jobs and reduce our dependence on carbon-intensive energy. The biomass industry would benefit from a renewable electricity standard, as an RES would encourage the growth of carbon-neutral renewable energy meaning new jobs in South Carolina.



Conclusion and Contact Information

The SC Energy Office of the State Budget and Control Board continues to promote the production and use of biomass and strives to monitor biomass activity in our state. For continued updates of these activities and more, please visit our website at www.energy.sc.gov and go to the Renewable Energy section. Please help the SCEO keep this document up-to-date. If you have any suggestions or updates to our list of biomass activities in South Carolina, please contact:

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