



Bioenergy in the Southeast: Current and Past Policies Driving Markets

INTRODUCTION. Research and development on alternative sources of energy has been a priority for the United States since volatile energy prices in the 1970's. This period of time, known as the "Energy Crisis," occurred due to an oil embargo and limited global supply of oil. To combat these problems, Congress passed the Emergency Petroleum Act in 1973, the Energy Policy and Conservation Act in 1975, and created the Department of Energy in 1977. These congressional acts from more than 30 years ago were the beginnings of a national interest towards developing alternative energy sources. The outcome has been support for research and development of non-fossil fuel energy sources such as biomass, which is a renewable and carbon neutral source of energy used for heat, electricity and transportation fuels.

Utilizing biomass provides significant benefits for reducing atmospheric carbon, by offsetting greenhouse gas emissions from fossil fuel combustion as carbon emitted from bioenergy is re-absorbed by growing trees and plants. **Greenhouse gas** (GHG) emissions are gases such as carbon dioxide, methane and water vapor that absorb radiant energy from the earth, trapping it as infrared radiation, which contributes to the warming of the earth. A sustainable bioenergy industry would absorb some atmospheric carbon through carbon sequestration (long-term storage of carbon) in the terrestrial biosphere or underground while biomass feedstocks were growing. The bioenergy industry also creates local economies and it has been shown that biofuel refineries that produce ethanol in the Midwest generate state tax revenue where the majority of every dollar spent on production stays within that

state or region. The emergence of bioenergy facilities either for power or fuel creates new market opportunities for items once considered a waste such as logging or agricultural residues.

State, federal and international policies significantly influence development of the biofuels industry. Different policies such as tax incentives, subsidies, renewable fuel standards, and energy mandates have an impact on how bioenergy will compete in the marketplace. Additionally, federal policies influence the research

BIOENERGY is a term used to describe the energy produced from biomass that will be used to produce electricity or heat or transportation fuels.

BIOMASS can be defined as any organic matter including forest and mill residues, agricultural crops and wastes, wood and wood wastes, animal wastes, livestock operation residues, aquatic plants, and municipal and industrial wastes.

FEEDSTOCK is simply a raw material used for the generation of energy or products.

BIOFUELS refer to fuel derived from biomass or their processing and conversion derivatives that are used within the transportation sector and are either in a liquid, solid, or gaseous state.



FIRST GENERATION BIOFUELS

- corn feedstocks derived to produce ethanol
- consumed as E10 in the US, 10% ethanol / 90% gasoline blend
- soybean feedstocks used to produce biodiesel
- blend of up to 5% biodiesel in diesel fuel



SECOND GENERATION BIOFUELS OR ADVANCED BIOFUELS

- cellulosic feedstocks (crops that don't produce food)
- examples: sorghum, switchgrass, miscanthus, wood
- research underway to produce cost competitive 2nd generation biofuels

dollars which may go towards supporting the bioenergy industry. Therefore, in order to better understand the bioenergy industry, it is necessary to understand the policies which influence it. The following is a synopsis of federal, state and foreign policies that may influence biomass and bioenergy production. The reader is encouraged to review these policies to ensure they are still the most current.

Federal Policy

CARBON POLLUTION EMISSION GUIDELINES FOR EXISTING STATIONARY SOURCES: ELECTRICITY GENERATING UNITS "CLEAN POWER PLAN" Under the authority of the Clean Air

Act (Section 111d) the Environmental Protection Agency (EPA) on June 2, 2014, announced a rule, known as the Clean Power Plan, to regulate greenhouse gas emissions from existing fossil fuel fired electricity facilities. The plan calls for a 32% reduction of carbon dioxide levels by 2030, based on 2005 carbon dioxide levels. It is expected that renewable power sources will be widely used to reach these emission reductions. Converting coal power plants to burn 100% biomass or a percentage of biomass with coal, also known as cofiring, has been studied since the 1990s. That was when utility companies began looking for options that require little capital investment for aging coal plants and when the first demonstration projects were being implemented across the United States.

1970's Energy Crisis Policy Impacts

EMERGENCY PETROLEUM ACT [1973]

This Act provided temporary authority for the president to allocate fossil fuel resources in the event of an existing or imminent fuel shortage or interruption within the distribution system in order to protect the public health, safety, and welfare of citizens. This act also lead the way for other energy policies.

ENERGY POLICY & CONSERVATION ACT [1975]

This comprehensive act most notably created energy conservation programs, mandated fuel efficiency standards for the transportation sector, and authorized the creation of a strategic petroleum reserve.

UNITED STATES DEPARTMENT OF ENERGY [1977]

Congress created this department which brought together most energy-related programs scattered across the Federal government as well as the Federal Energy Administration, the Energy Research Development Administration, and others.

RENEWABLE FUEL STANDARD [RFS1 & RFS2] The **Renewable Fuel Standard**¹ (RFS1) policy, under the **Energy Policy Act** (EPAct) in 2005, was adopted to facilitate domestic fuel production from renewable feedstocks to improve energy security, create rural jobs, and reduce greenhouse gas emissions. The RFS1 required that a minimum of 4 billion gallons of renewable fuels be used in 2006, rising to 7.5 billion gallons in 2012². The RFS1 focused on conventional feedstocks such as corn-based ethanol and soybean-derived biodiesel and emphasized developing a cellulosic-based fuel industry through the assistance of research on feedstock development, logistics, and project development. Two years later, the Energy Independence and Security Act (EISA 2007) was passed and the Renewable Fuel Standard was altered to focus more on second generation or **advanced biofuels** and a 15 billion-gallon cap was placed on conventional (corn derived) ethanol. The revised Renewable Fuel Standard commonly referred to as the “RFS2” requires that annual renewable fuel volume targets steadily increase to an overall level of 36 billion gallons by 2022 with at least 16 billion gallons being derived from cellulosic biofuels and no less than 1 billion gallons from biomass based diesel.

The Renewable Fuel Standard, 36 Billion Gallons (BG) by 2022

1. Conventional Fuels = 15 BG

20%+ Lifecycle GHG reduction
Example: corn based ethanol

2. Advanced Biofuels = 21 BG

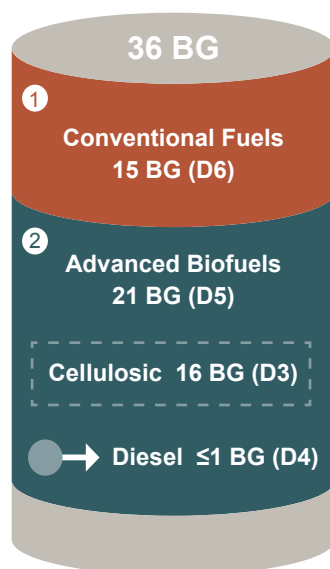
50%+ Lifecycle GHG reduction
EPA approved feedstocks such as sugarcane ethanol, grain sorghum, and algae

- Cellulosic = 16BG

60%+ Lifecycle GHG reduction
Examples: lignocellulose feedstocks such as switchgrass, miscanthus, woody biomass, and corn stover

- Biomass Based Diesel >= 1 BG

50%+ Lifecycle GHG reduction
Examples: camelina, biogenic waste/oils/fats/greases and oil from annual cover crops



*Miscanthus, sorghum, and switchgrass are examples of feedstocks that are commonly used to produce **SECOND GENERATION OR ADVANCED BIOFUELS** because they are grown specifically for their fuel value. **WOODY BIOMASS** is a term used to describe trees and woody plants, including limbs, tops, needles, leaves, and other woody parts, grown in a forest, woodland, or rangeland environment that are the byproducts of proper forest management. When trees are specifically grown for fuel value they are referred to as **SHORT ROTATION WOODY CROPS**. These are examples of second generation or advanced biofuels feedstocks.*

The Environmental Protection Agency (EPA) calculates the percentage-based standard for the approaching year for cellulosic biofuel, biomass based diesel, and advanced biofuel. The RFS2 requires advanced biofuels to be derived from sustainable feedstocks such as sorghum, switchgrass, and woody biomass. Biofuel facilities using feedstocks that meet EPA's approved lifecycle greenhouse gas (GHG) profiles are required to receive an approved *renewable fuel pathway before fuel production can take place*³. After receiving approval the EPA assigns a category based on the feedstock(s) used to produce the fuel. Cellulosic advanced biofuels are classified as D3, advanced biomass based diesel biofuels are classified as D4, advanced biofuels which include D3 and D4 are classified as D5, and conventional biofuels are classified as D6.

A **lifecycle GHG analysis** determines the total amount of greenhouse gas emissions related to the full lifecycle of the feedstock from the field to the final fuel component or sometimes referred to as “from the cradle to grave.” An approved renewable fuel pathway identifies the feedstock, the technology used to convert the renewable biomass into fuel, and the fuel type, and category. Fuel type examples include ethanol, biodiesel, cellulosic diesel and compressed natural gas and electricity from renewable biomass.

¹<http://www.epa.gov/otaq/fuels/renewablefuels/index.htm>

²The corn ethanol industry well exceeded the 2012 final benchmark by producing 13.9 billion gallons of ethanol in 2011.

³<http://www.epa.gov/otaq/fuels/renewablefuels/new-pathways/approved-pathways.htm>



Farm Bill Energy Title Programs

BIOMASS CROP ASSISTANCE PROGRAM (BCAP)

Incentives to help owners and operators of agriculture and non-industrial private forestland grow advanced bioenergy feedstocks for energy production.

BIOMASS RESEARCH & DEVELOPMENT INITIATIVE (BRDI)

A partnership between the DOE and USDA to fund projects that focus on feedstock development, biofuels and biobased products development, and biofuels and biobased products development analysis.

BIOREFINERY ASSISTANCE PROGRAM

Loan guarantees awarded for the development and construction or the retrofitting of a commercial-scale biorefinery using applicable technology to produce biofuels or biobased products.

RURAL ENERGY FOR AMERICA PROGRAM (REAP)

Loans and grants are provided to farmers and rural businesses to promote renewable energy development and energy efficiency.

BIOPREFERRED PROGRAM

Program to promote the purchase of biobased products from federal government purchasing agents and to provide a voluntary labeling initiative so consumers are able to identify products that meet the requirements of this program.

FARM BILL. The first Farm Bill, the Agricultural Adjustment Act of 1933, originated during the Great Depression and has undergone many changes throughout the decades. The bill originally provided farm aid to help our nation's farmers address issues such as soil erosion, super-low level commodity prices, national hunger, inequitable export practices, lack of credit, and other issues in order to control and ensure an adequate food and fiber supply. Later, a more permanent farm bill known as the Agricultural Adjustment Act of 1938, was passed with a built-in requirement to update it every five years. This requirement has allowed for the farm bill to address current agricultural interests and other programs such as disaster assistance programs, trade and foreign agriculture, rural development, research, conservation, renewable energy & energy efficiency, forestry, nutrition, commodity futures, and trade & taxes. Over the years, other programs have been added or removed, depending on the congress in session.

The first farm bill to address renewable energy and energy efficiency was the Food, Conservation, and Energy Act of 2008. This farm bill aimed to strengthen and develop a viable bioenergy industry. Programs created for this purpose under the 2008 farm bill included the Biomass Crop Assistance Program⁴ (BCAP), Biomass Research & Development Initiative⁵ (BRDI), Biorefinery Assistance Program⁶, and the Rural Energy for America Program⁷ (REAP). The 2014 farm bill known as the Agricultural Act has set its priorities on reforming agricultural policy, reducing the deficit, and growing the economy. This new bill reauthorized the energy programs from the 2008 Farm Bill, expanded the Biorefinery

⁴Provides payments to producers that establish energy crops on marginal lands near biomass energy conversion facilities.

⁵Provides competitive grants for research and development and pilot projects that help the biofuels industry reach the commercialization stage.

⁶Provides loan guarantees to develop new or retrofitted advanced biorefineries

⁷A program to create local biomass energy markets and supply chains to provide heat and power for rural business, agricultural producers, and communities. Other programs include: Community Wood Energy Program and Forest for Biomass Energy Program.

NC RENEWABLE ENERGY PORTFOLIO STANDARD & STRATEGIC PLAN FOR LEADERSHIP *In an effort to promote more renewable energy generation, the North Carolina General Assembly adopted Session Law 2007-397 (Senate Bill 3¹¹), known as the Renewable Energy & Energy Efficiency Portfolio Standard (REPS). The REPS requires that 12.5% of North Carolina electric retail sales from investor owned utilities by 2021 and beyond be acquired from renewable energy sources or energy efficiency measures. Rural electric cooperatives and municipal suppliers are subject to a 10% REPS requirement.*

Assistance Program to include biobased products and renewable chemicals. The 2014 Farm Bill also expanded the original BioPreferred Program (Farm Bill 2002) to include forestry products.

State Policies

As of this time North Carolina⁸ is the only southeastern state to have a renewable energy portfolio standard that requires utility companies to have a percentage of their energy portfolio come from renewable energy. Renewable energy incentives and policies vary from state to state but most states offer sales tax incentives, corporate tax credits, rebates and loan programs, and other incentives focused on specific renewables or efficiency measures. The Database of State Incentives for Renewables & Efficiency (DSIRE) allows the user to search for state specific incentives for the entire United States.

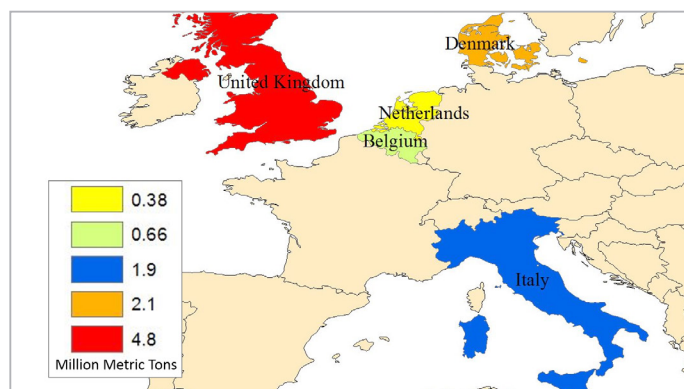
Foreign Policies

20/20/20. Foreign interest in woody biomass feedstocks from Europe is a result of the European Union's (EU) commitment to reach greenhouse gases (GHG) reduction goals outlined in the Kyoto Protocol⁹. The only foreign policy that has had an influence on developing bioenergy export markets in the southeastern United States is the "20/20/20" goal that is part of the European Union (EU) Energy and Climate Change Package (CCP). The EU's '20-20-20' strategy adopted in 2007 requires a 20% reduction in GHG

emissions by replacing 20% of fossil fuels with renewables and 20% energy efficiency improvement for European union countries by 2020.

European Union countries such as England, Denmark, Belgium, and Italy are importing wood pellets from North America, the Baltic States¹⁰, and Russia to use for industrial and residential heating to offset greenhouse gas emissions. The amount imported by member states of the EU is expected to increase significantly. There is also an increasing demand from Asian countries that will have an impact on the global trade of pellets.

European Union countries that imported pellets from North America, the Baltic States, and Russia in 2014



CONCLUSION. Federal, State, and Foreign policies will continue to drive research and create new technologies that utilize biomass feedstocks. As history has shown over the past fifty years a global energy market will continue to be subject to price volatility, production shortages, regional instability, and other uncertainties that will impact our energy needs. Diversifying our energy mix allows for innovation, efficiencies, and stability. A sustainable bioenergy industry creates rural jobs, reduces greenhouse gas emissions, enables energy security and creates new markets for products that were once considered a waste.

⁸NC General Assembly: <http://www.ncga.state.nc.us/gascripts/billlookup/billlookup.pl?Session=2007&BillID=S3>

⁹An agreement that was reached at the United Nations Conference on Climate Change in Kyoto, Japan, in 1997.

¹⁰Estonia, Latvia, and Lithuania. Northern European countries located on the eastern coast of the Baltic Sea

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