

ON THE COVER

# NC Biofuels: In the Beginning

"It's not a fuel of the future. Biodiesel is here now, and it's going to stay."

– Leif Forer, founder Piedmont Biofuels and president NC Biodiesel Association

**In the beginning**, there were a handful of determined individuals who, instead of talking about energy independence and environmental friendliness, decided to do something about it. They started biofuels companies. Today, their companies are supported by a strategic plan, a center, an association and ongoing research. Altogether, these elements mark the beginning of North Carolina's biofuels industry.

## BIODIESEL

Piedmont Biofuels led the way. In 2002, a few friends experimented with biodiesel production at Central Carolina Community College in Pittsboro. Over six years, Piedmont's evolved from a cooperative to a full-fledged business producing, after a recent expansion, 1,000 to 1,500 gallons a week at their coop and another 150,000 gallons a month or approximately 1.8 million gallons a year at their commercial plant.

The coop, which has 580 members, a board of directors, three fulltime staff and two paid interns, collects used vegetable oil from 70 sites in the Triangle and manages five distribution points. They work with a coop in Durham and one in Burlington to manage four other distribution points. They sell their biodiesel for \$5 a gallon, which is nearly double the retail price of petroleum diesel.

"The truth is we can't make enough. We're backed up on production. Every gallon is sold the second we make it," said Matt Rudolf, former executive director of Piedmont Biofuels. Rudolph is now the director of the Americas office of The Roundtable on Sustainable Biofuels, a Swiss organization working on global standards for the sustainability of biofuels.



Piedmont's commercial site is six miles away from the coop. It took a \$2.5 million investment cobbled together from family, friends and grants to refurbish an abandoned metal alloy plant for biodiesel production. Two dozen employees manage the operation that converts a variety of fats and oils into biodiesel and valuable co-products. The primary feedstock is waste from the local poultry industry. Most of Piedmont's current production is sold to a distributor that resells to the European market. Piedmont gets a premium over the price of diesel fuel from the arrangement. Through a loan from the Biofuels Center of North Carolina, they also refine and sell glycerin and fatty acids, by-products of biodiesel production.

"It's not a fuel of the future," said Leif Forer, one of Piedmont's founders and president of the NC Biodiesel Association. "Biodiesel is here now, and it's going to stay. Biodiesel is a drop-in replacement for diesel fuel. You transport it in the same tankers, dispense it from the same gas stations and use it in the same vehicles without modification. We can grow it, make it and use it right here."

Piedmont's diversified its revenue to reflect a philosophy of local fuel and local food. The coop rents an acre of land to Edible Earthscapes, an organic food producer. Piedmont BioFarm rents 3.5 acres at the commercial site. Piedmont's eco-industrial park is home to Eastern Carolina Organics, the Green Bean Counter, Screech Owl Greenhouse and the Abundance Foundation.

Blue Ridge Biofuels in Asheville opened in 2005. They use reclaimed vegetable oil as their feedstock to produce 1.3 million gallons a year of biodiesel. Depending on the blend, they sell wholesale at \$3 a gallon. They collect waste vegetable oil from 200 sites in Western North Carolina, an increase from 120 a year ago. Once collected, the oil is processed and then distributed to 10 public fueling stations and several fleet customers where they fill onsite tanks for businesses from landscapers to the Biltmore Estate. Their home heating division serves over one hundred customers.

"The Asheville area has a strong, progressive mindset of environmentally conscious people," said Scott Barnwell, general manager of Blue Ridge Biofuels. "Biodiesel cuts

both ways. People, for reasons of patriotism and national security, want a local fuel source instead of importing from the Middle East. A lot of people are willing to pay a little bit more for a product they know is cleaner and locally made.”



**Piedmont Biofuels' commercial biodiesel processing facility in Pittsboro.**

Randy Dellinger opened Foothills Bio-Energies in Lenoir in 2006 after renovating a chemical plant that made adhesives and resins for the wood and furniture industries. He uses vegetable oil and poultry fat for his feedstock to produce approximately one million gallons of biodiesel a year. He sells his biodiesel to distributors who sell to markets within a 100-mile radius of Caldwell County. Some fuel is sold in upstate South Carolina where Dellinger's business partner owns a fuel distribution company.

“The energy balance for biodiesel is far and away much better than other transportation fuels and almost equal to petroleum diesel in terms of BTU content,” Dellinger said. “There's significant air emissions improvement not to mention the benefit to local agriculture and energy independence. We're keeping dollars in local economies. It's one fuel that works on all of these levels.”

The same benefits attracted Tommy Evans, who opened Evans Environmental Energies in 2006. He produces one million gallons a year from his plant in Wilson. He is currently expanding his capacity to four million gallons with plans to increase to six. He sells to distributors who in turn distribute his fuel throughout North Carolina and into Virginia.

“I feel like we need other alternatives to petroleum,” he said. “Biodiesel has environmental

## BIOFUELS BACKGROUNDER FROM THE BIOFUELS CENTER OF NC

**Biofuels** are any transportation or liquid fuel made from biomass or organic plant material that has chemical energy which can be converted into fuel. Different types of biofuels are bioethanol, cellulosic ethanol, biobutanol, methanol and biodiesel.

**Biodiesel** is a clean burning alternative fuel produced from fat or oil through a refinery process called transesterification. Biodiesel is mostly made from seeds that contain oil like soybeans, canola (rapeseed), palm, jatropha and algae.

**Bioethanol** is also known as ethyl alcohol or grain alcohol and is the most commercially successful biofuel in the U.S. Most of the bioethanol produced in the U.S. is made from the starch in corn kernels with two to five percent gasoline added. Ethanol can also be made from gasification of carbon materials, which is a chemical process.

**Cellulosic ethanol** is produced from the fiber contained in leaves, stems and stalks, plant material not used for food. Cellulosic ethanol contains more energy at potentially less cost than corn ethanol once the process for manufacturing it is improved.

## BIOFUELS ADVANTAGES

### ECONOMIC

Studies estimate that producing enough ethanol to replace 25 percent of current gasoline use would add about \$200 billion to the economy and create one million new jobs.

### AGRICULTURAL

The U.S. could replace one-third of its oil supply with biofuels and still have enough food to meet continuing demand within the country. The future of biofuels relies on feedstocks that are not food sources. For example, switchgrass has more energy potential than corn.

### ENVIRONMENTAL

Compared to gasoline, ethanol reduces global warming emissions by 20 percent, cellulosic ethanol by 85 percent and biodiesel by 40 percent.



For more information visit:

[biofuelscenter.org](http://www.biofuelscenter.org)

advantages as a renewable energy. You get a much better energy conversion than any other fuel out there. I feel it's a way to help alleviate some of the issues around energy."

For all of its advantages, biodiesel is not yet a profitable business. Evans sees the market potential only a few years away. "I see the consumption going up," he said. "Any diesel you buy in the state will have biodiesel in it, B5, B10 or B20. Biodiesel or any alternative is going to produce jobs here and keep our money here. It's the way we need to go."

## ETHANOL

Commercial scale ethanol production is on the horizon. As a corn deficit state, meaning more is shipped in to meet demand than is grown, corn will not be the long-term feedstock for ethanol production in North Carolina. Until research brings about new technologies that make other feedstocks viable for commercial scale ethanol production, companies like East Coast Ethanol, LLC have to depend on the corn they can buy locally and from the Midwest to supply feedstock for their four, 110 million gallon production plants that are in development in North Carolina, South Carolina, Georgia and Florida.

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– Randy Dellinger, Foothills Bio-Energies

"There is a 2.1 billion gallon per year demand for ethanol in the four Southeastern states that we represent that is not being met very well by the folks in the Midwest," said Keith Parrish, vice president of research for East Coast Ethanol.

Each plant will be constructed with the ability to switch to production of cellulosic ethanol, ethanol made from corn stover, the leaves and stalks left over after harvesting, or other biomass. The \$212 million North Carolina plant will be under construction on a 414-acre site located west of Seaboard in Northampton County, a rural area off of I-95 bordering Virginia. The South Carolina site will be a \$230 million plant located southwest of Chester. The Georgia plant will be located in Wayne County and the Florida plant in Jackson County. The company's \$871 million investment will make them the largest ethanol producer in the Southeast and sixth largest in the country.

In total, the four plants are estimated to generate a \$400 million economic impact. The North Carolina ethanol plant will employ 45 people. Carbon dioxide, a by-product of the ethanol production, will be sold to the refrigerant and food industry and require another 35 employees. Dry distillers grain, another by-product, is expected to produce up to 353,000 tons that will be sold to the dairy, beef, swine and poultry industry as a high-protein animal feed.

Clean Burn Fuels, LLC is constructing the first of four ethanol plants in the state in Dundarrach south of Raeford in Hoke County. The 55 million gallons per year plant will have the capacity to expand to 220 million gallons per year and market the same by-products to the local economy.

## ASSOCIATIONS, CENTERS AND PLANS

Like any emerging industry, there are hurdles like legislation, availability of feedstock and feedstock costs. "The real drawback right now is feedstock or something to make it out of," Evans said. "We could be making more. We sell it as fast as we can make it. It's just finding a feedstock. They're working on algae and plants with different high oil production. That's going to be the key, whether it's ethanol or biodiesel."

Feedstocks are approximately 80 percent of the cost of biodiesel. As petroleum costs rose last year, so did the cost of soybean oil, poultry fat and other feedstocks. As the cost of petroleum has fallen, the cost of diesel has dropped while biodiesel feedstock prices have come down slowly but not to a competitive price point with petroleum diesel.

"If we look around, the Midwest states have large incentives. South Carolina has incentives. Pennsylvania recently introduced a very nice producer incentives program," Dellinger said. "All around us, there are incentives for production, but we don't yet have a comprehensive incentives program in North Carolina. So fuel from outside the state can still come in and undercut in-state production."

"We need creative incentives to encourage the growth of North Carolina's sustainable biodiesel industry," Forer said. "Our state leadership is serious about implementing

## BIOTECH TRACK RECORD

Developing industry sectors like biofuels is nothing new to the state of North Carolina. There's a 25 year track record and a billion dollar investment over the last decade to prove it. A study conducted by the Battelle Technology Partnership Practice for the North Carolina Biotechnology Center, valued the return on that investment at \$45.8 billion. The study highlights the overall impact of biotechnology in North Carolina including:

- ▲ **\$28.7 billion in direct revenues**
- ▲ **\$17.1 billion in company and employee spending on goods and services**
- ▲ **\$1.4 billion in state and local tax revenues**
- ▲ **53,200 biotech company jobs with an average salary of \$69,275**
- ▲ **180,007 total jobs created**

The NCBC is launching a new initiative to bolster the agricultural biotechnology industry sector. A 34-member steering committee co-chaired by former Governor Jim Hunt and Steven Burke, NCBC's senior vice president of corporate affairs, will lead work groups in farming and rural advantage; animals; aquaculture and marine; niche, specialty and value added crops; issues, policies and implications; and crops, trees and biomass, three areas essential to the biofuels industry.



For more information visit:

[www.ncbiotech.org](http://www.ncbiotech.org)

the right incentives because they see the tremendous value in an investment that leverages two of North Carolina's strongest assets: agriculture and biotechnology."


The North Carolina Biotechnology Center coordinated a 24-member steering committee and 70 representatives from academia, industry, non-profits and government to produce a 2007 strategic plan entitled *Fueling North Carolina's Future, North Carolina's Strategic Plan for Biofuels Leadership*. The plan outlines nine strategies all geared to achieve the goal of 10 percent by 2017. Meaning that by 2017, 10 percent or about 600 million gallons a year of all liquid fuel consumed in the state will be from biofuels that are locally grown and produced. Attaining the 10 percent goal equates to \$2.4 billion a year staying in the state economy.

The establishment of the Biofuels Center of NC, which is located in Oxford, north of Durham, on a former Federal Tobacco Research Station, is a direct result of the strategic plan. The Center officially opened in May 2008 with funding from the NC General Assembly and a partnership with the NC Department of Agriculture. One of their first initiatives was to award \$2.55 million in grants and loans to accelerate the development of the biofuels industry. A second grant cycle is underway to award another \$2.25 million.

The Biofuels Center is maturing into more than a funding mechanism for the industry. A research and education biodiesel production facility is under construction on the Oxford campus. In the future, researchers will have a place to plant and experiment with alternate feedstocks like purpose grown trees, switchgrass or sugar beets. The Biofuels Center staff will then develop economic models for each feedstock.

"Although we have a brilliant agricultural sector and we can grow all kinds of things, the technology doesn't exist yet to convert woody biomass cost effectively to help the state reach the 10 percent goal," said Norman Smit, Biofuels Center communications director. "So we're looking at a range of local feedstocks that can be grown to establish the cost structures around first generation technologies in the interim. We can't create an industry in North Carolina without creating sound economic models to show both farmers and producers."

The long range goal is to have an economically vibrant biofuels industry within 10 to 15 years, one that is licensing new technologies, bolstering the agricultural sector, creating a cleaner environment and providing statewide economic benefits.

"I think the goals for the industry are aggressive and will require active participation by all stakeholders, as well as the necessary political will, but they can be achieved," said Dellinger of Foothills Bio-Energies. "The foundation of the industry is going to be feedstock development. If we can develop and keep feedstocks in the state, the foundation is here to build a very robust biofuels industry." 

For more information visit:

**Blue Ridge Biofuels** [www.blueridgebiofuels.com](http://www.blueridgebiofuels.com)  
**Clean Burn Fuels** [www.cleanburnfuels.com](http://www.cleanburnfuels.com)  
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