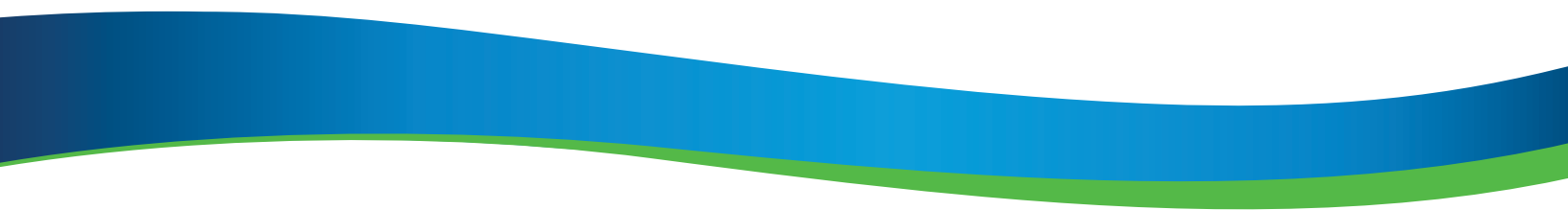




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Food *THEN* Fuel™

How the American Biodiesel Industry
Is Strengthening Food Security

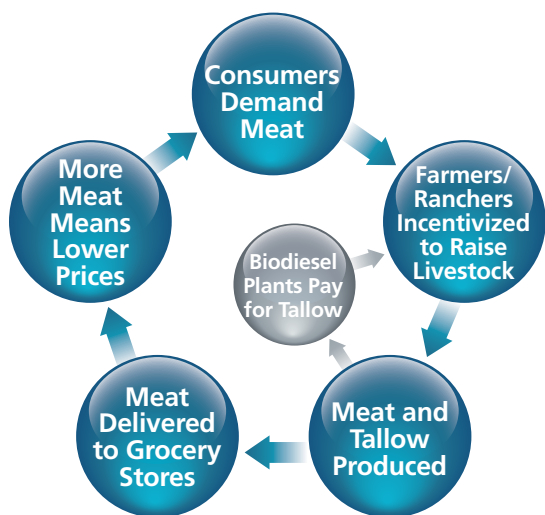


Executive Summary

American biodiesel is important to our country's energy diversity and environmental goals. However, biodiesel also plays a vital role in strengthening food security and keeps grocery items, like meat, from increasing in price more than they already would due to inflation and petroleum energy costs.¹

Biodiesel has proven itself as an advanced biofuel and is an excellent example of how the Renewable Fuel Standard (RFS2) is working as it was intended. Yet, some biofuel critics would incorrectly have the public believe that biodiesel depletes the food supply, contributes to higher prices at the checkout counter, and is uneconomic. The facts we will detail here will show those ideas to be wrong.

As this paper will explain, biodiesel is employing a "food *THEN* fuel™" approach by supporting the nation's food supply chain in a number of important ways: giving farmers a market-based incentive to boost overall meat and grain production, adding economic value to the production cycle to help offset grocery price pressures over the long run, and supporting



jobs and economic development, not only in the energy sector, but across a broad spectrum of industries. These are not potential benefits cast in the future tense, but rather real world outcomes of a productive alternative fuel industry that is working on a commercial scale for America today.

Why Biodiesel?

The American biodiesel industry has grown well beyond its humble origins to produce the most diverse fuel available today. Thanks to biorefinery upgrades and other major investments made by the industry's top producers over the years, biodiesel can be made from just about any fat, grease or vegetable oil — including waste products that in most cases are not suitable for human consumption. In 2012, American biodiesel was made from at least a dozen different raw materials, including inedible corn oil, used cooking oil, animal fats and soybean oil.

Biodiesel's energy source diversity is a remarkable achievement given that just two decades ago, the industry was confined to one raw material: soybean oil. In the early 1990s, increases in domestic soybean production left a huge glut of excess soybean oil sitting in tanks around the country. Rather than sell it for low-value uses, farmers reasoned that the oil could be refined to make biodiesel, an alternative fuel source that was being produced in large quantities in Europe using rapeseed (canola) oil.²

With petroleum prices skyrocketing as a result of the first Gulf War, soybean growers saw an opportunity not only to create value from an otherwise low-value by-product in surplus, but to help the nation diversify its energy supplies. Over the ensuing years, soybean farmers banded together with scientists, first to demonstrate

¹ Food Dollar Series, U.S. Department of Agriculture, ERS <http://www.ers.usda.gov/data-products/food-dollar-series/food-dollar-application.aspx>

² Charles W. Schmidt, "Biodiesel: Cultivating Alternative Fuels," Environ Health Perspective, Feb. 2007.

the feasibility of soybean oil-based biodiesel, and then deploy it in thousands of commercial settings.

Working Today for Land Efficiency and Economic Development

Farmland productivity has improved significantly over the last two decades and the burgeoning biodiesel industry has been a driving force behind those efficiencies. Improving land productivity and enhancing yields increases commodity supplies even as demand grows. In many cases this creates food reserves. In addition, the biodiesel industry³ and public and private firms⁴ continue to commit big dollars for investments in producing more food on fewer acres and then supplying more raw materials for biodiesel production.

When farmers are incentivized with higher profits by producing more meat and grain, they are empowered to maintain their land for sustainable agricultural production. This curbs competition from land development for building shopping malls and subdivisions, reducing grain production acres,⁵ and decreasing our ability as a country to produce food.

The story behind biodiesel's growth in the United States is as much about private enterprise seizing a ripe opportunity as it is a logical outcome of the public's increasing desire for diverse energy sources that limit environmental impacts. Biodiesel easily meets the federal government's definition of an "advanced biofuel" in that each and every raw material it utilizes reduces lifecycle greenhouse gas emissions (GHG) by at

least 50 percent, and in many cases up to 86 percent. In addition, biodiesel reduces carbon intensity by up to 96 percent⁶ as compared to petroleum diesel.

Biodiesel's clean-burning attributes have helped it become an important asset in reducing the emissions profile of America's transportation sector, the second-biggest generator of U.S. GHG emissions behind electricity generation.⁷ In fact, the American biodiesel industry has exceeded its federally required annual volume requirements since the Renewable Fuel Standard was enacted. In 2012, the biodiesel industry broke the 1 billion gallon mark for the second straight year. Biodiesel has delivered on these goals in the absence of any policy mechanism that would set a price on carbon.

As the industry has grown to meet and exceed the federal requirement, jobs have grown along with it. Biodiesel supports nearly 64,000 jobs around the country and provides more than \$2.1 billion in household income.⁸

Food *THEN* Fuel

Despite biodiesel's widespread economic and environmental benefits, it is still one of the most misunderstood advanced biofuels in the nation. Few people on the street could explain how biodiesel differs from other biofuels. This lack of understanding is not surprising given how far removed many Americans are from the agriculture producers and restaurant owners who have seen their businesses benefit from biodiesel's success.

³ Danforth Center Research on Biodiesel. <http://www.biodiesel.org/news/biodiesel-news/news-display/2013/02/05/biodiesel-goes-high-stake-with-ten-year-vision>

⁴ Agricultural Research Funding in the Public and Private Sectors, USDA. <http://www.ers.usda.gov/data-products/agricultural-research-funding-in-the-public-and-private-sectors.aspx>

⁵ American Farmland Trust. <http://www.farmland.org/resources/fote/default.asp>

⁶ California's Low Carbon Fuel Standard. Pathway for Inedible Corn Oil Biodiesel. http://www.arb.ca.gov/fuels/lcfs/lu_tables_11282012.pdf

⁷ US Dept. of Transportation, Center for Climate Change and Environmental Forecasting. <http://climate.dot.gov/about/transportations-role/overview.html>

⁸ National Biodiesel Board economic impact study. <http://www.biodiesel.org/production/production-statistics>

At the same time, critics of biofuels have capitalized on this confusion by trying to convince the public that biodiesel is merely part of an amorphous group of energy sources that share the same alleged disadvantages. Indeed, they would have the public believe that biodiesel not only depletes the food supply by creating a competing use in fuel, but that it also contributes to higher prices at the grocery store.



In reality, biodiesel is playing a vital role in strengthening America’s food security and reducing rising pressures on food prices. Rather than competing with food, biodiesel production applies a “food *THEN* fuel” approach by adding economic value for food industry by-products and sending economic signals to the

market to produce more. Biodiesel production helps make the food and agricultural sectors more profitable, incentivizes the production of protein and generally helps keeps grocery items, like meat, from increasing in price more than they already would due to inflation and petroleum energy costs.

Biodiesel’s Protein Boost

The global population continues to demand more and more protein. Led by China, where demand for meat has quadrupled over the last three decades, growing wealth in developing countries is creating more demand for beef, pork and chicken than ever before.⁹

Biodiesel is also supporting the production of soybeans. It is important to point out that soybeans are made up of approximately 80 percent meal and 20 percent oil. The more soybeans that are processed domestically, the more soybean meal, a major component of livestock feed, is produced.



With a larger supply of U.S. soybean meal, a 2011 study¹⁰ found the prices paid by U.S. poultry, livestock and fish farmers decreased between \$16 and \$48 per ton. **In short, without the biodiesel industry, livestock producers would have paid \$4.8 billion more in feed costs over a five year period.**¹¹

U.S. Production (in billion bushels) 1960-2012*				
Top 10	Soybeans		Corn	
	Year	Billion/Bu.	Year	Billion/Bu.
1	2009	3.36	2009	13.09
2	2010	3.33	2007	13.04
3	2006	3.20	2010	12.45
4	2004	3.12	2011	12.23
5	2011	3.09	2008	12.09
6	2005	3.07	2004	11.81
7	2012	3.01	2005	11.11
8	2008	2.97	2012	10.78
9	2001	2.89	2006	10.53
10	2000	2.76	2003	10.09

⁹ U.S. Department of Agriculture, ERS. <http://www.ers.usda.gov/publications/err-economic-research-report/err32.aspx>

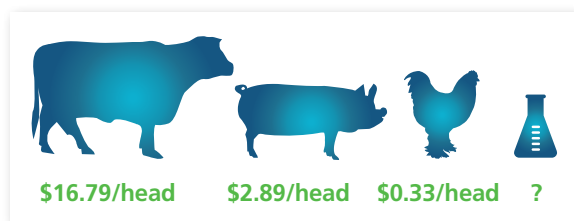
¹⁰ Centrec Consulting Group, LLC. December 2010 citing market years 2005-2009. <http://www.unitedsoybean.org/media-center/biodiesel-returns-us-soybean-farmers-investment-by-the-billions/>

¹¹ Centrec Consulting Group, LLC. December 2010 citing market years 2005-2009.

* USDA NASS 1960-2012 U.S. corn and soybean production.

The other direct benefit livestock producers obtain from biodiesel is new demand for animal fats such as poultry fat and beef tallow. In the past, these waste by-products were confined to generally low-margin uses. Thanks to investments that have enabled biodiesel producers to add animal fats as a raw material, their share of production has risen significantly in recent years. In 2011 alone, biodiesel producers were able to use approximately 1.29 billion pounds of animal fats.¹²

Increased demand from biodiesel companies has driven fat prices upward, creating an attractive alternative source of revenue for livestock and meat producers. In fact, an analysis examining the impact of biodiesel production on the value per head shows that cattle producers now earn up to an additional \$16.79 per head when beef tallow is used in biodiesel production — or more than twice as much as they earned before from these by-products.¹³ In 2011, biodiesel demand for beef tallow is estimated to have added approximately \$300 million to the U.S. beef cattle industry.¹⁴



Because biodiesel production helps bolster farm profit margins, farmers and ranchers earn market-based incentives to boost their overall meat and grain production. This is basic economics: when farmers make more money, they produce more. When there is more meat or soybean meal supply available, it relieves rising pressures on food prices.

So rather than contribute to food scarcity, as critics claim all biofuels do, biodiesel enhances food security by spurring additional supplies. This is an important distinction, as positive food cycle contributors such as the biodiesel industry help America generate roughly 85 percent of its agricultural products here at home. With so little of the nation's food supplies brought in from abroad, America enjoys an enormous national security advantage.

Benefits to consumers

Biodiesel's advantages also translate to consumers' household finances. The margin relief livestock producers realize from lower feed costs and higher revenue acts as a restraint on consumer meat prices. This means that while plenty of other factors — such as petroleum prices — are contributing to price hikes in the grocery aisles, biodiesel production is not one of them. In fact, biodiesel is not only providing long-term relief for such price pressures — it is diversifying our nation's fuel mix at the same time.

Improving Restaurants' Bottom Lines

Much like livestock producers, the foodservice industry has benefited from increased biodiesel production since 2005¹⁵ through lower costs and additional revenues. The key difference is that biodiesel has helped restaurant owners transform what was once a liability — used cooking oil — into an asset.

It was not so long ago that restaurants regularly had to pay companies to dispose of their used cooking oil (UCO) because the oil carried so little value it cost more to remove it. The economics of UCO changed almost overnight with the passage of the federal blenders tax

¹² EIA 22M Biodiesel Production Survey.

¹³ "Biodiesel Demand for Animal Fats and Tallow Generates an Additional Revenue Stream for the Livestock Industry" by Centrec Consulting Group, LLC for the National Biodiesel Board, Sept. 2012.

¹⁴ "Biodiesel Demand for Animal Fats and Tallow Generates an Additional Revenue Stream for the Livestock Industry" by Centrec Consulting Group, LLC for the National Biodiesel Board, Sept. 2012.

¹⁵ The Jacobsen, historical yellow grease price report. <https://www.thejacobsen.com/Price-Guide-Commentary/Animal%20Fats%20and%20Oils.aspx>

credit for biodiesel that was originally enacted by Congress in 2005. By spurring demand for biodiesel, the law served to put a floor under UCO prices. In fact, from 2006 to 2011, the price of yellow grease (a combination of animal fats and used cooking oils) climbed from 11.5 cents to 42¹⁶ cents per pound, and remains at about 36 cents a pound today.

With the exception of the fourth quarter of 2008, when the global recession pushed commodity prices down across the board, the value of yellow grease has been high enough to guarantee restaurants a value return on their UCO, in essence creating a new revenue stream. Not only that, but restaurants have been able to invest in closed-loop UCO recycling systems that help prevent employee injuries. This helps keep a lid on rising insurance costs and reduces occurrences of cooking oil being improperly disposed of down the drain, saving cities millions of dollars in sewer maintenance costs.



Today, biodiesel is helping restaurants large and small realize more efficient operations while meeting their environmental and corporate responsibility goals. For instance, more than 8,675 McDonald's restaurants

across the country participate in a cooking oil recycling program that takes advantage of a closed-loop UCO recycling system provided by Restaurant Technologies Inc. Each location recycles an average of 11,600 pounds per year.¹⁷ McDonald's said the strategy has transformed UCO into a "business asset," and also credits the program for helping it eliminate significant amounts of plastic and corrugated packaging

formerly used to deliver fresh cooking oil.

Benefits to consumers

Biodiesel's benefits to food service companies filter down to consumers by helping keep a lid on the prices they ultimately pay. Without the additional revenue realized today through UCO recycling, restaurants would be more likely to raise prices. Not only is this approach efficient — it is also sustainable. Restaurant chains now regularly receive their food supplies by trucks powered by biodiesel, closing the loop on what has become a virtuous circle of environmental stewardship throughout their supply chain.



Conclusion

Living in one of the most prosperous countries in the world, it is sometimes easy to lose sight of what makes America so special. Food security may be one of our nation's greatest strategic advantages, but it is also one of its least discussed. In recent years, this lack of awareness has created inroads for critics of biofuels to blame federal policies for increases in food prices that stem from other market pressures.

In the case of biodiesel, the impacts of these supportive policies have been decidedly positive because biodiesel enters the food supply equation as food needs are met. Along each step of the way in the industry's growth, increases in biodiesel production have added value, whether it is to the economy in the form of jobs and income, or through lower costs and additional revenues realized by specific trades such as livestock farming and food service.

¹⁶ The Jacobsen, Missouri River average historical yellow grease price report on April 10, 2013.

¹⁷ McDonald's corporate website: http://www.aboutmcdonalds.com/mcd/sustainability/library/policies_programs/environmental_responsibility/biodiesel_and_recycling_cooking_oil.html

As America seeks ways to advance its environmental, energy diversity and food security goals in the future, the U.S. biodiesel industry has the scale and capability to contribute much more. Understanding the biodiesel “food *THEN* fuel” approach in strengthening America’s food security is the first step in ensuring this advanced and diverse biofuel is empowered to build on its success to date.

Renewable Energy Group® is a leading North American biodiesel producer with a nationwide distribution and logistics system. Utilizing an integrated value chain model, Renewable Energy Group is focused on converting natural fats, oils and greases into advanced biofuels. With more than 225 million gallons of owned/operated annual production capacity at biorefineries across the country, REG® is a proven biodiesel partner in the distillate marketplace.

For more than a decade, REG has been a reliable supplier of biodiesel which meets or exceeds ASTM quality specifications. We sell REG-9000® biodiesel to distributors so Americans can have cleaner burning fuels that help lessen our dependence on foreign oil. REG-9000® branded biodiesel is distributed in nearly every state in the U.S.

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