



## **ECONOMIC CONTRIBUTION OF THE BIODIESEL INDUSTRY**

**Prepared for the National Biodiesel Board  
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Biodiesel is a non-toxic, biodegradable diesel fuel made from soybean and other vegetable oils, animal fats, and used or recycled oils and fats. The biodiesel industry is in its infancy but is poised for significant growth. An estimated 690 million gallons of biodiesel will be produced and used in the U.S. in 2008, up from 450 million gallons last year and about 500 thousand gallons in 1999. According to the National Biodiesel Board there are 176 manufacturing plants capable of producing biodiesel in the U.S. These plants have an annual capacity of 2.61 billion gallons.

The biodiesel industry makes a substantial contribution to the American economy and the economy of the communities where biodiesel production is located. The demand for soybean oil and other fats and oils used to produce biodiesel increases crush demand for soybeans, supports soybean prices, and keeps land in soybean production. Consequently biodiesel production helps increase the value of agricultural production and farm income from marketing and stimulates the demand for goods and services produced by other sectors of the economy and delivered to agriculture.

The impact of biodiesel production on the economy is provided by the direct effects of annual expenditures for soybean oil, other fats and oils used as feedstocks, and inputs such as natural gas, other utilities, and labor to produce biodiesel. Additionally the biodiesel industry invested in infrastructure aimed at increasing the supply of biodiesel to final customers and on scientific R&D largely directed at new feedstocks such as algae. Spending for these goods and services represents the purchase of output of the supplying industries. For example, soybean oil is the output of the fats

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<sup>1</sup> The USB is made up of farmer-directors who oversee the investments of the soybean check-off on behalf of all U.S. soybean farmers. Check-off funds are invested in the areas of animal utilization, human utilization, industrial utilization, industry relations, market access and supply.



and oils refining and blending industry. This spending circulates throughout the entire economy several fold stimulating aggregate demand, supporting the creation of new jobs, generating household income, and providing tax revenue for government at all levels.

The biodiesel industry will spend nearly \$2.9 billion on raw materials, goods and services to produce 690 million gallons of biodiesel this year. Feedstock costs (soybean oil and other feedstocks) are the largest component of operating costs, accounting for about 87 percent of production costs. As indicated above the biodiesel industry invested an estimated \$90 million on infrastructure and \$197 million on scientific research and development for feedstock development. The total impact of the biodiesel industry includes the impacts of ongoing annualized operations and the direct value added by the production of biodiesel and co-products (glycerin). The price of B100 (FOB Plant, Iowa) has averaged \$4.63 per gallon for 2008. Consequently the 690 million gallons of biodiesel produced this year is valued at \$3.2 billion. The biodiesel industry also produces glycerin as a byproduct. Given large supplies on the market, raw glycerin prices are averaging about 16.4 cents per pound. The 530 million pounds of raw glycerin produced by the biodiesel industry are valued at about \$87 million. The detailed impact of this spending is illustrated in Table 1.

Table 1  
Economic Contribution of Biodiesel by Industry: 2008

Industry	Spending (Mil 2008 \$)	GDP (Mil 2008 \$)	Impact Earnings (Mil 2008 \$)	Employment (Jobs)
Infrastructure construction	\$90.0	\$160.6	\$95.7	2,400
Feedstocks (soybean oil and other fats)	\$2,270.8	\$3,319.6	\$1,643.4	41,081
Industrial chemicals	\$195.1	\$273.9	\$140.0	2,738
Electric, natural gas, water	\$59.6	\$85.3	\$39.2	723
Maintenance and repair	\$10.6	\$18.5	\$10.0	264
Business Services	\$8.6	\$14.6	\$7.8	196
Research & Development	\$197.0	\$359.6	\$212.9	4,078
Earnings paid to households	\$33.1	\$31.3	\$15.6	412
<b>Subtotal</b>	<b>\$2,864.8</b>	<b>\$4,263.4</b>	<b>\$2,164.6</b>	<b>51,893</b>
Plus Value of biodiesel output		\$3,194.7	\$23.5	
Plus Value of co-product glycerin		\$87.3		
<b>Total Impact</b>		<b>\$7,545.4</b>	<b>\$2,188.1</b>	<b>51,893</b>



As shown in Table 1, when the value of biodiesel and glycerin is added to the indirect impacts generated by the spending to create this output, the biodiesel industry will add \$7.6 billion to GDP this year, increase household income by nearly \$2.2 billion, and support 51,893 jobs in all sectors of the economy.

- Operation of the biodiesel industry generates additional tax revenues for government at all levels from personal and corporate income taxes that increase in line with higher output levels, larger GDP, and additional household income. The biodiesel industry is expected to generate \$1.5 billion of additional tax revenue for federal, state, and local government this year.
- The biodiesel industry more than pays for itself. The additional tax revenues generated by the biodiesel industry are significantly larger than the value of the major Federal tax incentive for biodiesel. With the biodiesel tax credit of \$1.00 per gallon for agri-biodiesel and \$0.50 per gallon for biodiesel from other sources, this program will cost approximately \$621 million this year.<sup>2</sup> However, as indicated above the industry will generate \$915 million of new revenue for the Federal Treasury for a positive net balance of \$294 million.
- The biodiesel industry contributes to improving America's energy security. The 690 million gallons of biodiesel produced in 2008 will displace 38.1 million barrels of crude oil.<sup>3</sup> Since the U.S. is a net importer of oil, this means that less oil will need to be imported. At the 2008 average crude oil price of \$104 per barrel this means that nearly \$4 billion remained in the American economy instead of being sent abroad to finance oil imports.

The impact of the biodiesel industry on the economy was estimated by applying the current appropriate final demand multipliers for value added, earnings, and employment for the relevant supplying industry calculated by the U.S. Bureau of Economic Analysis (BEA) to estimates of

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<sup>2</sup> Using Census data as a base we estimate that soybean oil accounted for 60% of methyl ester production and animal fats (lard and inedible and edible tallow) accounted for 20%. Other fats and oils made up the final 20%.

<sup>3</sup> Distillate is produced along with gasoline. The 38.1 million barrels of crude oil reflect the amount of oil that would be required to produce the combination of gasoline consistent with 690 million gallons of distillate at 2008 year-to-date refinery yields.



expenditures for annual operations described above.<sup>4</sup> The final demand multipliers for GDP (value added), earnings, and employment for the sectors that supply the biodiesel industry are shown in Table 2.

Table 2  
U.S. Final Demand Multipliers

	Final Demand	Household Earnings	Employment
Construction	1.7842	1.0629	26.7
Fats and oils refining and blending	1.4974	0.7685	20.5
Rendering and meat byproduct proc	1.3847	0.6266	15.7
Power generation and Supply	1.4367	0.6004	11.6
Natural gas distribution	1.4180	0.6565	12.5
Water, sewer and other systems	1.5420	0.7141	16.0
Other basic organic chemical mfg	1.4038	0.7174	14.7
Office administrative services	1.7943	1.0112	22.9
Monetary Authorities	1.4644	0.5982	13.7
Business support services	1.6307	0.8179	24.9
Facilities support services	1.7491	0.9519	26.2
Scientific R&D	1.8256	1.0808	21.7
Households	1.3340	0.6645	18.4

The estimates summarized above result from a static analysis of the impact of increasing biodiesel fuels demand and production on the American economy. That is, they reflect the combination of a series of snapshots of the economy rather than a dynamic flow analysis.

The annual expenditures for biodiesel were estimated by multiplying the average cost per gallon for each major expenditure category by the number of gallons produced. The estimated costs to produce biodiesel are based on a process model for a new 10 million gallon biodiesel plant developed by USDA/ARS.<sup>5</sup> The prices for soybean oil, biodiesel, natural gas, and electricity reflect averages for

<sup>4</sup> The multipliers used in this analysis are the detailed industry RIMS II multipliers for the U.S. prepared by the Regional Economic Analysis Division, Bureau of Economic Analysis, U.S. Department of Commerce. These multipliers are based on 2006 regional data and 1997 national benchmark input-output data

<sup>5</sup> Haas, Michael J., Andrew J. McAloon, Winnie C. Yee, and Thomas A. Foglia. "A process model to estimate biodiesel production costs". *Bioresource Technology*. 2005.



January through early December 2008. Prices for other inputs and labor reflect current market conditions.