ABF Economics
Agriculture and BioFuels Consulting, LLP

THE IMPORTANCE OF THE BIODIESEL TAX CREDIT

Prepared for the National Biodiesel Board (NBB)

John M. Urbanchuk
Managing Partner, ABF Economics[1]

July 24, 2019

The Biodiesel Tax Credit (BTC) is essential to continued growth of the U.S. biodiesel industry. The Biodiesel Tax Credit was enacted in 2005 to incentivize U.S. fuel blenders to market biodiesel (and renewable diesel), providing a credit of $1 per gallon against their U.S. federal tax liability. While the tax credit has expired several times since enactment, until recently it has always been extended in a timely manner. Congress continues to show strong, bipartisan support for the program. Reflecting an expectation that Congress will act again to extend the credit, blenders build the tax credit into the market price they are willing to pay for biodiesel. As a consequence, because the tax credit expired more than 18 months ago– the longest lapse in the history of the credit – biodiesel producers struggle to cover production costs and maintain contractual agreements in the marketplace. Retroactive renewal of the $1.00 per gallon tax credit for 2018 and 2019 is as important as providing forward-looking, multiyear certainty in providing biodiesel and renewable diesel producers the ability to compete, cover costs and hold on to a profit.

Background

The Energy Independence and Security Act of 2007 (EISA) expanded the requirement to use renewable biofuels in the nation's on-road diesel and gasoline supply through 2022. This requirement includes biomass-based diesel, which commercially includes biodiesel and renewable hydrocarbon diesel (RHD). Under EISA the Environmental Protection Agency (EPA) sets annual Renewable Volume Obligations (RVOs). Obligated parties under EISA (refiners or importers of gasoline or diesel fuel) are required to blend sufficient volumes of renewable fuels to meet the annual obligations. EISA established a Renewable Identification Number (RIN) system to enable EPA to track renewable fuel use. Each type of renewable fuel is assigned a RIN category depending on its feedstock; biomass-based diesel is typically assigned category D4 RINs. RINs are generated by renewable fuel producers or importers and can be bought, sold, or traded by obligated parties, which means their price is determined in the marketplace.

[1] John M. Urbanchuk is Assistant Professor and Chair, Agribusiness Department, Delaware Valley University.

Obligated parties have two options to meet RVOs:

1. They can buy biodiesel (with the attached RIN) from producers and blend the biodiesel with petroleum diesel.

2. They can use petroleum based ultra-low sulfur diesel (ULSD) and purchase RINs on the marketplace and use these RINs to meet their RVO.

The market price of biodiesel (B100) typically is high enough to cover total costs and provide a positive margin for producers. Ultra-low sulfur diesel is a product of the crude oil refining industry and its price is largely determined by crude oil prices. As will be pointed out there is little or no causal relationship between ULSD and B100 prices. The value of the D4 RIN can help make up a difference in price between B100 and ULSD. However, when the sum of the market price for ULSD diesel and the D4 RIN is below the price of B100, obligated parties have little or no economic incentive to purchase B100. Over the past several years the combination of ULSD diesel and D4 RINs has been below the price of B100. As a consequence, blenders have had to reduce biodiesel transaction prices in order to compete. These lower transaction prices typically are passed back to the producer resulting in an effective market price frequently below the cost of producing biodiesel, resulting in a loss.

As indicated earlier, the BTC was not permanent and periodically expired (six times through December 2017). Reinstatement of the tax credit —regardless of timing – has kept it in effect continuously through 2017. The tax credit expired on December 31, 2017, and to-date has not been extended. Consequently, no tax credit is currently available for the biodiesel industry.

Congress' support for biodiesel production creates an expectation for blenders and producers that the credit will be reinstated. As pointed out by Irwin, "…at any given quantity of biodiesel, the effective selling price for biodiesel producers is increased by the amount of the credit."(Irwin p.2) Through contractual arrangements with blenders, biodiesel producers are able to share the financial benefit of the incentive as well as the risk of its renewal.

The current uncertainty surrounding reinstatement and retroactivity of the tax credit is a significant disincentive for the U.S. biodiesel industry (blenders and producers) and has constrained industry expansion. Absence of a tax credit and uncertainty is one major reason the industry is operating at only

70 percent of industry production capacity (EIA).[2] The uncertainty is forcing some producers to shut down production (Koperski).

Analysis

The role of a tax credit in supporting industry profitability depends on three key elements: the cost of producing biodiesel, the price of ULSD, and the price of D4 RINS.

Production of biodiesel is a relatively straightforward process. A feedstock (vegetable oil, animal fat, or used grease or oil) is combined with an alcohol (typically methanol) and a catalyst in a process called transesterification to produce biodiesel and crude glycerin as a byproduct.

We estimated biodiesel production costs by applying industry accepted feedstock conversion factors (7.45 pounds per gallon for vegetable oil and about 7.8 pounds per gallon for other fats) and usage of methanol and energy (natural gas and electricity). Other production and fixed costs were estimated based on discussions with industry participants and were evaluated against published cost of production estimates.

Feedstock costs represent a weighted average of feedstock use reported by the Energy Information Agency (EIA) in the Monthly Biodiesel Production report (22-M). For example, soybean oil is the most widely used feedstock for biodiesel in the United States. As a result, the soybean oil component of feedstock cost reflects both the amount of soybean oil used to produce biodiesel and average soybean oil price. Prices for feedstocks are principal market prices reported by the Economic Research Service of USDA. Methanol prices are those reported by the firm Methanex, while natural gas and electricity prices are national averages reported by EIA. Feedstock and methanol prices were adjusted to reflect estimated transportation costs from source to biodiesel plant. Estimated biodiesel production costs for 2016 through the first quarter of 2019 are summarized in Table 1.

[2] Calculated from industry capacity and production data contained in Table 1, Form EIA-22M "Monthly Biodiesel Production Survey". https://www.eia.gov/biofuels/biodiesel/production/table1.pdf

Table 1
U.S. Biodiesel Industry Costs and Returns
2016-2019 Year-to-Date, $/Gallon

	2016	2017	2018	2019 Q1
Feedstocks	$2.34	$2.52	$2.25	$2.26
Soybean Oil, degummed	$1.33	$1.36	$1.28	$1.37
Corn Oil	$0.24	$0.29	$0.29	$0.28
Canola Oil	$0.27	$0.36	$0.27	$0.22
Inedible Tallow	$0.11	$0.05	$0.09	$0.07
Choice White Grease	$0.11	$0.11	$0.09	$0.12
Yellow Grease	$0.22	$0.24	$0.21	$0.19
Other feedstocks	$0.06	$0.10	$0.02	$0.01
Methanol	$0.10	$0.14	$0.17	$0.15
Energy	$0.07	$0.07	$0.07	$0.07
Other Variable, Fixed, Depreciation	$0.35	$0.36	$0.37	$0.38
Total Cost	$2.85	$3.09	$2.86	$2.86
PROFITABILITY				
REVENUE				
Biodiesel	$3.18	$3.15	$3.00	$2.80
Glycerin	$0.05	$0.06	$0.07	$0.06
Total Revenue	$3.23	$3.21	$3.07	$2.86
TOTAL COST	$2.85	$3.09	$2.86	$2.86
Net Returns over Total Cost	$0.37	$0.12	$0.21	$0.00

It is important to note that these production costs are averages for the entire industry and reflect large and small plants and assume a uniform feedstock mix. Further, they do not reflect regional differences in input costs or vintages of production capacity. Higher capacity utilization rates typically allow a biorefinery to take advantage of economies of scale, reduce unit costs and increase profitability. Logistics of feedstock delivery are also a significant determinant for individual plants. To the extent that absence of a tax credit and increased uncertainty constrains willingness to expand output, industry costs likely are higher than would otherwise be the case.

As can be seen in Table 1, the biodiesel industry has been profitable over the past three years. That is, revenue from the sale of B100 and crude glycerin has more than offset the cost of producing biodiesel. Feedstocks account for the largest share of total production costs. Consequently, biodiesel production

cost is highly sensitive to changes in feedstock prices, particularly soybean oil. In any given year, a high or low price of soybean oil can significantly influence profitability. This is illustrated by performance over the past three years. Feedstock costs increased 7.7 percent as prices for soybean oil, refiners' corn oil, increased sharply. At the same time the market price of B100 fell so that producer returns were cut significantly. Feedstock prices fell in 2018 and even though B100 prices also declined, producer returns recovered. The issue for biodiesel producers is that the prices that determine ultimate profitability (feedstocks) and competitive environment in the fuel market (B100, ULSD, and RINs) are largely unpredictable. Absence of, and uncertainty regarding extension of the biodiesel tax credit significantly increases the risk biodiesel producers face.

Industry production costs, however, are only part of the story. The revenues shown in Table 1 are primarily provided by the sale of B100 at market prices. The U.S. industry produced an average of 1.95 billion gallons of biodiesel and renewable hydrocarbon diesel between 2016 and 2018, while the EPA-announced RVO for biomass biodiesel averaged 2.0 billion gallons over the same period.[3]

Biodiesel (B100) market prices typically are higher than petroleum ULSD prices. The fundamentals of the economics of production differ between biodiesel and petroleum diesel. Petroleum prices are largely dependent on world oil prices. Crude oil prices are determined in the global market and fluctuate based on actual and perceived supply and demand conditions. Petroleum diesel is a co-product of crude oil refining. According to the EIA, distillate fuel (diesel) accounts for about 30 percent of the volume of products refined from each barrel of crude oil. The market is driven by the demand for gasoline. Based on conditions in the global oil market, the price of petroleum diesel (No 2. Ultra-Low Sulfur, Spot Gulf) increased from $1.32 per gallon in 2016 to $1.87 per gallon in the first quarter of 2019.

There is no direct causal relationship between diesel and biodiesel prices; nonetheless, they compete for share within the same markets and applications. Over the past several years, while petroleum diesel prices increased, biomass biodiesel prices (B100, Upper Midwest) actually declined. D4 RIN prices are established in the marketplace and also have declined from $1.32 per gallon in 2016 to $0.78 per gallon in the most recent quarter.[4]

As shown in Table 2 the difference between B100 and spot market ULS diesel prices was about $1.13 per gallon between 2016 and the first quarter of 2019 although the difference fell from $1.86 per gallon in 2016 to $0.93 per gallon during this period.

[3] https://www.epa.gov/fuels-registration-reporting-and-compliance-help/rins-generated-transactions
[4] https://www.epa.gov/fuels-registration-reporting-and-compliance-help/rin-trades-and-price-information

Table 2
Impact of No Tax Credit on the U.S. Biodiesel Industry ($/gal)

	2016	2017	2018	2019 Q1
Biodiesel Production Cost	$2.85	$3.09	$2.86	$2.86
Biodiesel (B100), Upper Midwest	$3.18	$3.14	$3.00	$2.80
No 2. Diesel, ULS, Spot Gulf	$1.32	$1.62	$2.05	$1.87
D4 RIN "Wet" Basis	$1.32	$1.06	$0.89	$0.78
B100 price vs ULS Diesel	$1.86	$1.52	$0.95	$0.93
B100 price vs ULS Diesel + D4 RIN	$0.54	$0.46	$0.06	$0.15
Biodiesel Industry Loss w/o Tax Credit				
ULS Diesel + D4 RIN vs B100 Cost	-$0.21	-$0.41	$0.07	-$0.21

It is instructive to note that the variability of feedstock prices on biodiesel production costs is illustrated by 2018. Largely due to lower soybean oil prices, production costs fell below the combination of ULSD and D4 RIN prices. Data for the first quarter of 2019 suggests that anomaly is not likely to reoccur.

Impact on the Biodiesel Industry

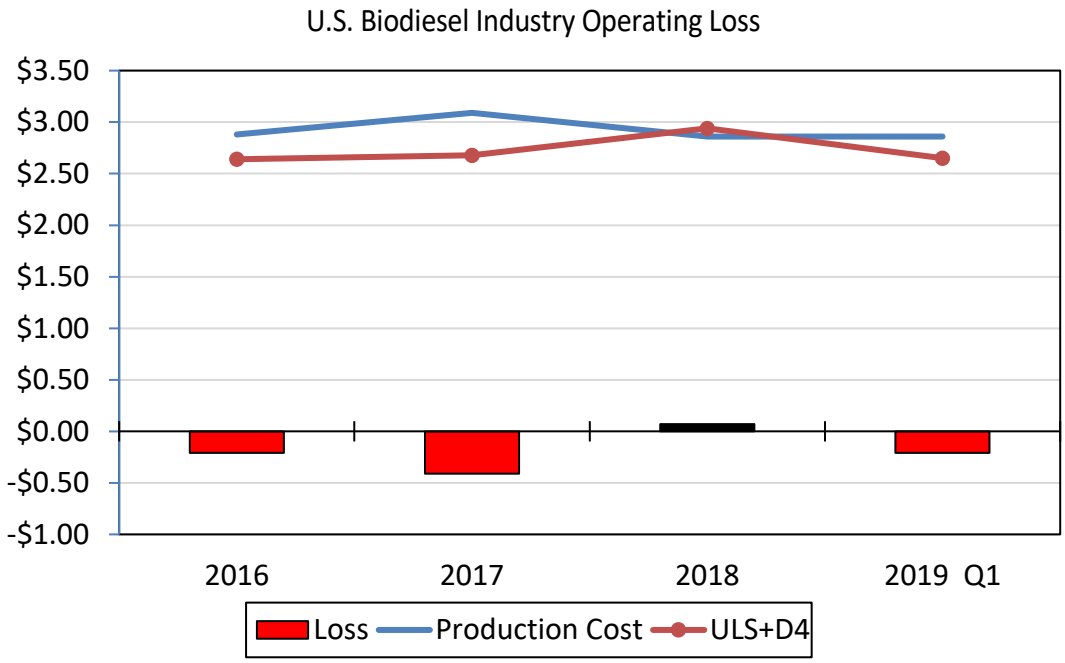
The price difference between ULSD and B100 discourages refiners from purchasing biodiesel. However, the RVOs set by EPA to meet the renewable fuel requirements of EISA obligates refiners to purchase biomass biodiesel or D4 RINs.

As indicated earlier, as long as the sum of petroleum diesel and the D4 RIN is lower than the price of B100 the refiner has no economic incentive to purchase B100. In fact, the maximum amount a rational refiner would be willing to pay to meet the RVO is the sum of the price of No 2. ULS diesel and the D4 RIN. This then becomes the “market” price of B100. The combination of these two prices increased from $2.64 per gallon in 2016 to $2.94 per gallon in 2018 and have declined to $2.65 per gallon during the first quarter of 2019, averaging $2.73 over the entire period.

This situation forces a biodiesel blender to reduce the transaction price of B100 (the price actually paid by the refiner) in order to remain competitive. The minimum price a biodiesel distributor would be willing to provide to make a biodiesel sale then is the sum of the price of No 2. ULS diesel and the D4 RIN. Blenders have substantial market leverage to pass some or all of this “discount” back to the biodiesel producer, who has to take the transaction price into account when calculating his breakeven and shutdown point. Breakeven is the point at which the market price is sufficient to cover variable costs of production while the shutdown point is where the market price fails to cover total costs.

Figure 1 illustrates the gap between the price a rational refiner would be willing to pay for B100 (the sum of No2. ULS diesel and D4 RIN) and the cost of producing biodiesel. As shown in Table 2 and Figure 1, the gap, which reflects an operating loss for biodiesel, grew from 2016 to 2017, fell in 2018 and has again increased during the first quarter of 2019, averaging $0.19 per gallon over the entire period.

Figure 1
Gap Between Total Cost and the Price of ULS Diesel Plus D4 RINs ($/gal)



In other words, the biodiesel tax credit over the last three years has been able to lift biodiesel producers above the breakeven point and incentivize some moderate expansion. As pointed out earlier, the BTC is not permanent and has periodically expired. The tax credit was in force at the start of 2016, expired at the end of 2017 and was only retroactively reinstated for 2017 in February 2018. The BTC currently is unavailable for the biodiesel industry. The industry's expectation that renewal of the tax credit will have a retroactive component encouraged biodiesel and renewable diesel producers to continue operations, even while taking a loss. It also needs to be restated that these estimates are averages for the entire industry. Individual plants will perform better than or worse than the averages.

Impact of a Biodiesel Tax Credit

A tax credit that enables blenders to claim a credit against their U.S. federal tax liability offsets the difference between the cost of marketing ULSD and biodiesel. Through contractual arrangements, biodiesel producers share the value of the credit, offsetting the difference between the cost of producing biodiesel and what refiners are willing to pay to meet their RFS RVOs. With the tax credit lapsed, producers are currently operating at a loss. Blenders and producers with lower risk tolerance, however, are already cutting their losses. Blenders, however, have more leverage to force the losses onto biodiesel producers.

It has become common practice for a tax credit to be shared between the blender and biodiesel producer. As Irwin points out "One can think of a retroactively reinstated tax credit (with no volume mandate) as a $1 per gallon windfall to blenders that would have gone to biodiesel producers in the form of a higher selling price if it had been in place at the time of the transaction. This is presumably the reason why the sharing agreements were originally negotiated and written into biodiesel marketing contracts." (Irwin p.3). A recent study estimated the biodiesel producer share of a tax credit of $0.46 per gallon (46 percent of a $1.00 tax credit) in 2017 (FTI).

Conclusion

The biodiesel tax credit is essential to maintaining the profitability and ongoing growth of the U.S. biodiesel industry.

Obligated parties (diesel fuel refiners and importers) have no economic incentive to pay more for biodiesel that the sum of the price of No. 2 ULS Diesel and the D4 RIN to meet RVO obligations under EISA. This forces biodiesel blenders to demand lower biodiesel prices through marketing arrangements. In the absence of the BTC biodiesel industry would not have covered production costs over the period 2016 through the first quarter of 2019 and consequently operated below industry breakeven point. The expectation that a tax credit would have a retroactive component has played large in the minds of the industry.

It is reasonable to conclude that failure to provide the biodiesel tax credit with retroactivity would lead to a contraction of the U.S. biodiesel industry and consequent loss of jobs and economic activity.

References

Biodiesel Profitability. Iowa State University Agricultural Marketing Resource Center. https://www.agmrc.org/renewable-energy/prices-and-profitability-models.

FTI Consulting "The Biodiesel Industry: Impacts on the Economy, Environment, and Energy Security." November 2018.

Irwin, S. "Blender and Producer Sharing of Retroactively Reinstated Biodiesel Tax Credits: Time for a Change?" *farmdocDaily* (7):62, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, April 5, 2017.

Irwin, Scott and Darrel Good. "How to Think About Biodiesel RINs Prices Under Different Policies" *farmdocDaily*. Department of Agricultural and Consumer Economics. University of Illinois. August 23, 2017.

Knittel, C.R., B.S. Meiselman, and J.H. Stock. "The Pass Through of RIN Prices to Wholesale and Retail Fuels Under the Renewable Fuel Standard. National Bureau of Economic Research Working Paper 2143. July 2015.

Koperski, Scott. "Beatrice Biodiesel Plant to Shut Down". Lincoln Journal Star, July 1, 2019. https://journalstar.com/business/local/beatrice-biodiesel-plant-to-shut-down/article_38126bf4-f685-52f3-9095-276273053d90.html.

U.S. Energy Information Administration, Form EIA-22M "Monthly Biodiesel Production Survey" available at https://www.eia.gov/biofuels/biodiesel/production/.

U.S. Government Printing Office. H.R. 2089: Biodiesel Tax Credit Extension Act of 2019. Introduced on April 4, 2019.