How might tariffs impact U.S. biomass industries, and are there hidden opportunities for these sectors?

BY ANURAG MANDALIKA AND BRIAN SNYDER

Abstract

Trade of biofuels and biomass feedstocks has become increasingly globalized over the past decades as economies pursue varied decarbonization strategies. Due to its large resource base, the United States exports a variety of biofuels and feedstocks, however, the international trade of these commodities may be impacted as a part of the ongoing trade disputes between the U.S. and its trading partners. In this paper, we consider the potential impact of tariffs (and retaliatory tariffs) on the biomass and biofuels industry in the U.S. We analyze the flow of important biofuels such as fuel alcohol (ethanol), biomass-based diesel fuel (BBD, which includes renewable diesel and biodiesel), densified biomass fuel (DBF or wood pellets), etc. Heightened trade barriers are likely to affect not just biomass-based fuels, but also the feedstocks that are used to manufacture biofuels. Our preliminary analysis shows that feedstocks for biofuels (which have competing uses for food and feed) such as soybeans and corn endure a greater effective tariff rate in comparison to finished biofuels (e.g., fuel ethanol or BBD). While international trade will likely be impacted, we also consider the potential for increased domestic use of these feedstocks as a result of decreasing globalized energy and feedstock flows. Opportunities for increased decarbonization of transportation sectors may exist through greater utilization of these feedstocks for biofuel production instead of producing a glut of biomass created due to trading barriers. As an example, were all soybean exports utilized domestically for BBD production (in the face of unattractive trade barriers), domestic producers can increase their capacity between 31 and 102-fold for renewable diesel and biodiesel, respectively (notwithstanding other barriers towards such an increase in production).

Introduction

In April of 2025, the Trump Administration announced broad-based tariffs on imports that ranged between 10 and 125%. Because tariffs varied across nations, and because products are unequally exported across space, these tariffs have the potential to have very different impacts on different sectors of the economy. In the bioenergy sector, feedstocks and fuels are traded in very different ways and with different nations, and so these tariffs might have markedly different impacts on different parts of the industry and these impacts may affect the supply, demand, and prices of bio-feedstocks and fuels. Here, we use data on the destination of U.S. exports of bio-feedstocks and fuels to provide a high-level analysis of the potential impacts of tariffs on the bioenergy industry in the U.S.

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Tariffs can have a variety of impacts on markets. They can raise prices for consumers and disrupt established trade patterns. They can also reduce local production and create a glut for products that were scheduled for export. Finally, tariffs also have the potential to stimulate innovative opportunities, and new domestic markets can potentially absorb the products intended for export that are now uncompetitive if the opportunities are created for their utilization.

Biofuels are unique energy vectors with regards to their functionality – the feedstocks used for biofuel production have multiple uses, including food and (animal) feed, materials and chemicals, and energy. First-generation biofuels in particular (produced from feedstock which can be considered as edible) have multiple roles to play. We do not advocate for or against tariffs or energy trade policies. Rather, we seek to interpret potential impacts of these policies and identify potential opportunities from these shocks. Winston Churchill is famously attributed to having said '*Never let a good crisis go to waste*'. We take this approach to argue that overcoming uncertainty and international trade barriers by deploying biomass utilization sustainably for increased biofuel production can valorize these feedstocks and lower the emissions associated with the U.S. transportation sector.

The biofuels sector in the U.S. is small, accounting for ~5% of total primary energy consumed, although this share has been rising again. The three main liquid biofuels produced in the U.S. are ethanol, renewable diesel and biodiesel (the latter two can be collectively referred to as biomass-based diesel, BBD). The primary solid biofuel is densified biomass fuel (DBF), and includes pellets, logs, and briquettes made from wood (referred to colloquially as wood pellets). The main feedstocks for producing these biofuels are corn grain (for ethanol), soybean oil, corn oil, canola oil, and used cooking oil (for BBD), and residuals (sawmill, other, and wood product manufacturing), and roundwood and pulpwood (for DBF). Along with the finished biofuel, the bio-based feedstock used for producing these fuels are also traded between nations. While import and export trading persists for all fuels, utility-grade DBF is primarily intended for exports to other countries, with the U.K., countries in the E.U., and Japan being the main importers. In addition, biomass feedstocks like corn and soybeans are among the most heavily traded commodities in the world but are generally used for food rather than fuels.

While biofuels were not directly targeted during the first Trump administration, feedstocks for biofuels production such as soybean exports were impacted. Retaliatory tariffs of 25% imposed by China on U.S. soybeans announced in 2018 led to cancellations of U.S. soybean orders.[1] This was also reflected in a bump in ending stocks for soybeans for the 2018/19 year, and a drop in season-average farm prices.[2]

The second Trump administration has announced the implementation of tariffs on several trading partners, announced a second round of tariffs on nearly all countries, and then suspended the latter round of tariffs for a 90-day period. Biofuels currently imported or exported which will be impacted by tariffs include fuel ethanol, BBD, and DBF. Exports of ethanol from the U.S. totaled 4.67 MMbbl in March 2025 (source: EIA), after reaching a peak of 45.8 MMbbl in 2024.[3] Canada has been the top destination for ethanol exports from the U.S., particularly in 2024, accounting for 16 MMbbl in 2024.[4] More recently, it was reported that ethanol exports fell by 45% for the week ending on April 18, 2025.[5]

The U.S. has been importing renewable diesel since 2012, primarily from the Netherlands and Singapore.[6] The year 2024 marked the largest imports of renewable diesel into the U.S. at 12.3 MMbbl.[6] The recent increase in renewable diesel imports during 2024 has been attributed to a combination of factors, including expansion of Neste's plant in Singapore, and perhaps more importantly, the phasing out of the Blender's Tax Credit (BTC) to the Clean Fuel Production Credit (CFPC), also referred to as the IRS Section 45Z tax credit) in January 2025. Delays by the Treasury Department in releasing full 45Z guidance has led to greater uncertainty regarding available credits.[7] This is evident in the drop in renewable diesel imports in the first months of 2025.[6] Historically, Singapore has been the primary exporter of renewable diesel to the U.S., accounting for 74% of imports, with Canada accounting for most of the remaining imports (18%). All January 2025 imports of renewable diesel into the U.S. originated from Canada at 1,000 bbl. On March 4, tariffs amounting to 10% went into effect on imports of Canadian biofuels into the U.S., with subsequent retaliatory tariffs announced by the Canadian government, with the potential to impact biodiesel imports from the U.S.[4]

DBF is exported from the U.S. to several countries, particularly the UK, multiple E.U. nations (e.g., the Netherlands, Denmark, Belgium-Luxembourg, etc.), Japan, Canada, and China, among others.[8]

To estimate potential impacts of tariffs (and retaliatory tariffs) on sectors associated with the U.S. biofuels (and their feedstocks) industry, we estimate export-weighted tariff rates on individual North American Industry Classification System (NAICS) sectors from the U.S. Census Bureau.[9] While the status of these tariffs is still undergoing temporal changes and several nations have signed individual trade agreements with the U.S., it is a useful exercise to analyze potential economic impacts of any tariffs and retaliatory tariffs on the sectors associated with biofuels production in the U.S.

Analysis

Estimation of export-weighted effective tariff rates

In this section, we analyze the potential impacts of the April 2nd tariffs on eight commodities of importance to the U.S. biofuel industry. We make the assumptions that: (1) there are no second-order effects due to U.S. tariffs (either substitution towards domestic production or switching trading partners to avoid higher tariffs), (2) trade flows remained at 2024 levels, and that trading partners levy retaliatory tariffs at the same level as is imposed by the U.S.

While these assumptions are not realistic, they allow for a preliminary analysis of potential impacts of these trade barriers, and of the susceptibility of various biofuels and the feedstocks that are used to produce them. Table 1 lists several biofuels and feedstock categories assembled according to their NAICS codes, the top importer of these commodities, and the value of all U.S. exports and imports of these commodities. It is evident from Table 1 that the U.S. is a net exporter of biofuels and associated commodities, by ~8.5 times in economic value. That said, the majority of corn and soybeans exported from the U.S. will not be used for

Table 1: Commodities considered in analysis of potential tariff impacts to the biofuels industry in the U.S.

Commodity	Top Importer of U.S. Exports (Share of U.S. Exports)	Value of All U.S. Exports (Billions)	Value of All U.S. Imports (Billions)
1005: Corn (maize)	Mexico (39.8%)	$14.3	$0.3
1201: Soybeans . . .	China (51.9%)	$24.6	$0.4
1507: Soybean oil . . .	Mexico (20.2%)	$0.5	$0.3
1518: Animal or vegetable fats and oils . . .	Mexico (28.6%)	$0.2	$2.4
2207: Ethyl alcohol . . .	Canada (33.3%)	$4.4	$0.4
271020: Petroleum oils . . .	Peru (94.4%)	$0.7	$0.02
3826: Biodiesel . . .	Canada (93.2%)	$0.8	$1.9
440131: Wood pellets . . .	United Kingdom (72.2%)	$1.9	$0.04
Combined	China (27.6%)	$47.4	$5.6

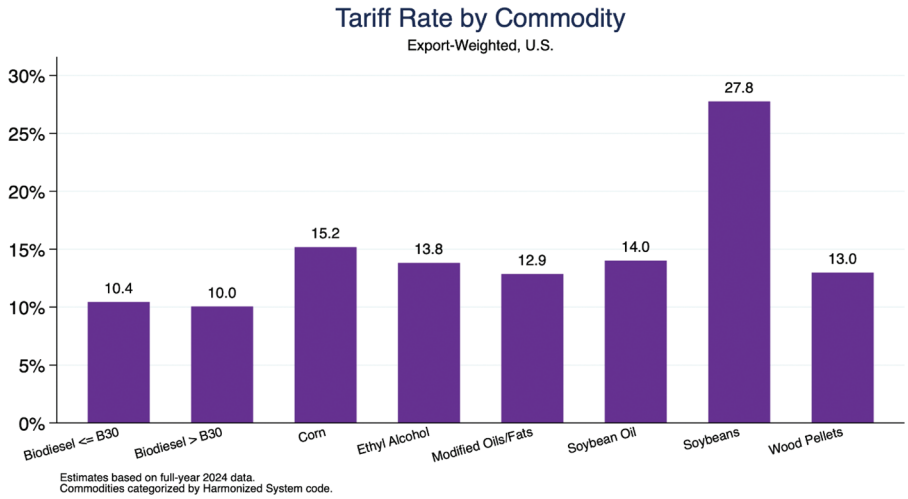

Figure: Calculated export-weighted tariff rates by commodity (industry sectors)

the production of biofuels and are instead used to meet nutritional needs in Mexico, China, and other importing nations.

To compare the potential impact of tariffs of different biomass feedstocks and biofuels, we calculate a weighted average of the country-specific tariffs imposed on April 2nd. These weights reflect the weighted average tariff of a dollar of biobased product exported. The effective tariff is given by the equation below:

$$\frac{\sum_{i=1}^{n} w_i x_i}{\sum_{i=1}^{n} w_i}$$

where i represents each country, w_i represents the value of exports from the U.S. to that country, and x_i represents the U.S.-imposed tariff rate on that country. This methodology assumes that U.S. policies provoke retaliatory tariffs at commensurate levels, as has occurred with China.[10]

Under commensurate global retaliation, agricultural feedstocks—corn (1005) and soybeans (1201)—are subject to the highest effective tariff rate due to their export to high-tariffed nations. Soy faces an effective tariff rate of 27.8% due largely to the scale of soybean trade with China, which is tariffed at 34%. Finished biofuels, on the other hand, are likely to face much lower export-weighted retaliatory tariff rates, as our analysis shows.

Potential for additional domestic biofuel creation

For additional context, the U.S. exported 52.4 MMT of soybeans in 2024.[11] Were all this material used as feedstock to produce BBD, it could have produced an additional 138 billion gallons of renewable diesel or 173.9 billion gallons of B100 biodiesel (Table 2). This calculation assumes that each bushel of soybeans (60 lb) yields 11 bushels of soybean oil,[12] and that it requires 1.26 and 1 kg of oil to yield 1 kg of renewable diesel and biodiesel, respectively.[13] Annual production capacities for renewable diesel (2024) and biodiesel (2023) were 4,328 MMgal and 1,699 MMgal, respectively.[14, 15] This means that diverting soybean exports to domestic BBD production can increase biodiesel production by over 102 times and renewable diesel production by over 31 times current capacity of these fuels. While we do not advocate for this transition in terms of soybean consumption to occur, and there are many factors that dictate commodity utilization, this analysis merely puts perspective on the additional potential for biofuel production.

Table 2: Analysis of the potential for BBD production from U.S. soybean exports

	Renewable Diesel	Biodiesel
Fuel Yield from Soybean Oil (kg feed per kg fuel)	1.26	1
Fuel from U.S. Soybean Exports (billion gallons)	138.0	173.9
Current Capacity (million gallons per year)	4,328	1,699
'Potential for Export-destined Fuel Compared to Current Capacity	31.9 times	102.4 times

Discussion

From this analysis, it is possible that the U.S. will experience another soybean glut similar to what happened when tariffs were implemented during the first Trump Administration. An effective export-weighted tariff rate of ~27% on soybeans could have a number of impacts. It may reduce U.S. exports, reduce U.S. production, or shift U.S. exports to low-tariff countries. These impacts will vary over time and depend on how exporters and producers perceive the permanence of tariffs. It is likely that all these changes will occur, but over different timescales and to different degrees. During the first Trump Administration, American

soybean farmers were compensated for losses and Chinese importers temporarily shifted to Brazil for their imports. Although this seems like a plausible consequence of tariffs and retaliatory tariffs, there are also potential opportunities which can be tapped for domestic biofuels production. Our analysis shows the potential for increased biofuels production in this scenario. This sentiment has been echoed previously as an opportunity in the face of economic uncertainty;[16, 17] the opportunity may lie closer to the feedstock rather than finished fuels, given the steeper international trade barrier the former commodities face.

While American soybean exports are primarily used for animal feed in China, they can be diverted to produce additional BBD and advanced fuels such as sustainable aviation fuel (SAF) in the U.S. Demand for BBD, in particular renewable diesel, has risen sharply, driven primarily by the Low Carbon Fuel Standard (LCFS) incentives in the state of California (along with similar initiatives in Washington state and Oregon). At the time of this writing, the Internal Revenue Service (IRS) 45Z tax credit for clean transportation fuels appears to have bipartisan support (similar to support that biofuels have historically enjoyed), with particular emphasis on domestically sourced feedstock.[18, 19] SAF production enjoys the greatest incentives as part of 45Z and there appears to be substantial momentum in expanding its consumption in the aviation sector.[20] Feedstocks such as soybeans which may end up being moored due to trade barriers can be routed to produce BBD and SAF, leading to lower feedstock costs and reducing transportation-related emissions.

Conclusions

Our preliminary analysis suggests that retaliatory export-weighted tariffs may affect biofuel feedstocks more than finished biofuels, although these feedstocks have nutritional uses in import regions. While the primary impact is greater hardship and economic uncertainty for the U.S. agricultural sector, we estimate the potential for utilizing these commodities for biofuel production. Soybeans, which are a large export product from the U.S. to China, are likely to face the largest trade barrier in the form of retaliatory tariffs. The three-way role that soybeans play (as a source of food, feed, and fuel) can allow for this feedstock to be increasingly incorporated into the biofuel production pipeline in the U.S., particularly to meet the increasing demand for BBD and SAF.

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