

# Renewable Diesel and California LCFS

## Impacts to Soybean Industry

### Joe Jobe - September 2021



**Statement of Purpose:** Soybean industry leaders are grappling to understand the impacts of the recent disruptive trend toward renewable hydrocarbon diesel (RHD) and away from biodiesel. It has spawned the question “Why do I care whether I’m selling my soybean oil to biodiesel producers or RHD producers?” This paper addresses that question, and the short answer is that you should indeed care for numerous reasons. The question itself is predicated on misconceptions. 1) That the market for biodiesel and RHD are permanent. The market is based on the renewable fuel standard (RFS), which requires political support to sustain. The soy and biodiesel industries have had to fight together every year to protect and grow the RFS in the face of vicious and sustained attacks. The fierce adversaries of the RFS are the petroleum refiners – the very companies moving into RHD that are subsuming the biodiesel industry. As this paper will detail, it remains the petro refiner’s top priority to oppose the RFS. How is a political policy sustainable after its fiercest advocates are replaced by its fiercest adversaries? It is not, and soybean producers will not be selling their oil to either biodiesel or RHD producers if the policy that underpins both markets collapses. 2) There is a widely-held misconception that RHD is superior to biodiesel and customer choice is driving the advance of RHD over biodiesel. This is false too. Biodiesel is the less expensive fuel and offers numerous performance, environmental, health, and safety benefits over RHD. The combination of the way the federal and state government credits transact and interact has created a market distortion rather than a market preference. It is a government policy problem that has created this distortion. This paper details this market distortion and recommends a public policy solution.

#### **Problem:**

From 2010 to 2016, biodiesel volumes grew from 315 mgy to almost 3 billion gallons per year. This growth was due primarily to the implementation of the Renewable Fuel Standard (RFS), and the long-term alliance between soy and biodiesel to build the biodiesel industry through joint investment and advocacy. This dramatic market emergence absorbed all of the soybean oil market lost to the trans fats labeling plus more. That 3 billion gallons was made up of nearly all biodiesel (a majority soy-based) with a small amount of renewable hydrocarbon diesel (RHD) – the two fuels together make up the category of “biomass-based diesel” (BBD). 2016 was the high-water mark, since then BBD volumes have remained stagnant for five years in a row at approximately 3 billion gallons. Biodiesel volumes have actually shrunk by nearly 1/3 to 2 bgy as RHD volumes have cannibalized biodiesel volumes. This trend of cannibalization by RHD is accelerating at an alarming rate, and it has primarily been spurred on by the California low carbon fuel standard. If there is not a course correction, the billions of public and private dollars that have been invested for the last 30 years to build out the biodiesel industry – America’s advanced biofuel – will be subsumed by a few mega-RHD refineries out West that will all be operating at the direction and at the mercy of the California government.

The California government is not a champion of BBD; CA reluctantly tolerates it as a bridge to all-electric. And CA likes soy the least. It must be noted at the outset that this white paper is not anti-petroleum refiner or anti-RHD. Petroleum refiners provide society many of the things we need and employs hundreds of thousands of good people. And RHD has its place in the energy mix as well. If the policy proposal in this paper is adopted, petro refiners and RHD producers will not be harmed. This white paper is pro-RFS and is pro-biodiesel. It is an appeal to the soybean industry to embrace a public policy that will yield far better outcomes for agriculture, the environment, taxpayers, and consumers. And it is an appeal not to abandon its successful alliance with the biodiesel industry in order to chase the unrequited love of a new suitor who will remain your primary political adversary (opposing the RFS and LCFS). And all this is occurring because of the market distortions created by a state that has a misplaced contempt for soy.

**Solution:** EPA should create a small refinery program for AB refiners similar to the small refinery safety net program in place for petroleum refiners under the RFS. The EPA should create a new category nested within the overall AB category - 2 bgy that can only be met by AB plants that are less than 100 million gallons per year.<sup>1</sup> This small refiner category would be technology neutral because it would apply equally to all AB technologies. EPA should also grow the overall volumes in the D4 and D5 categories. This will allow new RHD and sustainable aviation fuel (SAF) projects to grow and actually result in new carbon reduction rather than cannibalizing one low-carbon product with another resulting in no carbon reduction (and actually a net carbon increase). The EPA and the Administration have the statutory authority to do this through its rule-making process or under the “Set Analysis” (discussed later) *without* new legislation.

**California Low Carbon Fuel Standard (LCFS).** Petroleum refineries have been announcing projects to convert aging refineries out West into RHD refineries in order to capture LCFS credits. Because biofuel volumes under the CA LCFS program fall under the umbrella of the RFS, the LCFS has not generated any new demand, as evidenced by the fact that BBD volumes in total on a national level have stayed at 3 billion gallons for five years even while volumes in California are growing significantly. The RFS annual renewable volume obligations (RVOs) set the volume nationally. RVO’s were intended to set the floor for the market, but unfortunately, the way the program works now, the RVO’s also represent a ceiling. If production exceeds RVOs in a given year, RIN prices crater and production drops. The CA program has had many negative and market distorting effects. The CA LCFS –

- Penalizes soy oil for having indirect land use change (ILUC) effects. These land use changes were based on life cycle models 10 years ago and the predicted LUC did not happen. Yet, soy is still being penalized by the California program which assigns soy the highest carbon intensity of any feedstock. This has resulted in virtually no soy used in CA currently. This is likely to change as volumes in CA grow but:
  - A) If current trends continue, the growth of the market in California may simply mean more cannibalization of markets elsewhere in the country; so more soy-based RHD in California may not necessarily result in more soy oil consumption nationally. It is likely going to take feedstock away from soy biodiesel in the middle of the country.
  - B) The LCFS has already resulted in soy being the last choice feedstock. Soy has always been the market leader in fats and oils with other fats and oils priced at a discount indexed to soy. Because California and other state LCFS policies who follow California has inappropriately rated soy the worst feedstock, soy will likely lose its market leader position and become the marginal feedstock. According to market sources, one large RHD producer is sourcing used cooking oil from all over the Midwest, shipping it to Singapore, turning it into RHD and shipping it on to California. Sources say that this refiner is working to replicate these trades all over the world.

**Biodiesel (BD).** From 2005 to the present day the biodiesel industry answered the enormous challenge set forth by Congress and President George W. Bush for the nation to produce more advanced, domestic, low-carbon, renewable energy. President Bush signed the law enacting the BD tax credit (BTC) in 2004 and the RFS in 2007.<sup>2</sup> Presidents Obama, Trump and Biden continued strongly promoting and building upon these policies. The federal government invested billions of dollars and the private sector responded with billions of dollars of investment. Leadership, investment and innovation by the soybean industry created a new industry that did not exist before. Biodiesel is an environmental and economic success story. It can reduce carbon emissions by 80% or more and dramatically improves air quality for people exposed to harmful diesel emissions. BD plants are decentralized, located in virtually every state, providing clean energy and high-paying green jobs to rural and disadvantaged communities.

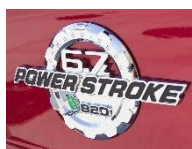


May 16, 2005 President Bush speaks at Virginia Biodiesel Refinery.

<sup>1</sup> Small AB category limit would apply by individual plants not cumulative by company. Multi-plant companies would qualify.  
<sup>2</sup>RFS was a part of 2007 [EISA](#). In his 1/31/06 State of the Union Speech, Bush declared that “America is addicted to oil,” and set a goal of replacing 75% of its imports from the Middle East with domestic sources such as biofuels by 2025.

**Renewable Hydrocarbon Diesel (RHD)** RHD is a BBD made by hydro-treating fats and oils in a conventional refining process that makes it chemically indistinguishable from diesel fuel. RHD uses the same fats and oils feedstocks as BD and also generates D4 RINs and BTCs. Whereas BD is a drop-in replacement fuel up to 20%, RHD is a drop-in replacement fuel up to 100%. However, RHD is significantly more expensive than BD. The cost to build a RHD plant (CapEx) is 3-4 times higher for RHD than for BD. Operating costs (OpEx) for RHD are significantly higher as well because the process operates at higher temperatures and pressures and has to reform methane into hydrogen using more energy in the process. A gallon of RHD sells at a significantly higher cost than a gallon of BD. Thus the cost of reducing carbon using RHD is more expensive in most cases to society and consumers compared to the cost of reducing carbon with BD. Carbon is reduced when a gallon of BD or RHD replaces a gallon of diesel fuel. It doesn't matter what blend level that gallon goes into, it only matters how many total gallons of BBD replace total gallons of diesel fuel. **Three billion gallons of RHD (sold in up to 100% concentrations) will reduce less carbon at a higher cost than 3 billion gallons of BD (sold in 20% blends).**

**Biodiesel is an Oxygenated Fuel.** BD is 11% oxygen, which is what makes it burn cleaner reducing virtually every regulated emission compared to diesel fuel and RHD. The oxygen in BD blended into diesel fuel is especially effective at reducing diesel particulate matter and other harmful compounds such as polycyclic aromatic



hydrocarbons (PAHs).<sup>3</sup> RHD is chemically identical to diesel fuel; does not contain oxygen or the clean burning characteristics of BD.<sup>4</sup> Other than lifecycle carbon benefits stemming from renewable feedstock, RHD provides no additional emissions reductions compared to diesel fuel. Because BD is an oxygenated fuel it has a better emissions/health/safety profile than RHD. BD has been shown to reduce maintenance costs for diesel particulate filters (DPF's). Because of the

oxygenation, BD triggers the DPF's regeneration event at cooler temps reducing maintenance and replacement costs. Also, the fuel's natural lubricity extends the life of the fuel injection system in a diesel engine. Because of the more efficient combustion from the oxygen, B20 has been shown to provide the same MPG and horsepower as diesel fuel and RHD, even though it has slightly less BTUs.

#### **B20 has premium diesel characteristics compared to diesel fuel and RHD:**

- Higher lubricity (increases engine component life and performance and reduces maintenance)
- Higher conductivity (reduces fire hazard from static charges)
- Higher Flashpoint (reduces fire hazard during handling and increases vehicle safety)
- Lower aromatics (lower emissions)
- Solvency (acts similarly to a detergent additive in premium diesel to help keep the fuel system and emission control systems cleaner, with lower maintenance costs and longer life)
- Non-toxic and biodegradable (reduces risk to environment in case of spills)
- B20 delivers same MPG, horsepower, cold temperature operability as diesel and RHD with no engine modifications – contrary to common misperceptions, *B20 is a drop-in replacement fuel.*<sup>5</sup>

In these ways, B20 is a superior fuel to diesel fuel and RHD. As a demonstration of B20's performance benefits, B20 set the diesel land speed record. In 2011, Brent Hyjeck set the Diesel Land Speed World Record running on ULSD at 171 mph on the Bonneville Salt Flatts with a Ford F250. On his second run he drained the tank, replaced the diesel fuel with B20 and broke the record he had just set using the same truck – nothing was different except the fuel. The new record: 182 mph.

<sup>3</sup> [Sciencedirect.com](https://www.sciencedirect.com). "Recent Studies on Soot Modeling for Diesel Combustion" 2015 Omidvarborn, Kumara, Kim

<sup>4</sup> "Assessment of [Health Benefits](#) of Using Biodiesel as a Transportation Fuel", Trinity Consultants, March 2021.

<sup>5</sup> Various perceptions persist of BD challenges such as cold flow, lower fuel economy, OEM acceptance, NOx, materials compatibility, filter plugging from solvency cleaning effect. Most of these issues have been eliminated with specification and fuel quality changes. What challenges remain occur when BD is used at high levels such as B100. These issues do not commonly occur with properly handled, on-spec BD in blends up to B20. According to several surveys conducted by NREL, fuel-related problems with B20 occurred less than with diesel fuel (B0). See this [article](#) by Mototrend Magazine.

**EPA's Statutory Requirement to Protect Small Businesses.** The [Regulatory Flexibility Act](#) requires agencies to consider the impact of their rules on small entities and to evaluate alternatives that would accomplish the objectives of the rule without unduly burdening small entities when the rules impose a significant economic impact on a substantial number of small entities. Inherent in the RFA is Congress' desire to remove barriers to competition and encourage agencies to consider ways of tailoring regulations to the size of the regulated entities.

**Social cost of carbon.** The EPA has for many years used the "Social Cost of Carbon" as a measure of how the RFS is performing toward its goals. This includes the decisions the EPA makes on setting the RVOs in the various categories of biofuels.<sup>6</sup> This is a governing principle that policy should be guided by goals to reduce the highest amount of carbon at the lowest cost to society. Yet the unintended market distortion in favor of RHD will result in less carbon reduction at a higher cost to society.

**Anti-backsliding.** The EISA statute gives EPA authority to take measures in the administration of the RFS that would prevent backsliding in environmental progress in the program.<sup>7</sup> To divert government incentives away from small producers who produce a more environmentally friendly product at a lower cost to a few large petroleum refiners who produce a less environmentally friendly product at a higher cost, would disrupt the advancement of the goals of the program. EPA has the authority to prevent such a harmful disruption.

**Environmental justice.** The inadvertent policy impacts of replacing one oxygenated, low-cost, lower carbon biofuel with a non-oxygenated, higher cost, higher carbon biofuel will also have the effect of depriving disadvantaged and rural communities of the existing high-paying green jobs.

**The "Set" analysis of 2022.** The EISA statute directs the EPA to analyze six factors to determine volume targets and other changes to the program after 2022. The EPA will be carrying out this analysis over the next 18 months to determine the future of the RFS program beyond 2022. The Small AB program would benefit all 6 factors.

**Small Petroleum Refiner Safety Net Program.** The EPA has broadly granted small refinery exemptions (SREs) to petroleum refiners that refine less than 75,000 barrels per day and show they are suffering "disproportionate economic hardship" as a "safety -net".<sup>8</sup> EPA should create a similar small refinery safety net program for small refiners of AB. A small AB program will result in more carbon reduction at a lower cost, enhanced social justice, and provide other performance, health, safety, economic, energy and environmental benefits. It will have no cost to taxpayers, is pro-consumer, and will strengthen the RFS. This proposal also urges EPA and the Administration to more fully realize the carbon reduction potential of the RFS by growing volumes for small *and* large AB refiners. If a policy course correction is not made:

- Billions of dollars in government investment aimed at reducing carbon will be transferred from small producers of biodiesel to petroleum refiners and the airline industry.
- Taxpayer dollars will be spent to replace biodiesel - a highly efficient, oxygenated, low-cost, low-carbon product, with RHD - a good product but one that has higher-cost and higher emissions. This transfer of wealth will result in more carbon, not less, and at a higher cost to consumers and taxpayers.
- Consider this analogy. The federal government has invested billions of dollars over the years to help build out America's airports.<sup>9</sup> Imagine if the federal government spent money from the newly enacted \$1 trillion Infrastructure program to replace the nation's top 100 major airports with 12 mega airports. The new airports are built at a much higher cost than the fully functional ones that are already built out and this higher cost is passed on to the airlines and their consumers. And the new airports accommodate fewer total passengers,

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<sup>6</sup> EPA [Social Cost of Carbon](#).

<sup>7</sup> [Anti-backsliding](#) provisions of the RFS program.

<sup>8</sup> EPA – [small refinery exemptions](#)

<sup>9</sup> The FAA administers the [Airports Improvement Program](#) (AIP) grant funding

deprives many of those passengers of an airport near them, and deprives 100 communities of the economic activity provided by their existing airports. That would be a wasteful use of government resources that produced a net negative result. Likewise, without a small AB refinery program, 100+ BD plants (which have already been built out with government, private, and soy checkoff investment) will be replaced by a few RHD plants. The new plants will reduce less carbon at a higher cost to consumers. This displacement will diminish the goals of the RFS and have tragic consequences for BD companies and the communities they operate in.

The trade association that represents these independent refineries who are announcing RHD projects is the American Fuels and Petrochemical Manufacturers (AFPM). Some BD stakeholders assert that now that refineries are investing in RHD, they will reverse their position and support the RFS. This assertion is counter to the evidence. Opposing the RFS remains AFPM's top policy priority. See [this](#) video and press release currently posted prominently on AFPM's website of a rally to oppose the RFS and support SRE's. Participating in this event is RHD producers Marathon and PBF energy. This month AFPM started a new [blog](#) dedicated to attacking the RFS.

The EIA recently released an [analysis](#) showing that as much as 5.1 bgy of RHD capacity could come online by 2024. Some of the projects that have begun construction or almost surely will be completed include Marathon's expansion to 1 bgy (Dickensen, Cheyenne, Martinez), Valero's DGD expansion to 1.1 bgy, Phillips 66 conversion of a refinery to 800 mgy, and PBF's 600 mgy conversion. That totals 3.5 bgy in the hands of four large petroleum companies who are all obligated parties and who continue to oppose the RFS. Several refinery CEOs have said publicly in earnings calls and elsewhere that if the RFS were to lose political support and go away, they would simply convert the RHD refineries back to petroleum refineries.

The US supreme Court just ruled in 2021 that the EPA has broad administrative authority to grant SREs to petroleum refiners. The AFPM CEO recently [testified](#) before Congress stating that America's small petroleum refineries are a part of the backbone of this country and that SREs are an important safety net in the RFS. If that assertion is true, then America's 100+ small AB refineries are also part of the same backbone and need a similar safety net. A small AB program would prevent a market distortion from causing a transfer of wealth from small AB refiners to large petroleum companies. If it is good policy to create a safety net for small petroleum refiners in the form of an SRE, then it is good policy to create a safety net for small AB refiners in the form of an Small AB category. It would simply apply the same principles and authority (upheld by the SCOTUS) to small AB refiners.

**Small AB Refinery Program is all Upside and No Downside for Soy.** There are some in the biodiesel industry that have been insisting to the soybean sector that the rapid growth of RHD will be all positive to soybean farmers and will not be a threat to the existing biodiesel industry. These stakeholders have been making this argument and ignoring the trends for over three years. They were wrong then and they are wrong now, which is now abundantly clear to virtually all knowledgeable, objective observers including the US Government ([EIA study](#)). But for those soy leaders who may have been persuaded by those arguments or are skeptical of the extent of negative consequences outlined in this document, please consider this. If the Small AB category is adopted, there will be more soybean oil consumed than if it is not adopted. The initiative offers significant upside opportunity to strengthen and expand soy markets for the long-term. The alternative of doing nothing offers substantial downside risk ranging from moderate to devastating.

**Conclusion.** The EPA is required under the Regulatory Flexibility Act to tailor the RFS program in a way that does not harm small entities. BD is the single largest and most successful Advanced Biofuel under the RFS. Yet, in the last five years BD refiners have gone from approximately 200 companies to approximately 100, and from producing approximately 3 bgy to approximately 2 bgy. They are being subsumed by large petroleum refineries who are making a higher cost, higher carbon product. According to the EIA, this trend is accelerating rapidly and could result in 5 bgy of RHD by 2024. This trend is not occurring because of any free-market, pro-competitive, pro-consumer forces. It is occurring because of a market distortion created by the CA LCFS. It is also happening because the EPA has refused to grow the RFS as they are required to do by EISA in order to realize the carbon

reduction goals of the program and so that both BD and RHD volumes could grow. Ironically, it is the same large independent petroleum refiners/RHD producers who are the primary adversaries of the RFS and who have successfully advocated for the EPA to keep RFS volumes low. They have also successfully lobbied to have the EPA broadly administer their own safety net program in the form of SRE's. If EPA does not act to provide a safety net for small producers of AB similar to the safety net program they provide for small petroleum refiners, most of the small AB refiners in the program will perish. There has never been a clearer example of why Congress passed the Regulatory Flexibility Act to protect small businesses, because these are small businesses that Congress invested in to build in the first place. A Small AB refinery category would result in more carbon reduced at a lower social cost, enhanced social justice, and other performance, health, safety, economic, energy and environmental benefits. It would strengthen the goals of the RFS at no cost to taxpayers and a cost savings to consumers.