LMC Lipid Feedstock Outlook to 2030

Rationale for the Study

- Demand for biofuels globally is growing strongly, particularly for biomass-based diesel, as countries aim to meet environmental goals.
- The Advanced Biofuels Association has set a goal for the U.S. to reach 21 billion gallons of biomass-based diesel (BBD) to replace fossil fuels by 2040.
- To reach this goal means 9 billion gallons of BBD by 2030.
- **The critical question: *Will there be enough lipid feedstock to meet this demand?***
- The ABFA commissioned LMC International1 to forecast the outlook for supply of lipid feedstocks to determine their ability to meet the ABFA's goal.

Lipid supply outlook to 2030

LMC International forecasts total global lipid supply to increase from 246 million metric tons in 2020 to 330 million metric tons in 2030. We include all lipid sources[2] in our analysis to form a full picture of the global market. (Diagrams 1-3)

In 2030, this volume of lipids will be the equivalent of 93 billion gallons of renewable diesel (RD), if all global lipids are converted to RD. (Diagram 1)

- Of this total, **RFS-approved feedstocks** are rising by 55 million metric tons to 171 million metric tons in 2030.

  This is equivalent to **55 billion gallons** of RD in 2030.

- **Potentially approved feedstocks** are rising by 25 million metric tons to 134 million metric tons in 2030.

  This is equivalent to **38 billion gallons** of RD in.

- **Other oils**[2] are rising by 4 million metric tons to 25 million metric tons in 2030.

  This is equivalent to **7 billion gallons** of RD.

[1] LMC International is a consulting firm specializing in global economic and market analysis of agricultural feedstocks and their major end products, with a special focus on biofuels.

[2] Other oils includes oils such as palm that are not RFS-approved and are ruled out of several biofuel policies, but that are a significant source of vegetable oil for a range of end uses around the world. We include more niche or specialty oils, too, in our total, although they are not analyzed in detail.

Note: It is important to include both RFS-approved and other lipid sources, as our objective is to look at demand for lipids from all end uses from all countries. So, to exclude a source of supply would create a false deficit.

Diagram 1: Global oils and fats supply forecast to 2030

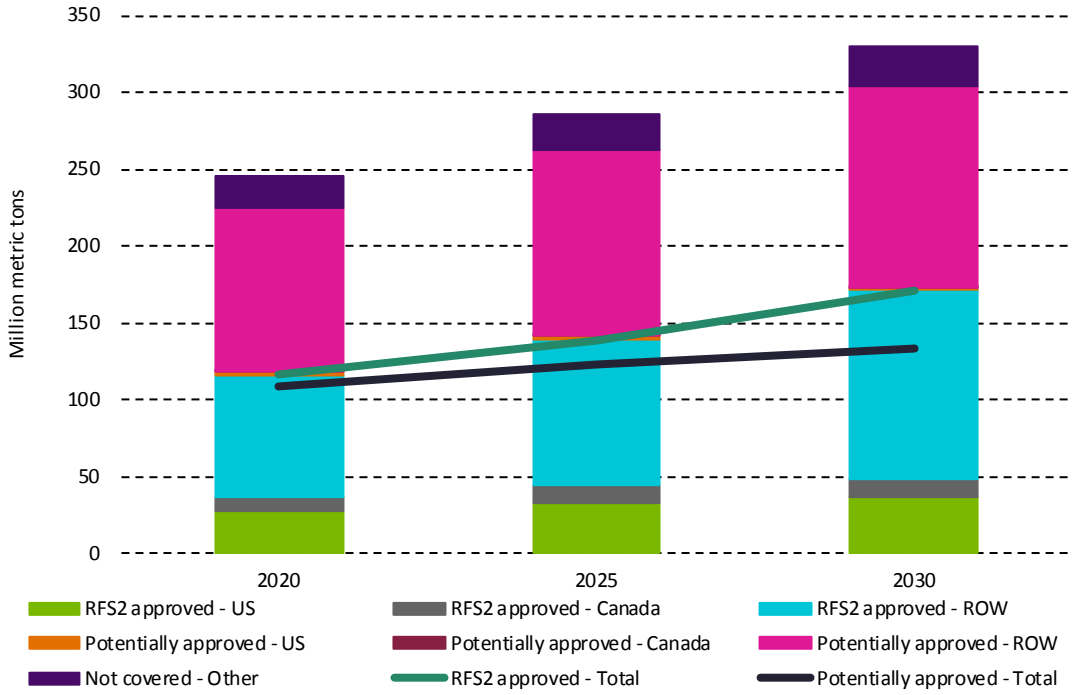


Diagram 2: U.S. feedstock supply forecast to 2030 – by feedstock

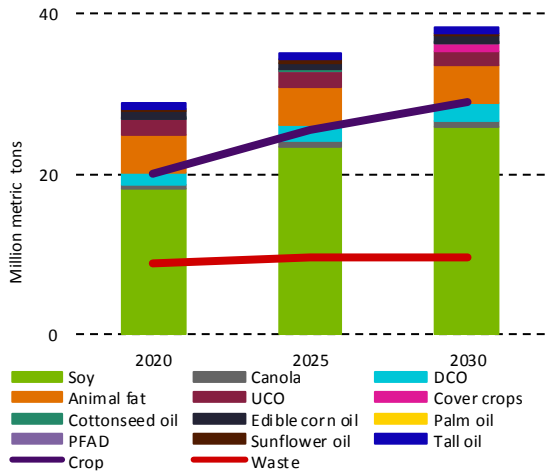
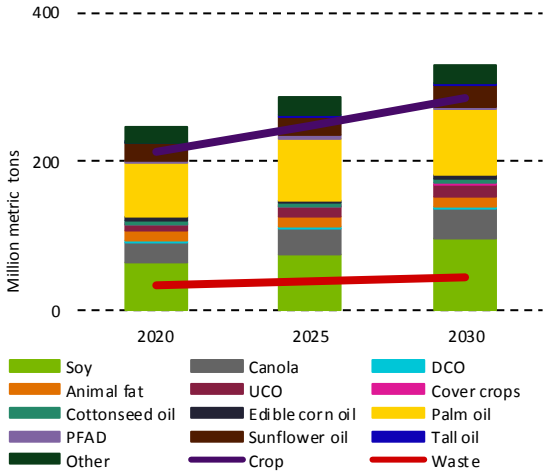


Diagram 3: Global feedstock supply forecast to 2030 – by feedstock



In the U.S.

- Soy oil has the most potential for growth in the U.S. We forecast volumes in terms of oil-in-seed. If more beans are crushed locally, that could increase available oil supplies compared to current U.S. production.

- Waste oils have only limited potential for increased growth in the U.S., as collection and extraction rates are already high.

Outside North America

- There is greater potential for growth in waste oils supply in countries with less developed collection networks. These supplies could be even higher than assumed in our forecasts, if prices are high enough to incentivize collection/extraction.

- Palm oil is a significant source of lipid supply to the world market. However, palm oil growth is set to slow and other oils will make up a growing proportion of the market.

Lipid demand to 2030

To assess whether the U.S. will be able to meet the ABFA goal, we take a tiered approach.

1. First, we remove the supply needed to meet demand from non-biofuel end uses (food, feed and oleochemicals). These end uses are inelastic – the need for them is relatively fixed and is not impacted by price.

   It is important to note that our analysis allows fully for food requirements before evaluating the feedstock supply for biofuels.

2. Then, we remove the demand from biofuels in four other markets with strong biofuel policies. (This is arguably overly conservative in that the U.S. might well come 2nd in line for feedstocks, after the EU, not 5th. In addition, of course, if policies in the U.S. change, the relationship with other markets with biofuels policies could change.)

3. The remaining volume is then compared to the required volume needed to meet ABFA's U.S. biofuel target.

In 2030, demand for lipids in non-biofuel end uses plus biofuels in the four countries outside of the U.S. with strong environmental biofuel policies is set to rise to 260 million metric tons. This leaves 70 million metric tons available for use in the U.S. (as well as other countries), equivalent to 19 billion gallons of RD.

- Global demand for non-biofuel end uses (food, feed and chemicals) is forecast to rise from 168 million metric tons in 2020 to 210 million metric tons in 2030.

- Demand for lipids from biofuels in the four key biofuel consuming countries is forecast to reach 51 million metric tons in 2030, up from 24 million metric tons in 2020 (assuming all biomass-based diesel fuels are made solely from lipids).

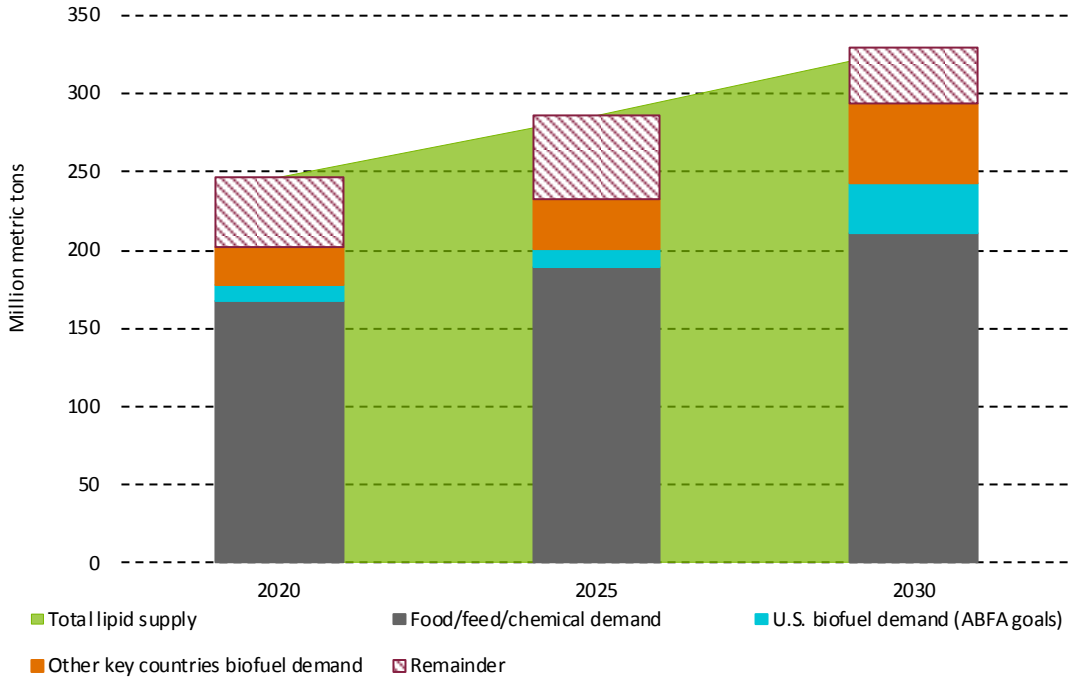
Conclusions

To meet the ABFA goal of 21 billion gallons of biomass-based diesel in 2040, we estimate that consumption will need to reach close to 9 billion gallons in 2030.

If all of this volume is produced from lipid feedstocks, it will require 32 million metric tons of lipids.

To 2030, feedstock supplies available for use in the U.S. are more than enough to meet our forecast demand, *after accounting for food*.

Diagram 4: Global lipid market forecast to 2030, supply vs. demand



In the long term, other technologies will need to progress to produce increasing volumes of sustainable aviation fuel (SAF) to allow for the ambitious growth targeted in the U.S. and around the world. [3]

[3] The exact amount of lipids required will depend on the type of biomass-based diesel produced, the feedstock, and the technology used, as conversions vary with each factor. Our estimate of lipid demand is based on LMC's assumptions of the progression of biodiesel (BD), renewable diesel (RD) and SAF. The conversion factors assumed are:
BD: 1.05 mt lipids per 1 mt of BD, 299.2 gals per mt
SAF: 1.4 mt lipids per 1 mt of SAF, 348.2 gals per mt
RD: 1.2 mt lipids per 1 mt of RD, 339.3 gals per mt

U.S. supply of RFS-approved feedstocks

Currently, U.S. demand for lipid feedstocks for biofuels can be met easily by U.S. oils supply, taking just over one-third of the total in 2020.

By 2030, U.S. biofuel use will require close to 90% of total *U.S.* supply of RFS-approved feedstock.

Diagram 5: RFS-approved feedstock supply vs. demand for lipids for U.S. biofuels