The Rise of Renewable Diesel

A global trend in the world of biofuels has been the skyrocketing demand for so-called "renewable" diesel. Renewable diesel is produced by treating vegetable or animal fats with hydrogen, sometimes referred to as hydrotreated vegetable oil (HVO). It can be produced from a wide variety of fats and oils including not only vegetable oils like soy, palm, corn, or rapeseed/canola oils, but also animal fats including tallow, lard, fat residues from slaughterhouses, as well as used cooking oil (UCO).

So rapidly is this trend escalating that we are witnessing a global "fat grab" as fuel producers, spurred on by lucrative (and misdirected!) climate policy supports, seek out and compete for access to fats and oils from all over the world.

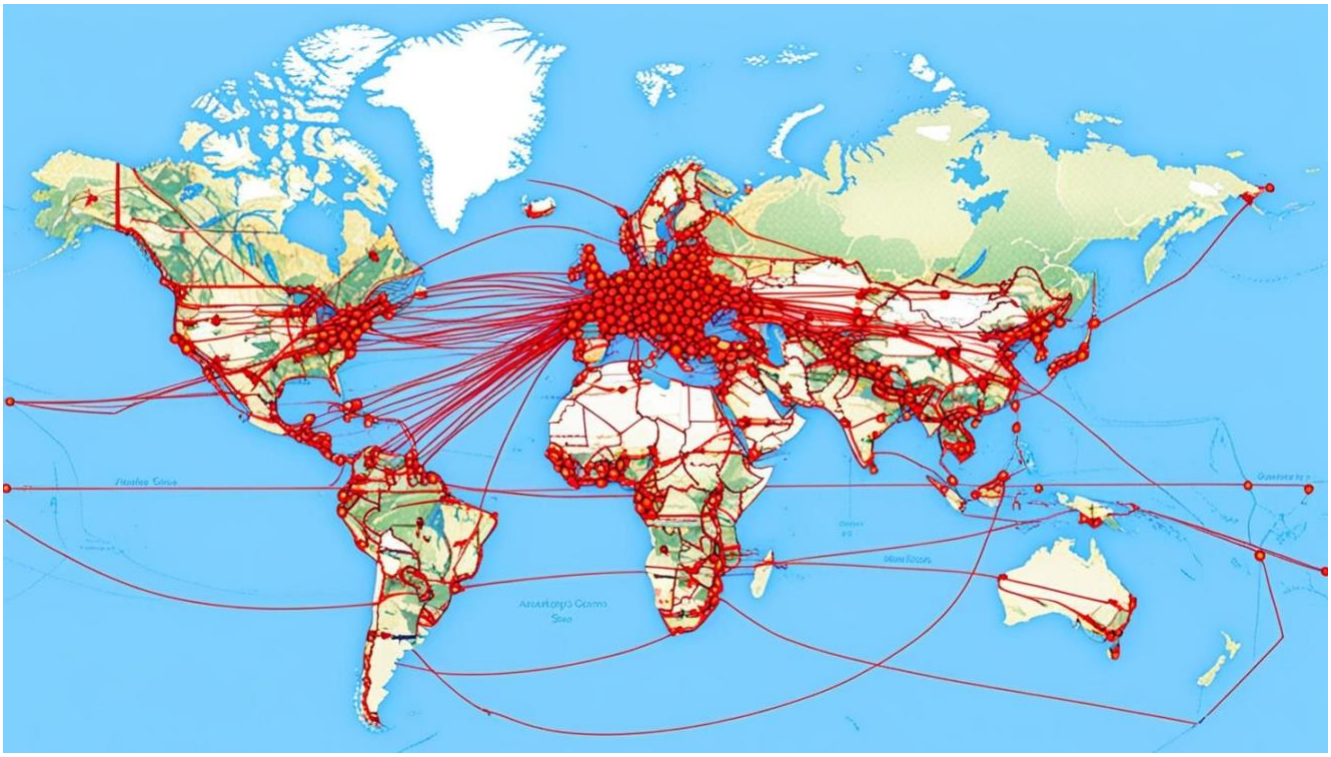
The potential scale of the demand for renewable diesel is far greater than that for other biodiesel fuels because it is a "drop in" fuel that can be used at full strength in most engines designed to burn diesel fuel without requiring engine modification or blending with fossil diesel. Hence, with many policy incentives for use of biofuels in place around the world, there is huge demand for renewable diesel for cars, trucks, heavy equipment and various forms of shipping.

Aviation Biofuels

What about airplanes? The hype over producing aviation biofuels - so called "sustainable aviation fuels" (SAF), from garbage or algae or fairy dust, is truly mind-blowing. Promises are being made, and billions of dollars are flowing in to research and development. Unfortunately, much of that is based on little real-world feasibility and can be predicted to fail, resulting in bankruptcies and fraud, not to mention wasting taxpayer funds, such as we have already seen with companies such as Fulcrum[i].

Various other technical pathways[ii] for making aviation grade biofuels have been developed and/or certified, but such fuels not have yet been successfully produced at a commercial scale. With additional process steps, renewable diesel can be upgraded to satisfy the specifications for use in airplane engines (though blended 50/50 with fossil fuel).

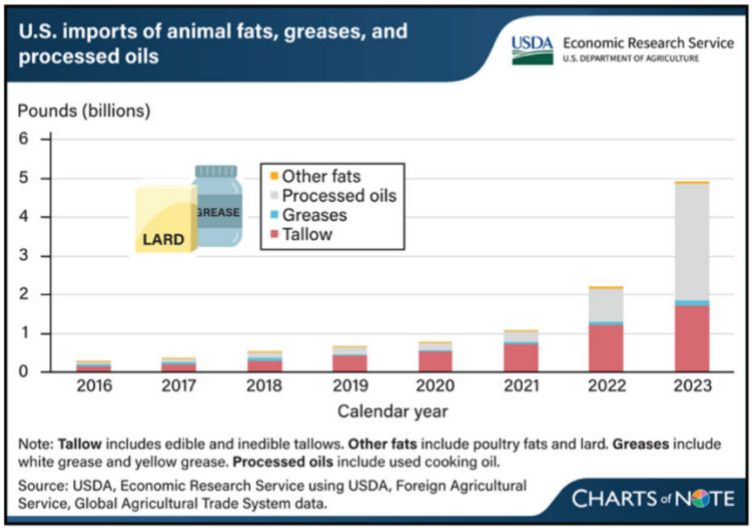
The demand for aviation fuel is astounding and growing rapidly. Commercial aviation alone (i.e. not including private and military aviation) burned through some 100 billion gallons[iii] of fuel in 2024. The industry is under pressure to reduce its outsized climate impact.[iv] With limited options for improving the design and operation efficiency of existing fleets, the focus has instead been on producing aviation biofuels. For example, the International Aviation Transport Association (IATA) has adopted a goal[v] to achieve "net zero" emissions by 2050, with potential for 65% of the reduction to come from using aviation biofuels.



Where Will the Fats and Oils Come From?

The question is: where on earth will all the fats and oils come from to satisfy both the huge demand for a drop-in diesel fuel in ground transportation and the vast demand for aviation?
According to a 2024 update, the International Energy Agency (Task 39)[vi] reports that renewable diesel production had been about 6-7 billion litres in 2022. But with many new and planned facilities, production is expected to make a whopping great leap to 25 billion litres.

U.S. imports of animal fats, greases, and processed oils surge to meet demand from biomass-based diesel production



Looking at the USA alone, a 2022 study by Cerulogy[vii] reported that if all the new facilities proposed and under construction at that time
were to come online, an unrealistic 17 million metric tonnes of additional fats and oils would be required as feedstock.

While it would make sense to pause and consider the implications of so vast a demand before attempting to satisfy it, the pace of renewable diesel expansion has offered little opportunity for precaution. The USA has scaled up production from about 100 million gallons in 2010 to over 3 billion gallons in 2023.[viii]

According to the US Department of Agriculture[ix], US imports of animal fats (edible and inedible tallow, lard and poultry fats), greases and processed oils, including used cooking oil (UCO), skyrocketed from about 1 billion pounds in 2021 to 5 billion pounds in 2023.

For a more intimate and detailed perspective on the US fat grab, consider some of the fuel production pathways submitted for certification under the California Low Carbon

Fuel Standard (LCFS). Most renewable diesel is consumed in California[x] due to the lucrative incentives offered to producers and consumers by that policy.

The fat grab reality first came into focus for us in December 2023, with a public comment period for fuels produced by Diamond Green Diesel, a joint venture of Valero and Darling Ingredients (a global supplier that claims to “repurpose approximately 15% of the world's meat industry waste streams into value-added products”. The company submitted several pathway applications involving transport and delivery of feedstocks to their Louisiana facility by ocean tankers and trucks. Those included shipments of canola (or rapeseed) oil from North America, used cooking oil (UCO) from Oceania, animal fats from Oceania, animal fat from South America, UCO from Asia, and animal fats from Asia.

On further researching LCFS pathway applications in that same year, we found that 23 different producers had filed petitions, in some cases involving multiple different pathways. Not all of them specified that their fuels are intended ultimately for aviation - there are many other demands for renewable diesel – though most presumably could be upgraded for aviation. Neste (Finland), one of the biggest renewable diesel fuel producers in the world, applied for certification of 25 different pathways using various fats primarily sourced within Europe. REG Geismar LLC (also in Louisiana) applied for certification of 40 different pathways, using soy and corn oils from North America, UCO from North America, South America and “global suppliers”, tallow from North America, South America, Asia/Pacific, and from JBS Colorado (JBS being the largest beef

producer in the world).

Envision huge fleets of ocean tankers filled to the brim with various fats, oils and greasy residues from livestock slaughterhouses crossing oceans from all over the world to

ports nearby these refineries (the majority in the USA are in Louisiana and Texas), where they unload their slop into truck tankers to deliver to the refineries. Once the fats have been treated and made into fuel, most is transported by rail or by ship to California, unloaded and transported yet again to distributors or to one of the massive refineries in the bay area - Marathon/Martinez and Phillips 66 (long targeted by environmental justice groups for their ongoing pollution of surrounding communities) which have been shifting from refining petroleum to biofuels[xi] with the capacity to upgrade to aviation fuel.

Especially nauseating to contemplate are slaughterhouses sending fats trimmed from cows, pigs and chickens, and shipping them around the planet. Industrial livestock production and slaughterhouse operations are a horror show, and this new market for fats only contributes further profitability to a grotesque industry. Similarly, the expansion of industrial monocultures of corn, soy, canola, and oil palms threatens to further flatten diverse ecosystems, deplete soils and water resources, use up scarce phosphorus supplies, and displace communities and food production.

The expanding trade in fats and oils also begs the question: if they are so valuable, why are they being shipped around the globe? Why aren't they used in their countries of origin rather than being shipped to the USA (or Europe). Policy incentives such as California's Low Carbon Fuel Standard, the federal Renewable Fuel Standard, and Europe's Renewable Energy Directive provide supports to bolster market demand. But countries around the world are increasingly adopting their own targets and incentives, hence supply crunches appear imminent. For example, Indonesia, with plentiful palm oil, has been ramping up its domestic biodiesel blending target to 40% and ultimately 50%, and has also adopted aviation biofuel targets, raising concerns about the impacts on export markets, not to mention expanding conversion of land.

Photo Credit: Peter Prokosch

Resource grabs including land grabs for growing food and feedstocks for livestock and biofuels, or for carbon offset projects are increasingly driving people from their lands and livelihoods[xii] and entrenching the culture of inequity. The "fat grab" is poised to further exacerbate this trend.

What impact will an impossibly monumental demand for fats and oils have?

Contributing to rising food costs and global hunger

Many of the fats and oils that are sought for producing renewable diesel are also used for food production. The vast new demand to supply aviation fuels contributes to the rising cost of cooking oil, straining the[xiii] budgets for many already struggling to put food on the table.

Driving deforestation and biodiversity losses

Commercial-scale edible oils share a common market "elasticity" because they can be substituted by other oils. For example, if soy oil is unavailable or more costly, users can simply substitute a different oil, including palm oil which is often the cheapest. Palm oil is a notoriously destructive crop[xiv] responsible for vast swathes of deforestation in some of the worlds most treasured biomes along with the displacement of local and Indigenous communities.[xv]

Palm fatty acid distillate (PFAD) is a popular feedstock for renewable diesel production and is often referred to as a residue or waste product of palm oil production. But PFAD is simply a component of crude palm oil. The content of PFAD in oil palm fruits can be increased or decreased (by leaving the fruits a little longer prior to processing) depending on market demand. A study of PFAD in biofuels[xvi] concluded: "Diverting PFAD to biofuel feedstock will lead to increased palm oil demand, and palm oil expansion is linked with extensive tropical deforestation and peat loss."

An estimated 350 million gallons, accounting for 96% of renewable diesel imported into the USA[xvii], approved and subsidized under California's Low Carbon Fuel Standard, derive from a Neste facility located in Singapore, whose primary feedstock is PFAD.

Used cooking oil is a highly sought feedstock for renewable diesel. Classed as a "waste-based" fuel, in the EU and UK, fuels made from UCO count twice as much toward emission reduction targets, and in the USA they are generously subsidized under both the Low Carbon Fuel Standard and the federal Renewable Fuel Standard. Suspiciously large quantities of UCO are imported into both the EU and USA.[xviii] Shipments labelled as UCO are believed to commonly (also) contain virgin palm oil, resulting in a number of investigations which suggest that fraud is widespread. The UCO trade involves many diverse producers, collectors, and traders. Hence both the incentives and opportunities for fraud are many. With the rapidly expanding fat grab, the

US and Europe are competing for the importing the largest amounts of UCO worldwide.[xix] - or what is labelled as such. The US Environmental Protection Agency recently launched audits[xx] of the supply chains for some producers, but there is little basis for confidence that supply chains can in fact be effectively tracked.

Providing a dangerous lifeline for the climate-destroying fossil fuel industry

This is evidenced by partnerships such as Marathon (oil refiner) and Neste (the world's largest producer of renewable diesel, including from PFAD). The two have joined forces to convert the Marathon oil refinery in the San Francisco Bay area to renewable diesel/aviation fuel production. Such conversions are convenient for oil refineries given that those have in place the facilities for hydrogen treatments (aka "hydrocracking") which were previously used for petroleum refining. Big refineries such as the Marathon refinery, along with the nearby P66 refinery[xxi], faced with financial difficulties, may remain viable by making use of their hydrocracking facilities to make biofuels.

Picture: The Phillips 66 refinery on the shores of San Francisco Bay.

Greenwashing aviation

The aviation industry push for biofuels provides a text-book example of a false solution. Unwilling to consider reducing the scale and scope of air travel given its environmental and social justice toll, the industry seeks a biofuel alternative and is allowed to cook the books when accounting for carbon emissions. Far from effectively addressing climate change, aviation biofuels provide yet another venue for extractivism - a global fat grab - offering a false sense of green-credentialled self-righteousness to the small portion of humanity that can afford to board an airplane.

Conclusion

The rapid escalation of renewable diesel (HVO) fuels, including the push for aviation biofuel, is driving a massive global shift in market drivers for fats and oils - a “fat grab” of monumental proportion. There is no question that fossil fuels extracted from below ground are a primary driver of climate change.

However, the current and growing scale of demand for energy and fuels, cannot possibly be met sustainably from the above ground living biosphere if we are to protect land, water, biodiversity and human rights while feeding a growing population.

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[iii] https://www.statista.com/statistics/655057/fuel-consumption-of-airlines-worldwide/

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[v] https://www.iata.org/en/programs/sustainability/sustainable-aviation-fuels/

[vi] https://task39.ieabioenergy.com/wp-content/uploads/sites/37/2024/07/IEA-Bioenergy-Task-39-drop-in-biofuels-and-co-processing-report-June-2024.pdf

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[xiv] https://www.nature.com/articles/s41477-020-00813-w

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[xvii] https://www.eia.gov/dnav/pet/pet_move_impcus_a2_nus_EPOORDO_im0_mbbl_m.htm

[xviii] https://www.transportenvironment.org/articles/european-and-us-used-cooking-oil-demand-increasingly-unsustainable-analysis

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