

U.S. BIOFUEL DEMAND AND THE POTENTIAL FOR USED COOKING OIL FROM MAJOR ASIAN EXPORTING COUNTRIES

The United States is increasingly importing used cooking oil (UCO) to meet domestic biofuel demand, and this trend is expected to continue in light of state-level clean fuels policies and federal volumetric blending mandates. California is in the process of updating its Low Carbon Fuel Standard (LCFS) and revisions are set to be adopted in 2023; Oregon expanded its clean fuels program in 2022; and the State of Washington adopted its first clean fuels program in 2022. Further, in 2021, the U.S. federal government introduced a 3 billion gallon sustainable aviation fuel (SAF) production target to be met by 2030.

UCO is a type of waste oil and a low-carbon feedstock that is used to produce biodiesel, hydroprocessed vegetable oil (HVO), which is used in the road sector, and hydroprocessed esters and fatty acids (HEFA), an aviation fuel. These are all technologically mature and commercially available means of producing biofuel. At the same time, domestic targets for HVO production could increase by nearly three-fold from 2022 levels.¹ Because the supply of domestic waste oil in the United States is already largely used as feedstock for biofuel production, imports might increase to supply the expanded production capacity and help meet the targets.

In this context, it is important to remember that the physical and chemical nature of waste oil and drop-in hydrotreated fuels makes it possible to disguise virgin vegetable oil as waste oil. Indeed, there have been documented cases of waste oil fraud in the United States already.² In the early years of the U.S. Renewable Fuel Standard program, Keystone Biofuels forged quality tests for UCO biodiesel and overstated production levels to receive higher quantities of renewable fuel credits.³

- 1 U.S. Energy Information Administration, "U.S. Renewable Diesel Capacity Could Increase Due to Announced and Developing Projects," Today in Energy, July 29, 2021, <https://www.eia.gov/todayinenergy/detail.php?id=48916>.
- 2 United States Department of Justice, "Owners of Lehigh Valley Companies and Their Engineer Charged in Green Energy Fraud Scheme," news release, December 21, 2015, <https://www.justice.gov/usao-edpa/pr/owners-lehigh-valley-companies-and-their-engineer-charged-green-energy-fraud-scheme>.
- 3 United States Department of Justice, "Pennsylvania Biofuel Company and Owners Sentenced on Environmental and Tax Crime Convictions Arising out of Renewable Fuels Fraud," news release, October 20, 2020, <https://www.justice.gov/opa/pr/pennsylvania-biofuel-company-and-owners-sentenced-environmental-and-tax-crime-convictions>.

In the European Union, as well, there have been multiple instances of companies supplying soy biodiesel and claiming it as UCO biodiesel because of the higher EU incentives for waste biofuels. UCO is nearly indistinguishable from virgin vegetable oil and it is difficult for auditors to detect fraud using chemical fuel testing.

ICCT'S STUDY ON UCO IN ASIA

Asian countries export most of the UCO in the world.⁴ While import volumes fluctuate annually, the UN Comtrade Database shows that approximately 15% of the UCO imported by the United States comes from Asia. A recent ICCT study estimated how much UCO is currently collected, and the potential for additional collection, in six major UCO-exporting countries in Asia: China, India, Indonesia, Japan, Malaysia, and the Republic of Korea. The study estimated the potential for UCO collection from urban households, urban restaurants, and food processing, the sectors and regions from which it is easiest to collect UCO. The work also considered how much UCO currently goes to other uses within each country and to export, to assess the potential availability of what is inherently a limited resource. We further estimated the total amount of fuel that could be produced from current collection and explored the risk of re-use as gutter oil. The term gutter oil describes waste oil collected from sources such as restaurant fryers, sewer drains, grease traps, and slaughterhouse waste that is then illicitly re-sold as cooking oil in grocery stores.

KEY FINDINGS

A summary of the findings is in Table 1. Positive (black) numbers in the “Net of totals” column indicate that more UCO is produced and imported than is currently exported and used for biofuel. In the same column, negative (red) numbers in parentheses indicate that the country was estimated to export and use more UCO than it plausibly produced and imported. Negative numbers suggest a high likelihood that fraudulent UCO exports are already occurring.

Though other studies have suggested that thousands of kilotonnes of UCO could go to gutter oil in China and India each year, gutter oil was not considered in ICCT's estimates because of a lack of data. Still, some of the countries listed in Table 1 have programs in place to reduce gutter oil, and many are also developing domestic biofuel programs to use UCO, either at the national or regional level. By not including estimates of gutter oil, our study likely overestimated the availability of UCO for export and thus underestimated the risk of fraud.

Table 1. Summary of results (in kilotonnes) from Kristiana et al. (2022).

Country	Estimated total potential	Estimated current collection	Imports in 2019 (from Comtrade)	Total collection+ imports	Exports in 2019 (from Comtrade)	Domestic biofuel use	Total export+biofuel use	Net of totals
China	5,131	3,086–4,097	42	3,128–4,139	737	918	1,655	1,473–2,484
India	1,697	224–326	49	273–375	9	65	74	199–301
Indonesia	715	182–266	9	191–275	148	0.66	149	42–126
Japan	331	70–122	9	79–131	84	22	106	(27)–25
Malaysia	158	48–71	208	256–279	321	no data	321	(65)–(42)
Republic of Korea	116	88–107	62	150–169	7	161	168	(18)–1

⁴ Donovan Lim, “Demand Heats Up for Asia’s Used Cooking Oil,” S&P Global Commodity Insights blog, July 29, 2022, <https://www.spglobal.com/commodityinsights/en/market-insights/blogs/agriculture/072922-sustainable-aviation-fuel-used-cooking-oil-uco-methyl-ester>

Future import demand, including from the United States, will likely exceed the potential for genuine UCO exports from Asia. We estimate that U.S. policy incentives could promote the import of 8,900 kilotonnes of UCO into the United States in 2030 due to the SAF mandate alone. That is a sizeable amount compared to the UCO that we estimate is currently collected in the six countries, which is in the range of 3,700 to 5,000 kilotonnes. Although UCO could be imported from other regions of the world, our study highlights that UCO is a limited resource, even in a region as populous as Asia. Additionally, other regions are already developing or could develop their own domestic biofuel programs to meet national climate policies, and we saw this in the Asian countries we investigated. Further, Europe continues to put increasing pressure on global UCO markets to meet the policies incentivizing UCO HVO and HEFA production there. In 2035, for example, a proposed 15% SAF mandate could incentivize demand for an estimated 5,600 kilotonnes of UCO imports to the European Union.

IMPLICATIONS FOR U.S. POLICY

If the contribution of UCO and animal fats is not limited, in other words capped, in state and federal regulations, it could exacerbate sustainability risks due to waste oil fraud. The vegetable oils that are used in place of UCO could include palm and soy oil, both of which are associated with high indirect land use change (ILUC) emissions.

Capping the contribution of waste oils including UCO at or near current levels would limit the incentive to expand waste oil exports from Asia and reduce waste oil fraud risk. This cap would help support the development of other advanced fuel technologies that are nascent and needed to convert other feedstocks. Such technologies are going to be necessary to achieve deep decarbonization in the future.

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