

Required Report: Required - Public Distribution

Date: October 28, 2024

Report Number: ID2024-0018

Report Name: Biofuels Annual

Country: Indonesia

Post: Jakarta

Report Category: Biofuels

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Report Highlights:

Indonesia's fuel grade ethanol consumption remains small and localized in 2024, a year after the restart of the ethanol program. The formation of a taskforce for sugarcane expansion is meant to advance Indonesia's self-sufficiency goals in sugar and bioethanol. Biodiesel production is projected to rise by 3 percent to 13 billion liters in 2024 on expected higher diesel use combined with the government-mandated 35-percent blending rate. Combined palm oil mill effluent (POME) and palm fatty acid distillate (PFAD) exports remain high on continued demand from overseas markets, lower export levies relative to crude palm oil, and a lack of incentives for local refiners to use biodiesel feedstocks other than crude palm oil.

General Terms and Abbreviations:

BBD	Biomass-based Diesel
Bpd	Barrels per day
CPO	Crude Palm Oil
ESDM	Ministry of Energy and Mineral Resources
EU	European Union
FAME	Fatty Acid Methyl Ester (aka biodiesel)
GHG	Greenhouse Gas
HDRD	Hydrogenation Derived Renewable Diesel (aka Hydrotreated Vegetable Oil)
HEFA	Hydro-processed Fatty Acid Esters and Fatty Acids (ASTM-certified SAF pathway)
HVO	Hydrotreated Vegetable Oil (older term still used for HDRD)
ISPO	Indonesian Sustainable Palm Oil
KLHK	Ministry of Environment and Forestry
LCA	Life Cycle Analysis
MOT	Ministry of Trade
MW	Mega Watt
GW	Giga Watt
NDC	Nationally Determined Contribution
PFAD	Palm Fatty Acid Distillate
POME	Palm Oil Mill Effluent
PKFAD	Palm Kernel Fatty Acid Distillate
PTA	Preferential Trade Agreement
RBDPO	Refined Bleached Deodorized Palm Oil
RON	Research Octane Number
RSPO	Roundtable Sustainable Palm Oil
SAF	Sustainable Aviation Fuel
UCO	Used Cooking Oil

Section I. Executive Summary

Indonesia continues to provide strong support for the biodiesel blending mandate program through a financial support mechanism put in place in 2015. The mechanism uses funds collected from Indonesia's palm oil export levy, managed by the crude palm oil (CPO) fund agency (BPDPKS) to subsidize the price spread between biodiesel and fossil diesel. In 2024, the government of Indonesia (GOI) maintained its 35 percent blending rate for the biodiesel mandate program (B35) and is continuing its B40 trial in off-road sectors.

Indonesia's 2024 biodiesel production is estimated to reach a total of 13 billion liters, 3 percent higher than produced in 2023 on expected diesel demand growth. Indonesia's biodiesel industry initially relied mainly on exports up until 2011. After that, the domestic mandate program became the main driver of growth for the industry. Exports have seen occasional surges when discretionary demand from China rises. Otherwise, annual exports remain relatively stable ranging between 200 million liters (ML) and 500 ML. In 2024, exports are projected to remain within that range at an estimated 350 ML, slightly lower than the previous year.

The GOI's strong support for the biodiesel mandate program has not translated into support for the development of an advanced biofuels program that would include widespread use of HDRD or SAF, nor do incentives exist to lower the carbon intensity (CI) of biodiesel currently supplied to the market. Most lower CI feedstocks (mainly POME and PFAD) which, in addition to used cooking oil (UCO) and tallow are favored by current policy in Europe and North America for biomass-based diesel (BBD) and Sustainable Aviation Fuel (SAF) are exported, while domestic biodiesel producers continue to produce palm oil-based biodiesel. Exports of POME have jumped since 2022 and are expected to reach almost 2 million metric tons (MMT) in 2024 on continued demand from China, Malaysia, and the EU; lower export levies; and the lack of incentives for local refiners to use POME as feedstock. PFAD exports continue to be strong with annual sales of 3-3.5 MMT targeting multiple markets. Indonesia eventually revised its export levy allowing on par rate for POME and CPO.

A fuel-grade ethanol market has reappeared after many years of absence but remains very small and localized. E5 sales have slightly increased in 2024 as gas stations providing E5 gasoline have increased from 15 in 2023 to 65 locations as of April 2024. State-owned fuel retailer Pertamina continues to promote E5 sales as the GOI plans to replace subsidized RON 90 gasoline with a higher RON gasoline in 2025.

The GOI is making some progress on SAF development utilizing UCO. A regulation on a SAF roadmap is expected to be released in late 2024. In 2023, Pertamina produced a palm-based SAF that was used for flight tests for a Boeing 737-800 NG.

Section II. Policy and Programs

Indonesia began adopting national-level biofuels policies in 2006 with the issuance of Government Regulation (GR) No. 1 concerning the procurement and usage of biofuels. In support of the regulation, the President issued Presidential Decree No. 10/2006 establishing a National Biofuels Development Team, responsible for supervising the implementation of biofuel programs and creating a blueprint for biofuels development. The blueprint, which focuses on economic development goals rather than environmental goals, aims to (1) alleviate poverty and unemployment, (2) drive economic activity through biofuel procurement, and (3) reduce domestic fossil fuel consumption. In 2007, the Indonesia’s House of Representatives (DPR) passed the Energy Law ([UU 30/2007](#)) to strengthen regulations prioritizing the use of renewable energy. See additional background from 2019 GAIN report [ID-1915](#).

The National Energy Policy (KEN) established through [GR No. 79/2014](#) is now the most important policy basis for the biofuels program. The KEN targets 23-percent renewable energy use economy-wide by 2025 and 31 percent by 2050. The contribution of biofuels towards meeting these goals, shown in [Presidential Regulation \(PR\) No. 22/2017](#), roughly translates to 13.9 billion liters and 52.3 billion liters of biofuel use, respectively. Table 1 provides the plan for biofuel’s contribution to the transportation sector’s energy consumption.

Table 1. Plan of Biofuel Provision for Transportation, 2016-2050

		2016	2025	2050
Biodiesel	Blend rate (%)	20	30	30
	Volume (Bn liter)	2.5	6.9	17.1
Bioethanol	Blend rate (%)	5	20	20
	Volume (Bn liter)	0.1	2.6	11.4
Sustainable Aviation Fuel (SAF) (“Bioavtur”)	Blend rate (%)	2	5	10
	Volume (Bn liter)	0.0	0.1	2.7

Source: PR 22/2017

Indonesia’s biodiesel mandate program is a nationwide directive to blend palm oil-based biodiesel (also known as fatty acid methyl ester (FAME)) with diesel to reduce fuel imports, generate domestic demand for palm oil, and reduce emissions. However, it remains unclear if Indonesia can achieve the latter outcome without adequate reporting on land use change and palm oil mill operations, especially concerning the disposal of POME.

The biodiesel program was initially financially unstable. In 2015, the GOI switched from providing subsidies through the national state budget (APBN) to subsidies via the establishment of the CPO Fund. Through the CPO Fund, the GOI collects levies on palm oil product exports. As support became more reliable, Indonesia has aggressively expanded the blending program from the initial iteration covering only Public Sector Obligation (PSO) industries to a nationwide

B20 program in 2018. The GOI further advanced the program to B30 in January 2020. In February 2023, Indonesia increased its biodiesel blending rate mandate to 35 percent for several regions and expanded the mandate to nationwide coverage by August 2023¹.

The GOI is preparing to increase the blending rate mandate beyond 35 percent. A road test completed in 2022 sought to measure performance for two types of diesel fuels with different rates of bio-components: (1) 40-percent FAME and (2) 30-percent FAME + 10 percent renewable diesel. Despite an unclear implementation schedule, in May 2023 the GOI announced another test for 50-percent renewable diesel for heavy machinery specifically used in the mining industry. In July 2023, the GOI issued guidance for the handling and storage of biodiesel and a maximum 40-percent blending rate for diesel engines. The guidance was issued prior to the nationwide B35 implementation in August 2023. In June 2024, the GOI started conducting tests for a 40-percent biodiesel blending rate (B40) for off-road sectors such as trains, maritime, mining, stationary power, and agricultural machinery. The tests are still ongoing and will take several months, and the results should be announced by the end of 2024.

Both vehicle manufacturers and biofuel producers have expressed their concerns about the increasing blending rates. The biofuel producers association warns that current production capacity is not sufficient for the mandate program to move beyond B40.²

The auto industry association expresses concerns about technical impacts that could ultimately lead to increased maintenance costs. According to the association,³ the water content present at B30 and higher blending rates could potentially damage diesel engines and cause a suboptimal combustion process. The association also raised other concerns about shorter periods between fuel filter replacements as well as a potential 5-percent increase in fuel consumption in vehicles using biodiesel. Post expects Indonesia's auto industry, which is dominated by Japanese automakers⁴, will continue to adapt to the GOI's policy on higher blending rates based on the industry's past reactions to previous policy changes. Importantly, the association confirms that major diesel truck manufacturers in Japan and some in Europe, have modified engines (especially the fuel injection and ignition systems) in previous and current trucks supplied to reduce the risk of past increases in the blend rate.

On bioethanol fuel-related policy, Indonesia discontinued its bioethanol mandate program in 2010 due to inadequate support programs at the time (See [ID-1823](#)). In 2023, the GOI revived the bioethanol fuel program with the introduction of an E5 blending rate for the premium fuel market limited to Java Island. The E5 blending rate was codified by the issuance of Ministry of

¹ Some sectors are granted relaxation not to follow mandate program since 2019, specifically military vehicle, some power-plants and high-altitude mining industry.

² The biofuel producer association comment about B50 idea that proposed by a top government official. See [here](#)

³ See more auto industry comment [here](#)

⁴ Since 1970s Japanese automakers control Indonesia market with share over 90 percent.

Energy and Mineral Resource (ESDM) [Decree No. 252/2023](#) on specifications for RON 95 gasoline with 5-percent ethanol blending.

Driven by self-sufficiency (import substitution) goals which support local economic growth, improved balance of payments and a stronger currency, the GOI formed a taskforce to accelerate sugarcane expansion in the province of Papua. Presidential Decree (PD) 15 issued in April 2024 aims to facilitate land acquisition for new sugarcane plantation area and bioethanol production goals. [PD No. 15/2024](#)'s implementing regulation [PR No. 40/2023](#) sets forth Indonesia's target of achieving self-sufficiency in sugar production for human consumption by 2028 and producing 1.2 billion liters of sugarcane ethanol by 2030. Based on current International Energy Agency (IEA) gasoline fuel pool projections, Indonesia's gasoline use should reach 44 billion liters by 2030. If the 2030 sugarcane ethanol production target is realized, those 1.2 billion liters of ethanol produced and used (assuming no trade) would be equivalent to an E3 average blend rate at the national level.

In May 2024, the GOI announced it would create a roadmap for SAF development utilizing feedstocks such as UCO. The supporting regulation is expected to be issued before September 2024. A new regulation on SAF will intersect with PR No. 22/2017 which provides references to national biofuels targets without specifying waste product feedstocks. A revised PR No. 22/2017 or a new ministerial decree is expected to address waste product feedstocks aligning with Indonesia's national biofuels targets.

Cooking Oil Policies

At the end of 2021, the price of domestic cooking oil began rising along with global palm oil prices. Consumers had to queue to buy palm cooking oil as shortages occurred in many cities.

The GOI issued several on-and-off intervention measures, including setting a price ceiling, providing subsidies for certain periods, and a domestic market obligations (DMO) policy which effectively put restrictions on the volume of palm oil products permitted for export. As cooking oil prices continued to soar, the GOI outright banned palm oil exports for several weeks in April 2022.

After the export ban was lifted, the GOI reinstated the DMO policy, which remains in place today. In principle, under this DMO scheme, exporters are obligated to supply palm oil for domestic cooking oil market at a ratio of 1:4, i.e. exporters are eligible to export 4 metric tons of palm oil for each metric ton of palm oil that they supply for cooking oil production for the local market.

In August 2024, the GOI increased its price cap for cooking oil to align with increased palm oil market prices. The ceiling price is now at IDR 15,700 (\$1.01) per liter, up 12 percent from the previous price of IDR 14,000 (\$0.9) per liter. The GOI also reduced the target volume for the DMO scheme from 300,000 MT to 250,000 MT a month amid weakening global palm oil demand and decreased palm oil production due to the 2023 El Nino weather patterns.

As palm oil production is predicted to recover in 2024/25, Post expects the GOI will continue to maintain both the DMO policy and the biodiesel mandate program at a high blend rate, as it sees the DMO policy as a way to stabilize domestic cooking oil supplies without affecting palm oil supplies for the biodiesel mandate program.

Renewable Energy and GHG Emission Reductions

Indonesia’s latest nationally determined contribution ([NDC](#)) document submitted to the United Nations’ Framework Convention on Climate Change (UNFCCC) in September 2022 shows higher greenhouse gas (GHG) reduction targets of 31.89 percent (unconditional) and 43.2 percent (conditional) by 2030 from 29 percent and 41 percent respectively. The unconditional NDC target represents commitments for emissions reduction without any international assistance.

Within the energy sector, the business as usual (BAU) emission scenario below shows emissions without consideration for climate change mitigation policy. The Counter Measure 1 (CM1) emission scenario, with mitigation, considers sector targets without international support. The CM 2 emission scenario considers sector targets with international support. Emission reductions for the energy sector assume biodiesel use, specifically at B30, within the transportation sector covering 90 percent of the total diesel fuel pool under CM1 and 100 percent under CM2. Without certification of the actual carbon intensity of the biofuels being marketed, the values of future goals met will remain questionable.

Table 2. Projected BAU and Emission Reduction for the Energy Sector

GHG Emission Level 2010	GHG Emission Level 2030			GHG Emission Reduction			
	<i>MTonne CO_{2e}</i>			<i>MTonne CO_{2e}</i>		<i>Percent of BAU</i>	
	BAU	CM1	CM2	CM1	CM2	CM1	CM2
453.2	1,669	1,311	1,223	358	446	12.5	15.5

Source: Indonesia Enhanced NDC 2022

Indonesia’s long-term strategy for low carbon ([LTS-LCCR 2050](#)) puts forward biofuels as Indonesia’s main source of energy in the transportation sector by 2050 (see Table 3), gradually replacing gasoline with bioethanol and palm oil-based gasoline, and diesel with palm biodiesel and renewable diesel. However, the strategy does not specifically address jet aviation fuel and use of SAF.

Table 3. Indonesia Transport Energy Source 2050

Energy Source	Contribution
Biofuels	46 percent
Oil Fuels	20 percent
Electricity	30 percent
Natural Gas	4 percent

Source: Indonesia LTS-LCCR

In order to achieve its NDC target, the GOI issued [Law No. 7/2021](#) establishing a carbon tax and [PR No. 98/2021](#) laying out carbon pricing mechanisms, including (1) carbon trade, (2) result-based payment, (3) carbon tax, and (4) other mechanisms based on the development of science and technology. The detailed provisions for carbon pricing are stipulated in Ministry of Environment and Forestry (KLHK) [Regulation No. 21/2022](#), which addresses monitoring, reporting, and verification. KLHK No. 21/2022 also defines sectors and sub-sectors for the implementation of carbon pricing, aligning with NDC working areas such as energy, waste, industrial processing, agriculture, and forestry.

Non-trade mechanisms include a carbon tax and result-based payment (RBP). The carbon tax is expected to apply a minimum tariff of IDR 30 (\$0.002) per kg CO₂e, based on carbon content and carbon emitting activities, while the RBP allows payment based on emission reduction results. In [February 2023](#), the carbon trade scheme officially launched for the power-generation sub-sector. In September 2023, Indonesia launched a state-backed carbon trade exchange platform called IDX Carbon which is expected to pave the way for emission trading. The GOI plans to expand the carbon pricing mechanism to other sectors and sub-sectors, including transportation, without any certain timeline.

POME Utilization in Power Generation

Palm oil methyl ester (POME), one of the potential feedstocks for biofuels, is abundant but less used. It is estimated Indonesia will produce between 119 to 178 MMT of POME in 2024, based on 47.5 MMT of Indonesia CPO production.⁵ However, only a small amount of POME is currently being utilized to generate electricity with methane capture⁶. Without any methane capture facilities, POME is usually processed in an open ponding system.

The GOI, through [PR No. 112/2022](#) on tariff reference, allows the state electricity company PLN to purchase electricity from power plants utilizing renewable energy sources, including biofuels, biogas from POME, and biomass like solid waste from palm oil mills. Updated annually, the tariff reference is formulated by type of renewable energy source and is staging-based.

⁵ Assuming each ton of CPO produced will generate 2.5 to 3.75 tons of POME (Chin, May Ji, et al. 2013)

⁶ According to ESDM, in 2021, installed capacity of Indonesia biogas power plants (PLTBg) reached 117 megawatts (MW) consisting of 55 plants using POME, while biomass power plant (PLTBM) installed capacity was at 1658 MW. To achieve 23 percent of renewable energy mix in 2025, Indonesia must develop a total of 5.5 Gigawatt (GW) of installed capacity from bioenergy sources.

Mandates and Pricing

Indonesia's biofuel blending mandate was created in 2008 and is currently regulated through [ESDM No. 12/2015](#), released in March 2015. ESDM No. 12/2015 established biofuel-blending targets for the transportation, industrial, and power generation sectors.⁷ Table 4 shows the GOI plans to increase biodiesel and bioethanol blending rates through 2025. While biodiesel targets for on-road transportation have been achieved, albeit always a few years late, no progress has been made in fulfilling the bioethanol mandate and there has been little progress for biodiesel use in stationary energy⁸.

Table 4. Indonesia Biofuels Mandate Targets

Sector	Biodiesel			Bioethanol		
	2016	2020	2025	2016	2020	2025
Transportation, Public Service Obligation (PSO)	20%	30%	30%	2%	5%	20%
Transportation, non-PSO	20%	30%	30%	5%	10%	20%
Industry	20%	30%	30%	5%	10%	20%
Electricity	30%	30%	30%			

Source: ESDM 12/2015

Along with the mandate program, the GOI sets monthly market index prices for both bioethanol and biodiesel. Since 2016, domestic molasses prices published by state-owned agricultural trading company KPB are used as the basis for bioethanol prices. Prior to 2016, the GOI utilized an Argus-based price. For biodiesel prices, the GOI uses CPO prices published by the same state-owned company as a reference.

Table 5. Biofuels Market Index Price (HIP) Formula

HIP Formula (IDR/liter)	
Biodiesel	$= (\text{CPO Price IDR/kg} + 85 \text{ \$/ton}) \times 870 \text{ kg/m}^3 + \text{transportation cost}$
Bioethanol	$= (\text{Molasses price IDR/kg} \times 4.125 \text{ kg/liter}) + 0.25 \text{ \$/liter}$

Source: ESDM

The HIP biodiesel formula has been adjusted several times in recent years. In 2015, the biodiesel conversion was set at \$125 per metric ton (MT). In 2017, the GOI lowered the value to \$100 per MT before reducing it further to \$80 per MT in May 2020. Most recently, the GOI adjusted the conversion upwards to \$85 per MT in September 2020. The biodiesel conversion value bridges

⁷ Read historic policy background in earlier report [here](#).

⁸ Biodiesel use in the stationary energy remains small in 2023. The state-electricity company reported that only 3.3 percent of electricity generated in 2023 were coming from biofuel power plants.

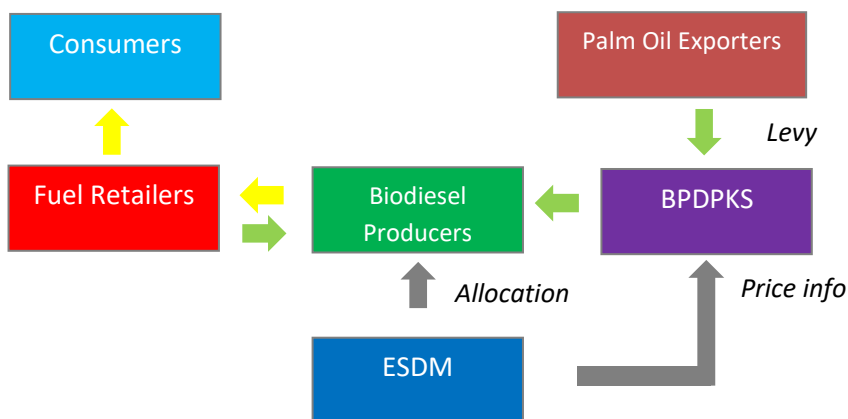
producers' margins and the amount of subsidies from the CPO Fund with lower values reducing subsidy expenditures and lowering producers' margins.

Financial Support for the Biodiesel Mandate Program

In 2015, the financial support mechanism for domestic biodiesel consumption was completely overhauled. The new scheme, with modifications as needed, has proven effective and durable. Managed by the Oil Palm Plantation Fund Management Agency (BPDPKS), funds are collected from a palm oil export levy to offset the price gap between biodiesel and fossil diesel. The agency also uses the funds for research and development, replanting, and palm promotion activities.

The GOI has been setting domestic biodiesel supply allocations on an annual basis since 2019. The ESDM establishes volumes for fuel retailers (both private and state-owned companies) and assigns production allocations to biodiesel producers, who in turn supply palm oil-based biodiesel, for blending. BPDPKS continues to disburse funds based on the spread between the diesel market index price (HIP Diesel) published by the Directorate General of Oil and Gas (DG Migas) and the biodiesel index market price (HIP Biodiesel) published by the Directorate of New and Renewable Energy (DG EBTKE). Both offices are parts of the ESDM.

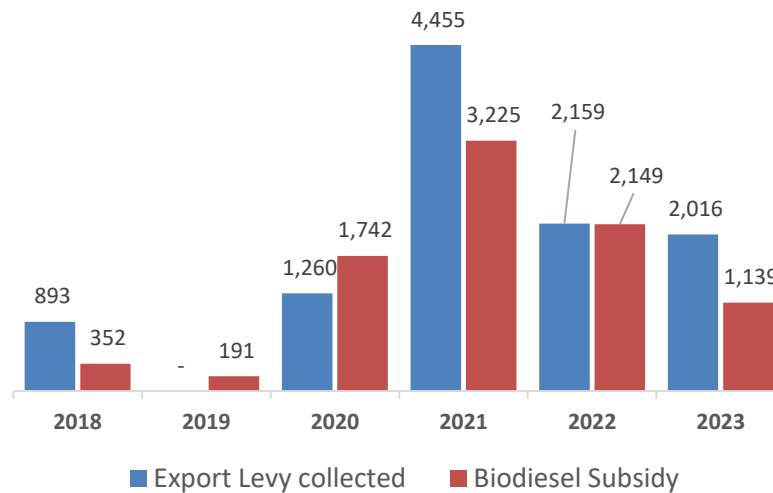
Figure 1. Indonesia Biodiesel Support Mechanism



Source: ESDM

Over the past few years, the GOI has frequently adjusted its export levy scheme to maintain the solvency of its CPO Fund amidst palm oil price fluctuations. In December 2018, the export levy formulation changed from a flat-rate structure to a progressive price-based structure in response to declining CPO prices. As the price decline continued into 2019, the GOI halted CPO levy collection altogether, leading to no new revenues being collected by the CPO Fund for the entirety of 2019. In 2022, the GOI also added new leviable categories of palm products, including UCO and POME, both used as feedstock for biodiesel, hydrogenated renewable diesel (HDRD), and HEFA-type SAF.

Figure 2. Exports Levy and Biodiesel Subsidy 2018-2023 (\$ million)



Source: BDPKKS

A discussion to modify the subsidy mechanism surfaced in 2024,⁹ proposing to change the subsidy recipients from biodiesel producers to fuel retailers. The biofuel producers association claims the current mechanism has damaged their exports markets. However, the proposed change is challenging since it would require many regulations to be revised and more parties to be involved.

Tax Incentives for Flex Fuel and Other Low Carbon Vehicles

The GOI provides lower sales taxes on flex-fuel vehicles (FFVs), electric cars, and hybrids to incentivize the adoption of low carbon emission vehicles. Government Regulation No. 79/2019, which was amended by [GR No. 74/2021](#), fixed lower sales taxes based on carbon emissions, engine capacity, and alternative technology. The tax incentive for flex-fuel vehicles was largely unused again in 2023, due to the limited availability of bioethanol gas stations and more lucrative tax cuts for electric vehicles. In August 2023, a local auto manufacturer exhibited a passenger vehicle with a flex-fuel engine capable of running on 100 percent bioethanol.¹⁰

Import Policy, Import Duties, and Export Taxes

Biofuel importation and exports used to require recommendations from the ESDM, as stated by the Ministry of Trade (MOT) [Decree No. 25/2022](#), but was subsequently regulated through the commodity balance system after it was added to the commodity balance list in 2023. Biofuel import approval is now valid for one year in accordance with the commodity balance. The importation of biofuels for mandatory blending programs is not specifically regulated in the decree. In the case of biodiesel, the export approval requirement is likely to be used to ensure that sufficient supplies of biodiesel remain in country to fulfil the mandatory blending programs.

⁹ See the article [here](#)

¹⁰ The flex-fuel passenger SUV is showcased in the Indonesia largest auto show, August 2023. Read more [here](#).

Table 6. MFN Imports Duties on Fuel Ethanol, Biodiesel, Gasoline and Fuel Additives

HS code	Description	Duty Rate (percent)
2207.10 2207.20	Undenatured ethanol Denatured ethanol	30
2710.12.21 2710.12.24 2710.12.27	Gasoline, RON 97 and above, unblended Gasoline, RON 90 and above, below RON 97, unblended Gasoline, below RON 90, unblended	0
2710.12.22 2710.12.25 2710.12.28	Gasoline, RON 97 and above, pre-blended with ethanol Gasoline, RON 90 and above, below RON 97, pre-blended with ethanol Gasoline, below RON 90, pre-blended with ethanol	0
2710.19.79	Hydrotreated Vegetable Oil/HDRD	0
2710.20	Petroleum oils containing biodiesel up to 30 percent by volume	0
2902.20 2902.30 2902.44	Benzene Toluene Xylene	0
2909.19	Methyl Ter-Butyl Ether (MTBE)	5
3826.001 3826.002 3826.003	Biodiesel, with coconut methyl ester content more than 70 percent Biodiesel, with methyl ester content more than 96.5 percent Biodiesel, other feedstock	5

Source: [INSW](#), Ministry of Finance

Indonesia is bound by several trade agreements that have enabled lower duties on ethanol imports from certain countries. The Preferential Trade Agreement (PTA) between Indonesia and Pakistan enables (medical grade and non-fuel industrial applications) ethanol imports from Pakistan to Indonesia at zero percent beginning in 2019.¹¹

Indonesia introduced a simplified set of palm export levies, effective September 21, 2024, amidst decreasing palm oil exports due to competition from other edible oils. The new set levy ranges between 3 percent to 7.5 percent of the reference price instead of the previous progressive tariff structure. Under the new set of levies, the export levy for POME is expected to increase to be on par with the levy for CPO, see [ID2024-0025](#).

**Table 7. Export Levy on Biodiesel and other Palm Products
(November 2022-September 2024)**

HS code	Description	Export Levy (\$/MT)
2306.60.90 2306.90.90	Palm Oil Mill Effluent (POME)	5

¹¹ See [ID2022-0017](#) for details trade agreements providing lower ethanol import duties.

1518.00	Used Cooking Oil (UCO) ¹²	35
1511.10.00	Crude Palm Oil (CPO)	55-240
1511.90.41	Crude Palm Stearin	
1511.90.42	Crude Palm Olein	
1513.21.10	Crude Palm Kernel Oil	
1513.29.11	Crude Palm Kernel Stearin	
3823.19.20	Palm Fatty Acid Distillate (PFAD)	45-214
3823.19.30	Palm Kernel Fatty Acid Distillate (PKFAD)	
1511.90.20	Refined Bleached Deodorized Palm Oil (RBDPO)	38-207
3826	Palm-based Biodiesel (with Methyl Ester more than 96.5%)	25-194

Source: [MOF Regulation 154/2022](#)

Environment Sustainability and Certification

Currently, there is no mandatory certification that sets emission standards for Indonesia's mandatory biofuel blending program. However, a requirement was set in 2021 for publicly listed companies to disclose the emissions they generate, which could pave the way for sustainability certification for biofuel producers participating in the biofuel blending mandate program.

Ethanol producers, specifically public-listed companies, began publishing sustainability reports as mandated by the Indonesia SEC (OJK)¹³. The report highlights sustainability aspects and programs in the ethanol production process. Some notable programs include replacing coal-based boilers with low-emission boilers, the application of zero waste and zero discharge principles. The OJK rule implies that publicly listed ethanol producers must disclose the amount of emissions generated and activities of emission reduction.

For palm biodiesel, there is mandatory certification at the oil palm plantation level. The GOI is requiring palm oil companies and smallholders operating in Indonesia to be ISPO-certified before 2025 as stipulated in PR No. 44/2020. The ISPO standard covers a range of criteria, including GHG emissions, land use, biodiversity, and labor. The ISPO certification process is carried out by a certifying agent that must be recognized by the National Accreditation Committee (KAN). Since 2021, at least 15 certifying companies have already been recognized by KAN. According to the Ministry of Agriculture (MOA), 3.9 million hectares of palm plantation, about 21 percent of the total planted area, were ISPO certified in 2023.

In June 2024, the GOI announced that the ISPO is being revised by adding new standards for the biodiesel industry. However, the announcement was disclosed with no certain timeframe for implementation.

In addition to the planned introduction of mandatory ISPO requirements, there are several voluntary sustainability certification schemes in place to support palm oil product exports, such as the RSPO (Roundtable on Sustainable Palm Oil).

¹² MOF details HS Code for UCO: 1518.00.14, 1518.00.19, 1518.00.32, 1518.00.38, 1518.00.60 and 1518.00.90

¹³ See [OJK Regulation 57/2017](#)

Voluntary certifications are also available for POME processing facilities, both for export and methane capture facilities in Indonesia. Third parties, such as ISCC (International Sustainability and Carbon Certification) carry out the certification process for selected facilities and operators in accordance with selected standards.

EU biofuel-related measures

The European Union (EU)'s focus on sustainability criteria for biofuels weighs heavily on the Indonesian biofuels sector and is a constant source of strife among GOI officials and their EU counterparts. The EU outlines its sustainability criteria in its Renewable Energy Directive (RED) and RED II which officially entered into force in December 2018 and EU member states transposed its provisions into national law in June 2021.

In March 2019, the EU Commission adopted the delegated act which set criteria both for (1) determining the high ILUC (indirect land-use change) risk feedstock for which there is a significant expansion of the production area into land containing high carbon stocks and (2) certifying low ILUC-risk biofuels. The report, published along with the delegated act, concluded that palm oil is a high ILUC-risk feedstock and therefore EU member state consumption of imported or domestically produced biodiesel and renewable diesel made with palm oil, eligible for counting towards mandate fulfillment, must be capped at 2019 levels then phased out by 2030. No SAF made from food (includes all virgin veg oils) or feed-based feedstock is eligible to meet any member state or EU-wide SAF mandate. Several EU member states have already eliminated palm oil use in biodiesel and HDRD, including France, Austria, Belgium, and Germany. As a result, the phase out of EU use of palm oil-based biodiesel or HDRD (whether imported or domestically produced) is well ahead of schedule and already nearly complete while imports of palm oil biodiesel from SE Asia have declined. However, the report also notes that palm oil-based biodiesel and HDRD production, under certain conditions (by smallholders), may be considered in the low ILUC risk category. This phaseout pertains only to palm oil-based biofuels, not POME and PFAD biofuels and not palm oil products for other uses such as food use.

The GOI continues to challenge this policy, initially requesting a WTO consultation in December 2019. A dispute panel was established in July 2020 at the request of Indonesia. In February 2023, the Chair of the panel announced the panel is expecting to issue its final report before the third quarter of 2023. Following Indonesia's request for a suspension in March 2024, the panel resumed its work and circulated the panel report in July 2024. Read more on the summary [here](#).

The EU deforestation regulation ([EUDR](#)) that entered into force in June 2023 is expected to affect several palm oil and derivative products exports, including palm oil waste used for biofuel feedstocks such as PFAD and POME. Companies exporting targeted products to the EU market must collect information ensuring that the product was not produced on land deforested after December 31, 2020. The EUDR also requires importers to carry out mandatory due diligence and mitigation measures such as using satellite monitoring tools to verify information.

Studies on Life Cycle Assessment (LCA) approach for Indonesia Biodiesel Production

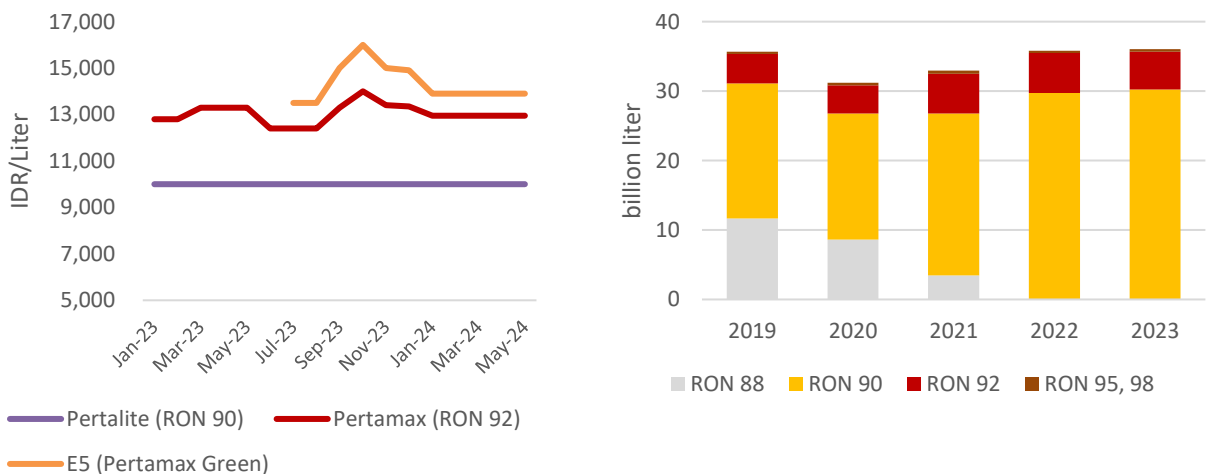
Studies on LCA biodiesel in Indonesia have been carried out with varying results. From land preparation to biodiesel combustion, several LCA studies identified stages that critically contribute to the value of Global Warming Potential (GWP). The studies found that minimizing extreme negative environmental impacts from biodiesel production is best achieved by selecting non-burning techniques for land clearing and choosing non-forest and non-peat land. Another study highlighted additional key factors as farm fertilizer and soil management techniques as well as disposal methods of palm oil mill POME and the presence of biomethane capture.¹⁴ U.S., European, and Canadian experts in applying LCA to palm oil-based biofuels would unquestionably add “methane capture” (appropriate management of POME at palm oil mills) to the list of critical management tools. Another study pointed out that total GWP for a metric ton of biodiesel production is 2,762 kg CO₂e, 90 percent of which is caused by the planting stage, 1.1 percent from the CPO production stage, and 8.6 percent from biodiesel production stage¹⁵.

Section III. Ethanol

Consumption

Indonesia fuel ethanol consumption is projected to reach 5 million liters for 2024 on limited sales of E5 in Java. State-owned fuel retailer Pertamina increased the number of gas stations selling E5 gasoline from 15 in 2023 to 65 locations as of April 2024. The E5 station expansion aligns with the government’s plan to replace RON 90 gasoline with higher RON gasoline, including ethanol-blended gasoline. RON 90 gasoline made up 84 percent of total gasoline sales in 2023.

Figure 3. Indonesia Gasoline Price (IDR/Liter) and Sales (billion liters)



Source: ESDM, Pertamina

¹⁴ See [K Siregar et al, 2021](#)

¹⁵ See [Paminto AK et al, 2022](#)

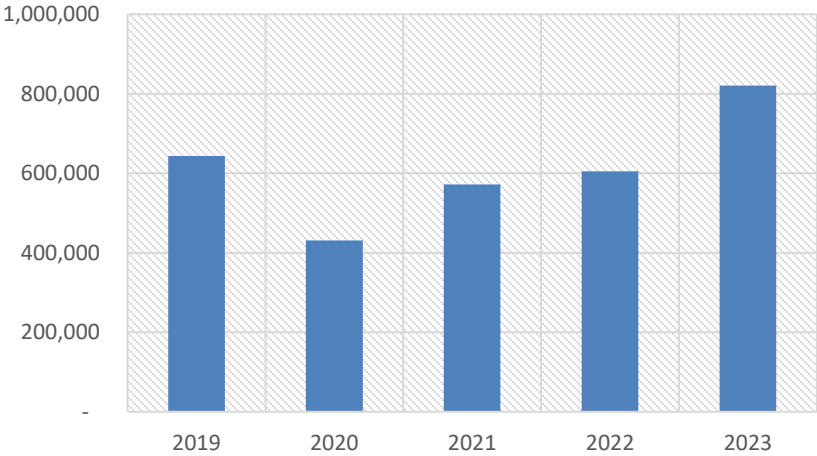
The introduction of E5 at RON 95 gasoline poses challenges due to affordability and regulation complexity. The sales share of RON 95 gasoline is typically smaller than that of RON 90 gasoline which is heavily subsidized. Current regulations on ethanol sales put fuel-grade ethanol in the same category as industrial grade ethanol, requiring fuel refiners to pay a levy of IDR 20,000 for each liter of ethanol purchased from producers. Despite available refund mechanisms, fuel refiners are exposed to cash management risks. Post estimates total ethanol consumption will remain stable at 164 million liters in 2024 on continued demand for industrial ethanol for pharmaceuticals, cosmetics, and chemical solvents.

Production

Post forecasts Indonesia fuel ethanol production at 6 million liters for 2024 on increased demand for E5 gasoline. Indonesia fuel ethanol production relies on molasses feedstock supplied by state-owned sugarcane companies in East Java. Indonesia’s cumulative total ethanol installed capacity is roughly 350 million liters per year across eight active ethanol producers.

Non-fuel industrial ethanol production is expected to decline to 205 million liters for 2024 following slightly increased imports and reduced exports, the result decreased price competitiveness of domestic product. Indonesia’s sugar production is expected to reach 2 MMT in 2024,¹⁶ providing about 1.4 MMT of molasses. However, competition for the valuable feedstock continues to pose challenges for local ethanol producers as molasses is also used in food processing, the production of monosodium glutamate, and for export.

Figure 4. Indonesia Molasses Exports 2019-2023 (MT)



Source: TDM, LLC

¹⁶ Indonesia Sugar Annual 2024 (see [ID2024-0015](#))

Trade

Post forecasts Indonesia's 2024 ethanol exports at 50 million liters, down from 60 million liters in 2023 on weaker demand from major export markets due to limited price competitiveness. Indonesia's ethanol shipments to the Philippines decreased in the last two years due to stiff competition from other origins, mainly Brazil. In 2023, Indonesia shipped 55 million liters of ethanol to the Philippines, a 30 percent decrease from 2022. Over the last five years, about 93 percent of Indonesia ethanol exports were bound for the Philippines.

Table 8. Ethanol Supplies, Trade and Use in Indonesia

Ethanol Used as Fuel and Other Industrial Chemicals (Million Liters)										
Calendar Year	2015	2016	2017	2018	2019	2020	2021	2022r	2023r	2024f
Beginning Stocks	14	16	15	14	14	5	5	10	7	10
Fuel Begin Stocks	0	0	0	0	0	0	0	0	0	1
Production	205	205	195	200	200	193	200	205	221	205
Fuel Production	1	0	0	0	0	1	0	0	1	6
Imports	0	2	5	96	1	29	54	32	6	10
Fuel Imports	0	0	0	0	0	0	0	0	0	0
Exports	67	71	64	158	70	47	82	77	60	50
Fuel Exports	0	0	0	0	0	0	0	0	0	0
Consumption	136	137	137	138	139	175	167	163	164	164
Fuel Consumption	0	0	0	0	0	0	0	0	0	5
Ending Stocks	16	15	14	14	5	5	10	7	10	11
Fuel Ending Stocks	0	0	0	0	0	0	0	0	1	2
Refineries Producing Fuel Ethanol (Million Liters)										
Number of Refineries	3	3	3	3	3	3	3	3	3	3
Nameplate Capacity	100	100	100	100	100	100	100	100	100	100
Capacity Use (%)	1.0%	0.0%	0.0%	0.0%	0.0%	1.2%	0.0%	0.0%	0.5%	6.0%
Feedstock Use for Fuel Ethanol (1,000 MT)										
Molasses	4	0	0	0	0	5	0	0	2	24
Market Penetration (Million Liters)										
Fuel Ethanol Use	0	0	0	0	0	0	0	0	0	5
Gasoline Pool ^{1/}	31,528	31,986	33,548	34,490	35,677	31,194	32,953	35,800	36,024	36,744
Blend Rate (%)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Note: r: revised, f: forecast 1/ Gasoline pool includes all additives (like MTBE) and any biocomponents (like ethanol) when used. Source: ESDM, Trade Data Monitor, LLC, Post calculation

Section IV. Biodiesel/Renewable Diesel

Consumption

Indonesian biodiesel consumption is driven by the blending mandate program and supported by funds from the levy on palm oil exports. Diesel truck engine design in vehicles delivered to the market are periodically updated to reduce engine damage risk due to higher blending. Biodiesel consumption has soared 48 percent compared to pre-pandemic 2019 on increasing blending rates as well as higher diesel use. Post forecasts 2024 biodiesel consumption at 12.6 billion liters, up by 3 percent (353 million liters) on a full year's implementation of B35 and expected rising diesel consumption. Post predicts 2024 biodiesel consumption to reflect the previous year's performance, reaching around 88-95 percent of the allocation. As Indonesia's economic growth is projected at 4.9 percent in 2024, Post projects diesel use will rise slightly to 40.5 billion liters from 39.5 billion liters in 2023.

HDRD consumption at the commercial level is expected to be virtually zero in 2024, since the biodiesel blending mandate program covers only biodiesel (FAME) as the biocomponent blended with diesel. However, the inclusion of HDRD in the blending mandate program as one of the biocomponents to meet a 40% renewables content in diesel is on the table since the government has already completed road tests in late 2022 to support this move.

The biodiesel mandate program relies on subsidies funded by Indonesia's palm oil export levy to cover the price spread between biodiesel and fossil diesel. In 2023, the subsidy reached \$1.2 billion, while funds collected from the export levy hit \$2 billion. This subsidy amount was 47 percent lower than the subsidy provided in 2022 of \$ 2.2 billion due to the narrowing of the spread between palm oil diesel and fossil diesel prices.

The GOI appointed 27 fuel retailers to carry out the 2024 biodiesel allocation, who in turn blend biodiesel with their conventional fossil diesel and sell the product through their distribution channels. Pertamina alone is assigned around 81 percent of the total biodiesel allocation volume.

Production

Post forecasts 2024 palm oil-based biodiesel production at 13 billion liters, up 400 million liters from 2023 on full year's implementation of B35 coupled with some fuel pool growth and stable exports. The GOI set biodiesel allocations at 13.41 billion liters for the 2024 biodiesel mandate program. Biodiesel production nameplate capacity is projected to be unchanged year over year and thus the capacity use rate remains high and unchanged as well.

Indonesia uses palm oil to produce biodiesel. Waste stream POME from palm oil mills and co-product PFAD from palm oil refineries as well as UCO, a waste product from food processing industries, restaurants and home cooking, are exported because Indonesia's biofuel policy does not incentivize lower carbon feedstock use in biofuel and products find higher value in other countries. In addition, developing a UCO collection system which effectively captures a high portion of total supply is far more challenging than capturing available waste products of palm

mills and refineries due to the dispersed nature of supplies which requires new supply chains. Procuring UCO, POME and PFAD for use in the domestic biofuel market will only find traction if incentives are put in place to redirect them away from more lucrative export markets in North America and Europe or if those markets put import restrictions in place.

Trade

Indonesia exported significant amounts of biodiesel from 2011 through 2019. Exports surge during periods when demand from China for discretionary blending emerges and collapse as that demand disappears. This demand is driven by the price spread between the price of palm oil biodiesel and the price of diesel and can be tracked using the price of CPO in the Malaysia exchange and the price of diesel in Europe. Exports tend to decrease in years when such discretionary demand disappeared and after the enactment of high duties in key export markets. Since 2020, other than some upward movement in 2022 when China demand briefly appeared and then vanished, exports have remained more modest.

Post forecasts Indonesia's 2024 biodiesel exports at 350 million liters, on par from 2023. China, the Netherlands, and the Philippines were key destinations representing 78 percent of total biodiesel exports in 2023. Shipments to the Philippines have increased since 2022 and are expected to reach 50 million liters for 2024 on rising demand resulting from the Philippines' higher blending rate.

Indonesia palm biodiesel exports to the United States remains limited partially due to countervailing and anti-dumping duties. U.S. market remains constrained as Indonesia palm biodiesel does not meet the 20-percent minimum GHG savings threshold and thus obligated parties cannot use the product to meet Renewable Fuel Standard (RFS) volumetric obligations. It is therefore also not eligible for Renewable Identification Numbers (RINs) which have market value. The EU has also imposed 8-18 percent countervailing duties on Indonesia biodiesel since December 2019 and has shifted away from the use of palm oil biodiesel.

Select Feedstocks for Biofuel Production¹⁷

A study in 2022 estimated potential collectable UCO in Indonesia at 715,000 MT per year, based on sources from urban restaurants, urban households, and food processing facilities. This estimate excludes illicit "gutter oil" from sewers, drains, and grease traps as that data is not available. Indonesia UCO exports showed growth up until 2021, peaking that year before being levied at \$35 per MT in 2022.

As POME's export levy is set at only \$5 per MT, exports are expected to rise to 2 MMT in 2024 from 1.8 MMT in 2023, on increased demand from Malaysia and the EU. However, shipments to China have decreased 38 percent year-on-year in the period of January to June 2024.

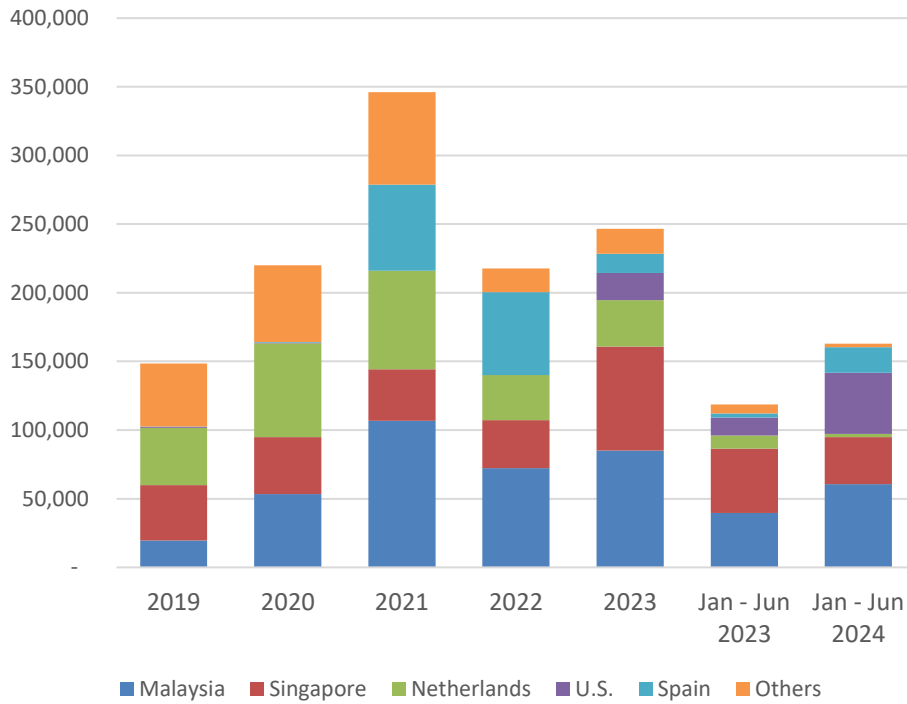
¹⁷ HS Code for UCO: 1518, POME: 230690 and 382319 for PFAD.

Table 9. Biodiesel/Renewable Supplies, Trade, and Use in Indonesia

Biodiesel (Million Liters)										
Calendar Year	2015	2016	2017	2018	2019	2020	2021	2022r	2023r	2024f
Beginning Stocks	97	94	110	152	258	294	329	390	356	339
Production	1,200	3,500	2,800	5,600	7,700	8,500	9,550	10,900	12,600	13,000
Imports	0	0	0	28	0	0	0	0	0	0
Exports	343	476	187	1,772	1,271	39	193	516	370	350
Consumption	860	3,008	2,572	3,750	6,393	8,426	9,296	10,418	12,247	12,600
Ending Stocks	94	110	152	258	294	329	390	356	339	389
Balance Check	0	0	0	0	0	0	0	0	0	0
Production Capacity (Million Liters)										
Number of Biorefineries	27	30	32	31	31	31	32	33	34	34
Nameplate Capacity	6,887	10,898	11,547	11,357	11,357	11,357	14,415	16,656	18,548	18,548
Capacity Use (%)	17.4 %	32.1 %	24.2 %	49.3 %	67.8 %	74.8 %	66.3 %	65.4 %	67.9 %	70.1 %
Feedstock Use (1,000 MT)										
Crude Palm Oil	1,104	3,220	2,576	5,152	7,084	7,820	8,786	10,028	11,592	11,960
Used Cooking Oil (UCO)	0	0	0	0	0	0	0	0	0	0
Palm Oil Mill Effluent (POME)	0	0	0	0	0	0	0	0	0	0
Market Penetration (Million Liters)										
Biodiesel, On-road use	583	2,263	1,963	2,982	5,238	7,341	7,945	9,076	10,703	11,088
Diesel Pool, On-road use ^{1/}	21,931	21,567	23,877	24,984	30,610	28,859	31,653	35,364	36,975	37,899
Blend Rate (%)	2.7%	10.5 %	8.2%	11.9 %	17.1 %	25.4 %	25.1 %	25.7 %	28.9 %	29.3 %
Diesel Pool, Total ^{1/}	30,912	30,039	31,441	33,268	33,169	31,230	34,728	38,684	39,532	40,521

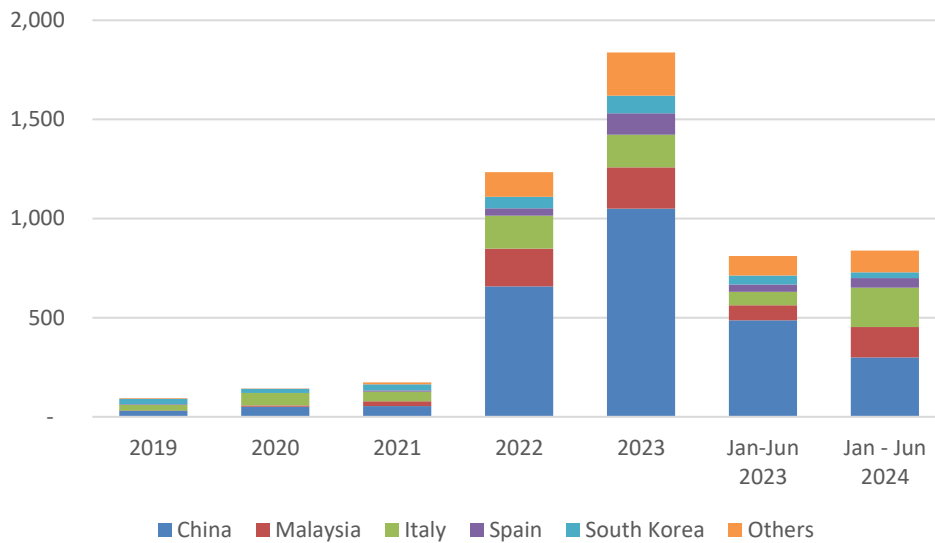
Note: R: Revised, F: forecast ^{1/} Covers diesel and all biocomponents. Source: Aprobi, ESDM, Trade Data Monitor, LLC

Figure 5. Indonesia UCO Exports 2019-2024 (MT)



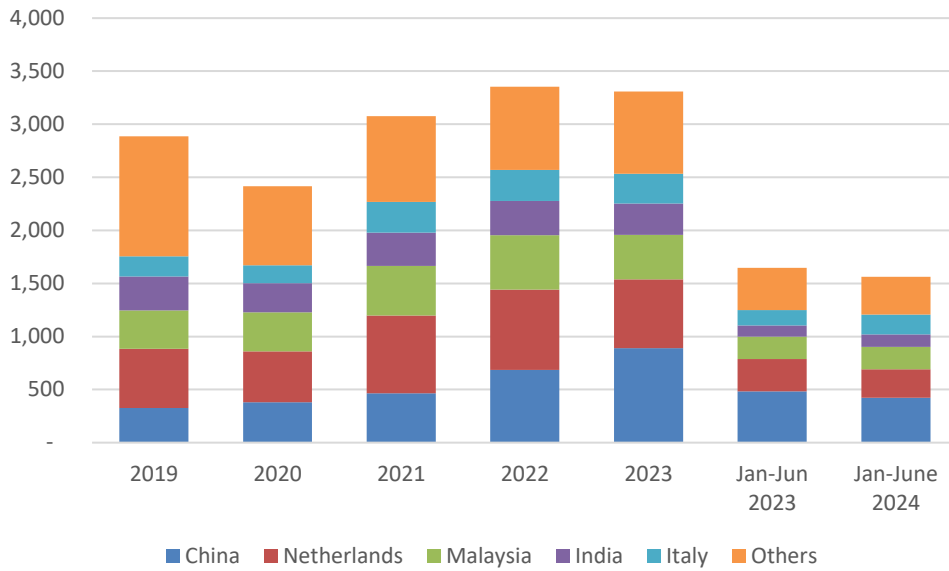
Source: TDM, LLC

Figure 6. Indonesia POME Exports Destination 2019-2024 (1,000 MT)



Source: TDM, LLC

Figure 7. Indonesia PFAD Exports Destination 2019-2024 (1,000 MT)



Source: TDM, LLC

Section V. Advanced Fuels

GOI agencies and state-owned companies are collaborating to conduct research and various tests for developing advanced biofuels. If a domestic market for HDRD and SAF was to develop, given its higher production cost over biodiesel, fossil diesel, jet fuel, and given experience in Europe and the United States, Indonesia will have to mandate and likely provide financial supports or otherwise incentivize fuel switching through tax policies, including an effective carbon tax policy. No such mandating or other support has yet to occur.

Sustainable Aviation Fuel (SAF)

In October 2023, Pertamina and state-owned airline company Garuda conducted a flight test utilizing SAF on a Boeing 737-800 NG. This flight test followed another flight test in 2022 on a military aircraft and a statis test on CFM56-7B jet engines in July 2023. Pertamina produces SAF utilizing co-processing technology and uses feedstock of Refined Bleached Deodorized Palm Oil (RBDPO) at Cilacap Refinery facility in Central Java.

Table 10. Indonesia SAF and HDRD Production Capacity

Producers	Location	Production Capacity	Products	Status
Pertamina	Cilacap, Central Java	477 kilo liters per day	HDRD, SAF	Operational, Phase 2 to be onstream by 2026
Pertamina	Plaju, South Sumatera	3180 kilo liters per day	HDRD	Development, to be completed in 2027
Pertamina	Dumai, Riau	159 kilo liters per day	HDRD	Trial

Renewable Gasoline

The ESDM plans to expand its research to include palm-based renewable gasoline at a pilot plant in South Sumatera with a production capacity of 238.5 kiloliters per day (87,053 liters/year). This project converts palm oil to renewable gasoline using a cracking process utilizing a zeolite-based catalyst produced by Bandung Institute of Technology (ITB).

Section VI. Notes on Statistical Data

Biodiesel

Biodiesel consumption is sourced from a biofuel association ([Aprobi](#)) using a “distribution number” figure. Biodiesel production is based on Post estimates. The “residual” is based on other supply/demand elements) based on Pertamina’s fuel stock average of 19 days, trade, and consumption. Nameplate capacity figure is gathered from ESDM/Aprobi.

Ethanol

Historical ethanol production and consumption are based on Post calculations. Nameplate capacity: association of ethanol producers data and ESDM.

Gasoline and Diesel

Gasoline and diesel sales figures, based on the ESDM publication issued in 2024: [Handbook of Energy & Economic Statistics of Indonesia](#). Historical figures from previous publications have been updated with the latest figures.

Trade

All trade data sourced from Trade Data Monitor, LLC with the following HS codes: 3826 (Biodiesel/FAME), 2207 (ethanol), 1518 (UCO), 230690 (POME) and 382319 for PFAD.

Conversion Rates

1 MT Biodiesel = 1,136 Liters

1 MT Ethanol = 1,267 Liters

Feedstock to Biofuels Conversion

Molasses to Ethanol: 1 MT= 246 liters

CPO to Biodiesel: 1 MT= 1,087 liters of PME

Attachments:

No Attachments