Required Report: Required - Public Distribution

Date: May 14, 2024

Report Number: RP2024-0017

Report Name: Biofuels Annual

Country: Philippines

Post: Manila

Report Category: Biofuels

Prepared By: Florence Mojica-Sevilla

Approved By: Mark Hanzel

Report Highlights:

Post sees Philippine biofuels consumption recovering in 2024 in line with economic growth, as fuel ethanol demand grows 8 percent to 682 million liters and biodiesel increases at 0.8 percent to 240 million liters. The primary driver of this growth will be increases in the fuel pool, with potential for greater growth if higher blending standards are fully adopted. Post forecasts ethanol production to increase to 395 million liters. The feedstock problems remain and imported ethanol will fill the gap, growing by 14 percent to 280 million liters in 2024. The implementation of the discretionary E20 blend (20 percent ethanol for gasoline) and mandated B3 blend (3 percent biodiesel) is still pending awaiting the Department of Energy's (DOE) decision to issue a Department Circular (DC) containing the implementing guidelines on the E20 and B3 roll-outs.

ACRONYMS AND ABBREVIATIONS

BIR	Bureau of Internal Revenue
BOC	Bureau of Customs
BOI	Board of Investments
CME	Coco Methyl Ester
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DC	Department Circular
DENR	Department of Environment and Natural Resources
DOE	Department of Energy
DOF	Department of Finance
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DOTr	Department of Transportation
DTI	Department of Trade and Industry
EPAP	Ethanol Producers Association of the Philippines
EPPB	Energy Policy and Planning Bureau
EVAP	Electric Vehicle Association of the Philippines
FDA	Food and Drug Administration
HB	House Bill
IRR	Implementing Rules and Regulations
JAO	Joint Administrative Order
LMA	Local Monthly Allocation
MLPY	Million Liters Per Year
NABI	Notice of Allowable Bioethanol Importation
NBB	National Biofuels Board
NDC	Nationally Determined Contribution
NREP	National Renewable Energy Program
PCA	Philippine Coconut Authority
PEP	Philippine Energy Plan
PNS	Philippine National Standard
PUV	Public Utility Vehicle
RA	Republic Act
RE	Renewable Energy
REMB	Renewable Energy Management Bureau
SAF	Sustainable Aviation Fuel
SAWP	Social Amelioration and Welfare Program
SRA	Sugar Regulatory Administration
TBAP	The Biodiesel Association of the Philippines
TCPPA	Technical Committee on Petroleum Products and Additives

I. Executive Summary

The Philippines has enacted two key relevant laws: the Biofuels Act of 2006 (RA 9367) and the Renewable Energy Act of 2008 (RA 9513). Significantly higher blending goals for existing biofuels have been promulgated but have not been implemented. The Department of Energy (DOE) leads the implementation of the two laws, together with seven government entities. The National Biofuels Program provides direction under the guidance of the National Biofuels Board (NBB). In compliance with the law, the five percent blend of fuel ethanol (E5) was mandated in the second year of the Biofuels Act in 2007, and the 10 percent blend (E10) was mandated in 2011. For biodiesel, three months after the Act a one percent biodiesel (B1) blend was implemented and was increased to a two percent blend (B2) in 2009. The blends remain at B2 and E10 awaiting the release of DOE Department Circulars (DC) that detail the implementation guidelines for the roll-out of voluntary E20 and mandated B3 blends.

The **Renewable Energy Act** aims to accelerate the exploration and development of RE sources such as biomass, geothermal, solar, hydropower, ocean energy sources, and wind. The National Renewable Energy Program (NREP), does not cover transport biofuels. The NREP outlines the policy framework enshrined in RA 9513 and focuses on a sustained drive towards energy security and improved access to clean energy, but is silent on the contribution of biofuels. The Philippine Energy Plan 2020-2040, however, covers biofuels in the first chapter of the Renewable Energy Plan.

Domestically produced bioethanol uses sugarcane (mostly molasses) as feedstock, while biodiesel feedstock is from coconut (coconut oil transesterified into coco methyl ester or CME). Policy implementation is focused on production and consumption with no policies issued to incentivize lower carbon intensity (CI) of existing biofuels over time.

Post sees an 8 percent growth in fuel ethanol consumption to 682 million liters in 2024, and a minimal increase of less than one percent in biodiesel consumption to 240 million liters prompted by fuel pool increases. Biodiesel production will increase by 2 percent to meet demand. The rated production capacity of 677.9 million liters per year is a result of the industry's overexpansion in anticipation of the B5 blend and is now more than enough to cover the required blending for 12 billion liters of diesel consumption. The overcapacity of fuel ethanol plants compared to the local feedstock available is a result of the unexpected shift of seven potable alcohol producers to fuel ethanol following the implementation of a 22 percent excise tax on potable alcohol.

There is no immediate solution to insufficient feedstocks for fuel ethanol production. There are recommendations to use corn, but this would run counter to the government's food security program and would require huge investments to establish plants. To date, the Philippines has no option but to continue to use molasses and sugarcane. In 2024, local producers can supply around 58 percent of the bioethanol requirement for gasoline blending. Fuel oil companies can import ethanol only if there is a shortage, a condition that should continue with the perennial problem of insufficient feedstocks. Imported ethanol does not compete with local ethanol. All local ethanol must be exhausted before imports are allowed. **Imports are forecast to reach 280 million liters in 2024** due to the expected increase in consumption. Traditionally, the United States has been the largest supplier of imported ethanol, but has faced increasing competition recently, particularly from Brazil. Biodiesel trade is minimal with no importation allowed under the Biofuels Act.

II. Policy and Programs

The Philippines has enacted two laws to promote renewable energy (RE): the Biofuels Act of 2006 (RA 9367) with its implementing rules and regulations (IRR) and the Renewable Energy Act of 2008 (RA 9513) and its IRR. For key features see Biofuels Annual 2021. The Department of Energy (DOE) issued policies, mostly in the form of Department Circulars (DC), relative to the Biofuels Act of 2006. Please see Biofuels Annual 2023 for the detailed list.

The **Biofuels Act** seeks to reduce dependence on imported fuels by promoting the development and mandating the use of locally sourced biofuels, specifically bioethanol and biodiesel. Domestically produced bioethanol uses sugarcane (mostly molasses) as feedstock, while biodiesel feedstock is from coconut (coconut oil transesterified into coco methyl ester or CME). Policy implementation is focused on production and consumption with no policies issued to incentivize lower carbon intensity (CI) of existing biofuels over time. Advanced biofuels were never commercialized as has happened in the United States and Europe for renewable diesel (HDRD) and sustainable aviation fuel (SAF), to some extent in China for HDRD, and a few other countries to a more limited extent.

Renewable Energy and Greenhouse Gas (GHG) Emissions

The **Renewable Energy Act** aims to accelerate the exploration and development of RE sources such as biomass, geothermal, solar, hydropower, ocean energy sources, and wind. The Act envisions the Philippines to be energy self-sufficient through sustainable development of RE resources and reduce its reliance on fossil fuels, thereby minimizing vulnerability to international market price fluctuations. It encourages the development and utilization of RE sources to prevent harmful emissions. Renewable energy is an essential part of the country's low emissions development strategy and is vital to addressing the challenges of climate change, energy security, and energy access. The National Renewable Energy Program (NREP), however, does not cover transport biofuels. The NREP outlines the policy framework enshrined in RA 9513 and focuses on sustained drive towards energy security and improved access to clean energy but is silent on the contribution of transport biofuels. The Philippine Energy Plan (PEP) 2020-2040 covers biofuels in the first chapter of the Renewable Energy Plan (page 66).

With its signing of the Paris Agreement, the Philippines pledged to reduce carbon dioxide (CO_2) and other GHG emissions by scaling up renewable energy activities using biofuels as one of the solutions. The Philippines submitted its first Nationally Determined Contributions (NDC) on April 15, 2021, committing to GHG carbon dioxide equivalent (CO_2e) emissions reduction or avoidance of 75 percent by 2030 relative to its business as usual (BAU) scenario of 2020-2030. Reduction of CO_2e emissions will come from the energy, transport, waste, agriculture, and industry sectors. There are ongoing activities being enforced across these sectors that would contribute to the NDC's fulfillment but no movement on transport biofuels in terms on increasing the blend. Most vital is transforming the country's energy sector from fossil fuel-reliant to RE-dependent. Another example is the ongoing Public Utility Vehicle (PUV) Modernization Program, which emphasizes the environmental benefits of modernizing PUV, particularly the traditional jeepneys. Jeepneys have been used as a mode of transportation since the 1950s from modified Willys Jeep left by the American troops after Worl War II. Since then, the customized, privately-owned jeepneys become the backbone of the Philippines transit system. To date, the program implementation is not yet fully implemented. Implementation has started but there is still some opposition because of high investment costs. Transport accounts for one-third of

GHG emissions in the Philippines. Fuel ethanol has half the carbon footprint of refined petroleum products. GHG emissions reduction in the transport sector helps in environmental savings, which lead to human health savings. FAS monitors two programs: PUV Modernization and Electric Vehicles (EVs).

Fuel ethanol reduces GHG emissions and helps meet the country's NDC commitments. The Philippines' NDC commitments have not been updated since April 15, 2021.

Biofuels Policy Framework and Mandates

Policy Framework. The DOE leads the implementation of the Biofuels Act and its IRR, and prepares the National Biofuels Program consistent with the PEP. The National Biofuels Board (NBB) was established following the law as an oversight body composed of eight government entities. The NBB acts as recommendatory body on biofuels policies, assisted by a Technical Secretariat, whose powers and functions are monitoring implementation and recommending policies to be promulgated by the DOE.

Table 1. The National Biofuels Board

Chair: Secretary, Department of Energy (DOE)
Vice Chair (Bioethanol): Administrator, Sugar Regulatory Administration (SRA)
Vice Chair (Biodiesel): Administrator, Philippine Coconut Authority (PCA)
Members: Secretaries, Department of Agriculture (DA),
Department of Trade and Industries (DTI)
Department of Science and Technology (DOST)
Department of Finance (DOF)
Department of Labor and Employment (DOLE)
Non-voting Members: Secretaries
Department of Environment and Natural Resources (DENR)
Department of Transportation (DOTr)
Department of Agrarian Reform (DAR)
Chairman of the National Commission of Indigenous People (NCIP)

Blend Mandates. The NBB determines the feasibility and recommends adjustment in the minimum mandated biofuel-blends subject to the availability of locally sourced biofuel. In compliance with the law, the five percent blend of fuel ethanol (E5) was mandated in the second year of the Biofuels Act in 2007. The 10 percent blend (E10) was mandated in 2011. The mandated blend of E10 did not reach national average for most of the past 10 years.

For biodiesel, three months after the Act went into effect in 2007, all diesel engine fuels sold in the country had a minimum of one percent biodiesel (B1), which was increased to a two percent blend (B2) in 2009.

Table 2. Biofuels Blends: Date Mandated and Implemented

Blend Mandate	Date Mandated and Policy	Date Implemented
Bioethanol		
E5	February 5, 2009 DC 2009-02-0002	February 12, 2009
E10	February 6, 2011 DC 2011-02-0001	February 27, 2011
Biodiesel		
B1	May 17, 2007 DC 2007-05-006	June 7, 2007
B2	February 5, 2009 DC 2009-02-0002	February 12, 2009

Source: DOE

The Philippines initially set higher eventual blend targets for biodiesel and fuel ethanol, but the mandated blends have remained at B2 and E10 since 2009 and 2011, respectively. The DOE promulgated the Philippine National Standard (PNS) for E20 on October 31, 2023, but as of publication the discretionary E20 blending has still not implemented. The Philippines is set to increase the biodiesel blend to B3, B4 or B5, as agreed upon by the NBB. The DOE-Technical Committee on Petroleum Products and Additives (TCPPA) has drafted the PNS for E20, which had already undergone its fifth deliberation on April 26, 2023. The DOE targeted the E20 PNS final deliberation and endorsement to the Bureau of Product Standards (BPS) in September 2023. An increase to E20 blend would reduce dependence on imported fuel oil, reduce GHG emissions and tailpipe particulate harmful to human health, and allow local ethanol to maintain a higher price without affecting the price at the pump, as it is supported by much cheaper imported fuel ethanol. This, in turn, would encourage more local investments. The DOE has stated it prioritizes the implementation guidelines to roll out the voluntary E20, but there have been repeated delays. Three stakeholders' consultations were undertaken in Q1 2024. The DOE DC will be issued once all comments are addressed. Oil companies undertake the blending of gasoline and diesel fuels with fuel ethanol and biodiesel, respectively, in compliance with the PNS, using appropriate blending methodologies at their refineries, depots, or blending facilities prior to the sale of biofuel blends.

Table 3. Biofuels Blend Targets

Year	Biodiesel Target Blend (%)	Bioethanol Target Blend (%)
2007	1	-
2008	1	-
2009	2	5
2010	2	5
2011	2	10
2015	5	10
2020	10	20
2025	20	20/85*
2030	20	20/85*

Note: *aspirational and voluntary goal
Source: DOE

Table 4. Biofuels Target Blending Rate

Blending Rate	PNS Number	Promulgation
Bioethanol		
E20	PNS/DOE QS 019:2023	December 13, 2023
Biodiesel		
B3	PNS/DOE QS 015:2021	December 27, 2021
B4	PNS/DOE QS 017:2021	December 27, 2021
B5	PNS/DOE QS 010:2015	November 27, 2015

Source: DOE

Financial Supports for Biofuel Producers

To encourage investment, the government provides biofuels producers income tax breaks for the first seven years of operation, special realty tax rates on equipment and machinery, duty-free importation of equipment and machinery, zero-rated value added tax on purchases of goods and equipment, and zero percent value added tax rate on sale of bioethanol fuel, as stated in the RE Law of 2008.

The Board of Investments (BOI) extended a zero-VAT rating to the sale of raw materials used in biofuels production under the National Internal Revenue Code, as amended by the Expanded VAT Reform Law of 2006, in accordance with the Omnibus Investment Code of 1987 (Executive Order No. 226). BOI also provides incentives to registered biofuels manufacturers under the CREATE Act and IRR and the 2020 Investment Priorities Plan, which identifies projects under the Renewable Energy Act as among the mandatory inclusions.

The Biofuels Act contains several incentives detailed in Section 6 such as: tax exemptions for the biofuel component of the blended gasoline and diesel, and exemptions from wastewater charges imposed under Section 13 of the Philippine Clean Water Act for water effluents from biofuels production.

In accordance with Section 17B of the Biofuels Act, the Social Amelioration and Welfare Program (SAWP) has been institutionalized wherein biofuel producers contribute a corresponding "lien" per liter of biodiesel and bioethanol produced and sold. Currently, the Department of Labor and Employment (DOLE) imposed a lien of PhP0.05 per liter of CME-based biodiesel, PhP0.19 per liter of sugarcane-based bioethanol, and PhP0.07 per liter of molasses-based bioethanol. Under the SAWP, qualified biofuel workers can take advantage of various assistance, such as for livelihood, training, education, social protection and welfare, and emergencies. The revised guidelines on the implementation on SAWP for biodiesel workers were issued June 3, 2021, while the revised SAWP for ethanol was issued in January 22, 2021, both with increasing social protection and benefits to workers. The DOLE issued referendum in 2020 for the project entitled "SAWP-Adjustment Measures Initiatives for the Biofuel Workers Affected by COVID-19 and its Mitigating Measures" with the total budget of PhP19.3 million. To date, actual beneficiaries are 3,189 biofuel workers with actual fund utilization of 64 percent.

Impacting Fuel Pool Size Thru Incentives/Disincentives Affecting Demand

Beyond the E10 mandate, the Philippines continues to study (as it has for years) higher fuel ethanol blends in gasoline on a voluntary basis of up to 20 percent (E20). The higher voluntary blend would be facilitated through the implementation of the E20 blending. If local ethanol production scaled up, a voluntary blend of E20 would force refined petroleum products to compete with imported ethanol and could lower prices at the pump depending on relative prices for ethanol and gasoline at any time. See GAIN Report here. Ongoing consideration and opportunity for a potential larger ethanol market with E20 blend has incentivized local producers to consider scaling current investments as well as explore non-traditional feedstocks. Increasing the biodiesel blend to B3, B4 or B5 awaits implementation starting with B3 this 2024.

On January 13, 2023, Executive Order No. 12 was issued, temporarily modifying the rates of import duty on electric vehicles (EVs), parts, and components, prompting importation and setting up of sales outlets or distributorships of mostly Chinese-made EVs. The bulk of EVs in the Philippines are e-tricycles and e-motorcycles, followed by electric utility vehicles like e-jeepneys.

On April 15, 2022, the Electric Vehicle Industry Development Act (EVIDA) lapsed into law in line with the country's policy to ensure its energy security and independence by reducing reliance on imported fuel for the transportation sector. The IRR was issued on September 2, 2022 and implemented 15 days after publication. The draft Comprehensive Roadmap for the Electric Vehicle Industry (CREVI) specified a short-term target of 2.45 million EVs, and 65,000 EV charging stations from 2023-2028 in line with the clean energy scenario. To achieve the goal of eliminating gasoline-powered cars by 2040, the national governments has laid the groundwork for a strong EV market by providing tax breaks for EV imports over the next five years (2024-2028), and other incentives such as a production-linked incentive scheme, tax rebate or research and development, subsidy for EV purchase, and reduced electricity tariff for EV charging. The Department of Trade and Industry (DTI) set the policies for the

manufacturing of EVs and has issued incentives to encourage EV investment such as the removal of tariffs, excise duty exemptions, and VAT exemption for raw materials/parts/capital equipment to be used in EV manufacturing.

As of end 2023, the Electric Vehicle Association of the Philippines (EVAP) estimated that there are more than 16,000 EV units in the country. EVAP hopes the government will implement a 15-30 percent sales rebate policy for buyers of EVs.

The DOT currently implements a Public Utility Vehicle (PUV) Modernization Program, that calls for the phase out of jeepneys that are at least 15 years old. There are close to 180,000 jeepneys that need to be modernized, and the EV industry is targeting to fill in 10 percent of this potential demand. The full compliance with the PUV Modernization Program has been extended. Progress to date remains limited due to high investment cost and lack of effective incentives.

Environmental Sustainability and Certification

In 2023, fuel ethanol used in the country resulted in a reduction of more than 843,000 tons of CO2e in line with the efforts by the Philippine government to comply with its international commitment to reduce GHG emissions through RE. Among the objectives of the Biofuels Act are a) develop and utilize indigenous renewable and sustainably-sourced clean energy sources to reduce dependence on imported oil; b) mitigate toxic and GHG emissions; and c) ensure the availability of alternative and renewable clean energy without any detriment to the natural ecosystem, biodiversity and food reserves of the country. The Philippine government looks into the realization of the sustainable development goals, wherein economic progress supports the protection of the environment and the health and safety of the people. The DOE-Energy Policy and Planning Bureau (EPPB) continues to monitor the GHG avoidance contribution of the actual local consumption of biofuels in the country. To date, there is no third-party certification of GHG values released by the DOE-EPPB.

Table 5. Biofuels GHG Avoidance

Year	Bioethanol (KTCO2e)	Biodiesel (KTCO2e)
2016	499.59	551.98
2017	516.61	516.05
2018	668.81	520.39
2019	782.92	551.53
2020	609.38	406.75
2021	788.81	484.74
2022	810.60	512.53
2023	843.11	575.91
2024*	140.82	91.15

Note: * As of February 2024
Formula of DOE-EPPB based on actual sales
Source: DOE-EPPB

Life Cycle Assessments. In 2019, the University of the Philippines Los Baños (UPLB) completed a study on "Life Cycle Assessment in terms of Carbon Debt and Payback Analyses, Carbon Savings and Energetics Studies of Biodiesel Production from Coconut Oil in the Philippines." The study calculated carbon intensity of Philippine biodiesel from crude coconut oil and refined coconut oil at 32.8 gCO2e/MJ and 31.5 gCO2e/MJ, respectively. However, under the current B2 blending requirement, this only results in a GHG reduction of 1.2-1.3 percent, which is still minimal (near zero) to date, though this factor would grow to 12.6-12.9 percent under a B20 scenario as earlier envisioned by DOE.

UPLB also conducted a life cycle assessment of fuel ethanol production, considering 10 out of 12 bioethanol distilleries during 2019-2020 (September to August). The study calculated the Philippines'

overall ethanol carbon intensity at 46.8 gCO2e/MJ, albeit wide ranging from a 37 to 89 percent GHG reduction, depending on the ethanol plant observed. The study further estimated the adoption of an E20 mandate as earlier envisioned by DOE would result in four million tons of annual GHG savings by 2030. Environmental savings leads to human health savings. The E20 blend will help the Philippines to eliminate other oxygenates that do not specifically tie to E20.

At present, biofuel plants are not required to certify the CI of their fuels on their own nor through third-party certification. Producers are not required to comply with any GHG sustainability requirements as there is no mandatory certification for biofuels placed in the domestic market. The lack of incentives lowers the drive of biofuel producers to bring down the CI of the fuels they market. Government policy is focused on compliance with the B2 and E10 mandate, and there is no clear direction on CI certification.

The Biofuels Act does not provide the Department of Environment and Natural Resources (DENR) any specific responsibilities for its implementation. The Biofuels Act exempts biofuel investors from wastewater fees but not from the obligation to secure a discharge permit. Under the Philippine Clean Water Act, the DENR enforced sustainability requirement on water quality, which requires facilities discharging regulated effluents to secure a permit to discharge (Section 14). The implementation of the Biofuels Act is linked to the provisions and in accordance with the objective of the Philippine Clean Air Act to develop and utilize cleaner alternative fuels. To date, no third-party certification is in place with permits only issued by the government.

There are no sustainability requirements for soil management or land use. The Philippines has no comprehensive land-use policy regarding cultivation of energy crops such as sugarcane for bioethanol or coconut for biodiesel. While the DA and DAR are mandated to determine the lands suitable to feedstock production, land use is largely determined by the local governments through ordinances. SRA monitors the sugarcane used for fuel ethanol production but there are no national standards or guidelines on how decisions are made on whether farmland is to be used for biofuel or food production.

Import Policy Including Duties

Fuel oil companies can import fuel ethanol only if domestic production cannot meet demand created by the mandate, which has been the case from the very earliest days of the fuel ethanol program. Section 5.1 and 5.2 of the Biofuels Act recognized the country's insufficient feedstocks supply to meet the mandated volume of gasoline-fuel ethanol blend (e-gasoline). DOE and DOF issued DC 2006-08-001 and Revenue Regulation No 8-2006, respectively, allowing oil companies to import fuel ethanol subject to the guidelines issued. The NBB determines the volume and allocates among fuel oil companies for compliance with the mandated blend.

By law, during the first four years of Biofuels Act implementation, in the event of supply shortage of locally produced fuel ethanol, oil companies were allowed to import fuel ethanol and benefit from a reduced tariff, but only to the extent of the shortage as determined by the NBB (Section 5 and 6 of the IRR, RA 9367). Due to insufficient feedstocks, NBB still allows importation of fuel ethanol to comply with the mandated E10 blend requirement. The DOE promulgates the import guidelines in DC 2011-12-0013 requiring oil companies to purchase the entire monthly allocation of local fuel ethanol before they can import.

Allocation System. The bioethanol producers submit their committed volumes available for delivery to the DOE- Renewable Energy Management Bureau (REMB) on the first day of the allocating month, which is one quarter ahead of the delivery month. DOE-REMB endorses the consolidated monthly committed volumes for any given quarter to OIMB. The OIMB calculates and circulates the respective local monthly allocation (LMA) of each oil company on the 10th day of each allocating month based on the average market share. The LMA issuance serves as the regulatory mechanism for the exhaustion of local bioethanol. While imported ethanol fills in the supply gap, it is calculated based on gasoline demand. Importations of ethanol blended fossil fuels shall not be considered as part of the compliance with the LMA mandate.

The quota allocation system ensures that imports do not displace locally produced fuel ethanol. DOE DC 2015-06-0007 provides revised guidelines on the utilization of locally-produced fuel ethanol. The revised DC omitted the notice of allowable bioethanol importation (NABI). Oil companies can only import fuel ethanol equivalent to the shortage, that is, total requirement less LMA.

EPAP requested the reinstatement of the NABI as stated in DC 2011-12-0013, which was omitted in the revised guidelines on the utilization of locally produced bioethanol in the production of e-gasoline. The DOE issued DC 2021-06-0014 or the revised circular for the accreditation and submission of notices and reports of the Philippine downstream oil industry (DOI) pursuant to Biofuels Act. The circular reinforces the DOE's mandate to strictly monitor the DOI. Additional information can be accessed here.

Diversion Prevention. The Bureau of Internal Revenue (BIR) issued Revenue Regulations No. 8-2006 prescribing the implementing guidelines on the taxation and monitoring of the raw materials used and the fuel ethanol-blended gasoline produced under the bioethanol program of the DOE. Imported fuel ethanol must be denatured with two percent gasoline in accordance with the formula prescribed under these regulations. This practice prevents the diversion of imported bioethanol to other usage other than fuel, i.e., potable alcohol. The denaturing of imported fuel ethanol must be conducted in the presence of authorized representatives of the oil industry participant, DOE, BIR and Bureau of Customs (BOC) within 48 hours immediately after completion of the unloading of the fuel ethanol from the foreign vessel and transfer thereof to the Customs-bonded storage tank. The REMB conducts monitoring and sampling activities to ensure compliance with the PNS – quarterly for biodiesel and semestral for bioethanol producers.

The HS Codes for ethanol (excluding beverage ethanol) are 2207.10 and 2207.20. Currently, there is no import tariff on ethanol as tariffs fell to zero in 2016 (ASEAN) and 2020 (Most Favored Nation). A one percent duty is paid by oil companies on imported ethanol destined for gasoline blending. Biodiesel is harmonized under HS Code 3826.00 (pure biodiesel and biodiesel blends down but not including 30 percent while petroleum oils containing 1-30 percent biodiesel by volume use HS Code 2710.20.

III. Ethanol

Table 6. Ethanol Used as Fuel and Other Industrial Chemicals (Million Liters)										
Calendar Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024f**
Beginning Stocks	na	na	na	na	25	14	14	10	18	22
Fuel Begin Stocks	na	na	na	na	25	14	14	10	18	22
Production	na	na	na	na	375	344	400	402	417	420
Fuel Production	168	230	235	297	346	280	355	375	387	395
Imports	na	339	322	347	341	322	385	398	461	475
Fuel Imports	311	260	276	285	257	241	225	277	246	280
Exports	0	0	0	0	0	2	4	0	0	0
Fuel Exports	0	0	0	0	0	0	0	0	0	0
Consumption	na	na	na	na	727	664	785	792	874	902
Fuel Consumption	479	490	511	557	614	521	584	644	629	682
Ending Stocks	na	na	na	25	14	14	10	18	22	15
Fuel Ending Stocks	na	na	na	25	14	14	10	18	22	15
Refineries Producing Fuel Ethanol (Million Liters)										
Number of Refineries	8	10	10	12	12	12	13	13	13	13
Nameplate Capacity	222	282	282	381	381	381	426	466	478	478
Capacity Use (%)	75.7%	81.6%	83.3%	78.0%	90.8%	73.5%	83.3%	80.4%	81.0%	82.6
Co-product Production (1,000 MT)										
Bagasse	45	17	12	3	88	150	102	164	208	222
Feedstock Use for Fuel Ethanol (1,000 MT)										
Sugarcane	150	55	40	200	190	502	340	547	690	740
Molasses	650	930	950	1,080	1,240	1,076	1,340	1,344	1,350	1,365
Sugar	0	0	0	0	0	0	0	0	0	0
Market Penetration (Million Liters)										
Fuel Ethanol Use	479	490	511	557	614	521	584	644	629	682
Gasoline Pool 1/	5,174	5,692	6,199	6,441	6,973	5,636	6,757	7,091	8,008	8500
Blend Rate (%)	9.3%	8.6%	8.2%	8.6%	8.8%	9.2%	8.6%	8.7%	7.9%	8.0

Note: f = forecast
na = neither government nor industry sources can provide stocks and production data from 2014 to 2018
1/= covers gasoline and all biocomponents (ethanol)
Conversion: 1MT of molasses = 246 liters of ethanol, 1MT of sugarcane = 80 liters of ethanol (average)
Source: DOE, SRA, Bureau of Internal Revenue, with Post estimates for 2024

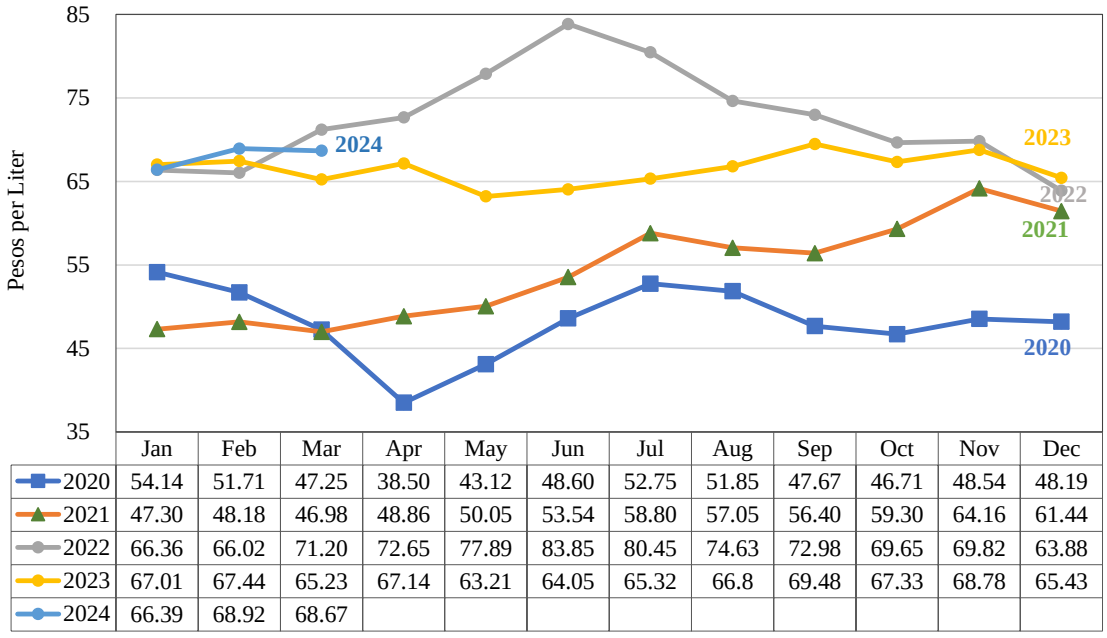
Consumption

Post forecasts an 8 percent growth in consumption in 2024 attributed solely to increased fuel pool size. The expected growth relates to the increasing car purchases with double digit growth in 2023, which continue to contribute to the increase in gasoline consumption.

Imports supplied most of domestic demand in the early years of the fuel ethanol program. With the expansion of domestic production capacity, the industry was able to reach up to 50 percent of domestic demand by 2016. Since then, the ability of the domestic industry to supply demand has stagnated at around 50 percent, with imports covering the remaining 50 percent of the E10 mandate. Over time, imported fuel ethanol is expected to cover a growing portion of total consumption because local production is expected to face continued feedstock supply constraints.

Prices. The Philippines experienced and continues to experience sudden increases in at-the-pump prices of fossil fuel, which prompted the proposal to suspend the Biofuels Act. EPAP opposed the proposal and shows support to to raise the blend to E20 to reduce gasoline prices and GHG emissions. EPAP acknowledges that domestic ethanol is expensive, and that oil companies and consumers have benefitted from cheaper imported fuel ethanol, which drives down the retail price of gasoline. In the past four years, the lowest gasoline prices were seen in April 2020 when the Philippines imposed a series of lockdowns due to COVID-19. In 2022, crude oil prices rose and peaked in June due to global supply/demand imbalances aggravated by the conflict between Russia and Ukraine that has destabilized markets. Local and imported gasoline competes openly on price, while imported fuel ethanol does not compete with local ethanol nor with local gasoline.

Figure 1. Monthly Gasoline Prices



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	54.14	51.71	47.25	38.50	43.12	48.60	52.75	51.85	47.67	46.71	48.54	48.19
2021	47.30	48.18	46.98	48.86	50.05	53.54	58.80	57.05	56.40	59.30	64.16	61.44
2022	66.36	66.02	71.20	72.65	77.89	83.85	80.45	74.63	72.98	69.65	69.82	63.88
2023	67.01	67.44	65.23	67.14	63.21	64.05	65.32	66.8	69.48	67.33	68.78	65.43
2024	66.39	68.92	68.67									

2023 $/gallon	
Jan	4.57
Feb	4.56
Mar	4.92
Apr	4.97
May	5.29
Jun	5.68
Jul	5.54
Aug	5.03
Sep	4.86
Oct	4.64
Nov	4.74
Dec	4.35

Source of data: DOE-OIMB

Economic Impacts of Higher Blend Rates. Had the Philippines maintained its earlier timeline to move to higher blends of E15 and E20, using current April 2024 prices, it would have decreased the gasoline pump price by 2 percent and 4 percent, respectively, resulting in average annual savings equivalent to PhP7.9 billion ($139 million) and PhP15.9 billion ($279 million). Such a move would have also facilitated an opportunity to share a portion of gained consumer welfare with local fuel ethanol producers via higher prices for locally produced fuel ethanol, which in turn, would have encouraged local producers to maximize production.

Table 7. Pump Price Impacts of Higher Blend Rates			
Blend	Pump Price E10-Equivalent	Consumer Welfare	Equivalent Peso Value (PhP Million)
E15	0.9799	.0201	7,947
E20	0.9599	.0401	15,893

Note: Gasoline – (average first half of April 2024) – PhP 65/liter
Bioethanol Reference Price (average first half April 2024) – PhP84/liter
Imported Ethanol (April 2024) - $0.607/liter + 20% = Landed Subic – PhP41.54/liter
Forex (April 2024) - $1: PhP57 (Source: Bangko Sentral and Pilipinas)

Production

Post forecasts fuel ethanol production to increase at 395 million liters in 2024 due to increased capacity of some ethanol facilities such as Balayan Distillery and Cavite Biofuels. Competitiveness of the local sugarcane industry to provide the needed feedstock remains a challenge. From the Sugar Annual Report 2024, Post expects raw sugar production to remain low at 1.85 million metric tons (MT), with cane production expected to be about 21.6 million MT. As in recent years, feedstock supply will be limited for fuel ethanol production, requiring imports to cover growth in fuel consumption.

The PEP 2020-2040 has set the targets for fuel ethanol production capacity on the assumption that all supply requirements are to be produced locally. See Biofuels Annual 2022 for historical developments. Currently, the main feedstocks are sugarcane-based materials, i.e., molasses and sugarcane juice. Only three fuel ethanol producers (San Carlos Bioenergy, Green Future Innovations, and Progreen Agricorp) use sugarcane as feedstock, the rest use molasses. While 80 percent of total molasses in the country is used for ethanol production, supply is still not sufficient. The industry looks at corn and other potential feedstock, i.e. sweet sorghum, cassava, nipa and sweet potato, but these are still in the research stage and will take time to produce alternatives to sugarcane commercially for bioethanol processing, if they can achieve success at all. The DOE has recent projects on biofuels on nipa sap as feedstock and cellulosic ethanol production technology. Corn as feedstock poses problems because of the food versus fuel dilemma. Corn is also not included in the list of crops in the guidelines governing biofuels feedstock production (DOE JAO No. 2008-1). Corn can be allowed if from newly opened corn areas but not from existing corn production areas, thereby avoiding conflict with food security issues. To use corn, existing bioethanol plants need to invest in corn processing and fermentation which requires different technology. Current ethanol plants are only equipped to process molasses and sugarcane juice. In 2022, one producer signaled interest in corn ethanol production but has stalled given the recent increases in corn prices. Brazil is the only country that has successfully developed a dual nationwide sugarcane-corn ethanol-processing industry.

Table 8. Fuel Ethanol Production Capacity Targets (In Million Liters)	
Year	Fuel Ethanol Production Capacity
2020	380.50
2025	944.15
2030	1,354.26
2035	1,913.05
2040	2,579.34

Source: PEP 2020-2040, DOE

There is no immediate solution to insufficient feedstocks. Molasses, a byproduct of sugar production, is dependent on the volume of sugarcane harvested and milled. For the past decade, the production of sugarcane exhibited a fluctuating trend attributed to declining sugarcane areas, adverse weather conditions, high cost of inputs i.e. fertilizer, declining farm labor force, and highly acidic or degraded soils for sugarcane planting.

The Philippines will continue to use molasses and sugarcane juice. The high demand for molasses drove up its price in previous years. Sugarcane planters are benefiting from the high molasses prices, but this has resulted in high fuel ethanol prices. The SRA releases the Bioethanol Reference Price twice a month as benchmark for the price negotiations of oil companies and bioethanol producers to establish a level playing field.

Table 9. Molasses Price and BRP

Marketing Year (September-August)	Molasses Price (PhP/MT	Sugar Composite Price (PhP/Lkg)	Bioethanol Price Index (PhP/Li)
2016-2017	8,544	1,430	53.68
2017-2018	6,364	1,440	50.96
2018-2019	9,694	1,532	57.40
2019-2020	11,828	1,484	61.07
2020-2021	9,352	1,500	57.07
2021-2022	11,735	2,014	65.79
2022-2023	14,510	3,163	82.07
2023-2024*	13,497	2,599	79.70

Note: September to March only

Source: SRA

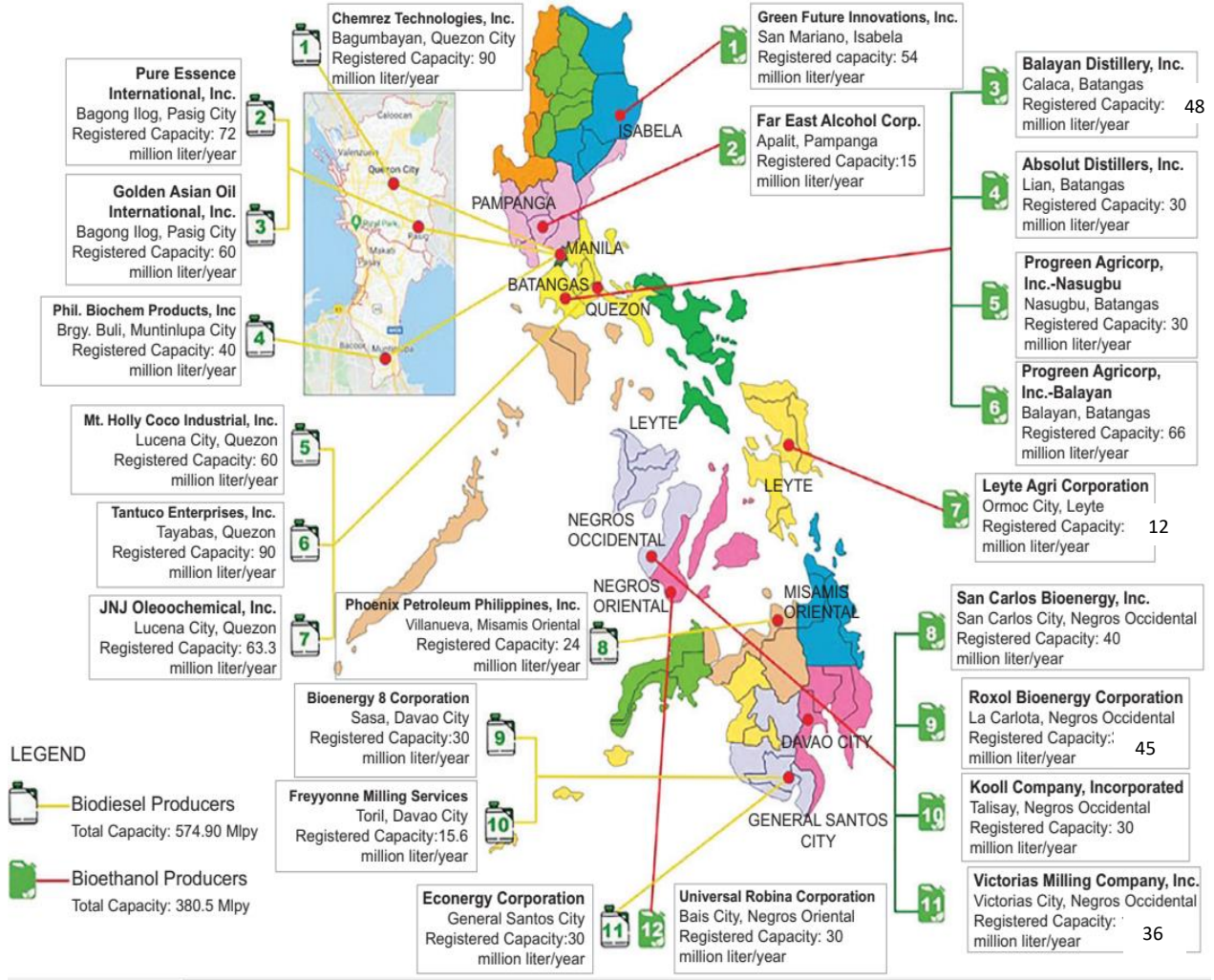
By law, imported molasses for use as a biofuel feedstock is not allowed. EPAP proposed temporarily allowing importation of molasses to maximize plant capacity given current high fuel prices. The DOE declined the proposal in 2020, with sugar planters, millers and the SRA opposed during the stakeholders' consultations in August 2021 and in E20 consultations in 2023. EPAP also discussed the proposal with the Philippine Senate but received no decision. EPAP hopes the new government will back such a proposal for the development of the biofuels industry.

Meanwhile, imported molasses is allowed as feedstock in the production of denatured alcohol for industrial use. The DOE allowed the bioethanol producers to repurpose their production processes from fuel use to medical use. Five bioethanol producers went into production of medical grade alcohol or rubbing alcohol to increase the country's supply of the needed alcohol due to COVID-19. The Philippine Food and Drug Administration (FDA) issued interim guidelines for the provisional licenses to operate and certificates of product notifications for all rubbing alcohol through FDA Memorandum Circular 2020-001. In 2022, about 27.2 million liters of rubbing alcohol were produced locally, 64 percent lower than 2021 production of 44.7 million liters. During the peak of COVID-19 in 2020, about 64 million liters of rubbing alcohol were produced by bioethanol producers Victorias, Progreen (Balayan and Nasugbu), Kooll Company, and Far East Alcohol. According to EPAP, ethanol producers donated about 1.5 million liters to hospitals, government offices, local government units, and schools as part of the producers' corporate social responsibility.

There are 14 accredited bioethanol producers in the Philippines, with a total production capacity of 508 million liters per year (MLPY) in 2024. One facility closed toward the end of 2022, but another one opened in February 2024. Additional capacity of 28 MLPY is expected by the end of 2024 and potential additional capacity of 45 MLPY under negotiation. The current capacity utilization is equivalent to 81 percent of the volume requirement for the E10 mandate.

The overcapacity of fuel ethanol plants compared to the local feedstock available is a result of the unexpected shift of seven potable alcohol producers to fuel ethanol following the implementation of a 22 percent excise tax on potable alcohol.

Figure 2. Philippine Biofuels Producers



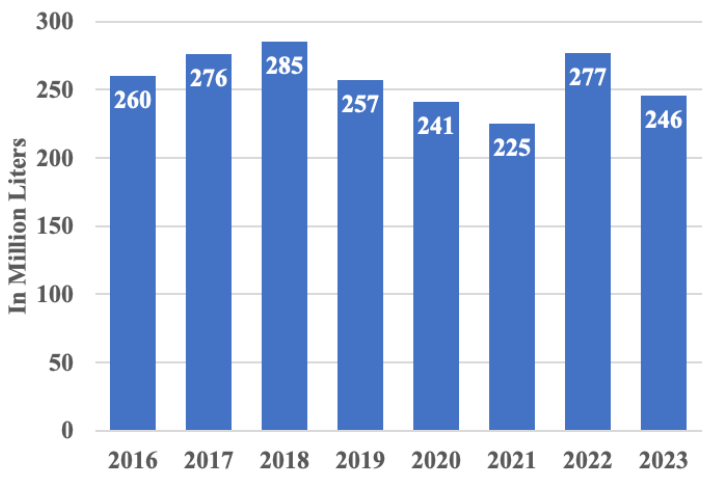
Source: PEP 2018-2040

Trade

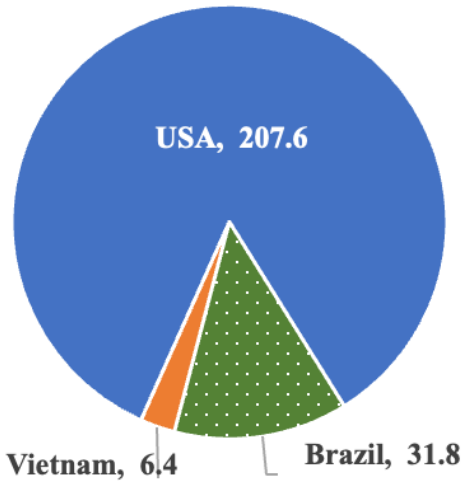
Post forecasts fuel ethanol imports to increase to 280 million liters in 2024 due to the rise in gasoline pool consumption. Local ethanol remains the priority, but imports will continue to cover around 42 percent of the needed supply for gasoline for the E10 blending. The timing for the implementation of the discretionary E20 blending remains uncertain pending release of the DOE Department Circular detailing the implementing guidelines on the E20 roll out. Total imports declined in 2023 due to high fuel prices. The United States has been the largest supplier of imported ethanol, but recently faced increasing competition with Brazil.

Figure 3. Fuel Ethanol Imports

Volume in Million Liters



By Country Source, 2023



Source: SRA and DOE

As of April 2024, there are 23 accredited importers of fuel ethanol composed of the top fuel oil companies (Petron, Shell, Chevron) and fuel traders who supply small players.

Table 10. Accredited Downstream Oil Industry Biofuel Participants

1. Petron Corporation	13. Insular Oil Corporation
2. Pilipinas Shell Petroleum Corporation	14. Warbucks Industries Corporation
3. Chevron Philippines, Inc.	15. Warbucks Southern Corporation
4. PTT Philippines Corporation	16. ERA 1 Petroleum Corporation
5. Seaoil Philippines, Inc.	17. Power Fill International Subic Inc.
6. Unioil Petroleum Philippines, Inc.	18. Vmaximus Subic FreePort Corp.
7. Jetti Petroleum Inc.	19. APEX Petroleum OPC
8. Phoenix Petroleum Philippines, Inc.	20. Trafigura Philippines Inc.
9. Filoil Logistics Corporation	21. Goldenshare Commerce & Trading, Inc.
10. Marubeni Philippines Corporation	22. South Brookville Trading Corp.
11. Micro Dragon Petroleum, Inc.	23. Felcor Petroleum Depot Corporation
12. High Glory Subic International Logistics, Inc.	

Source: DOE

IV. Biodiesel

Table 11. BIODIESEL (Million Liters)										
Calendar Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024f**
Beginning Stocks	29	32	41	57	53	64	56	47	48	35
Production	204	227	220	220	242	188	198	203	225	230
Imports	0	0	0	0	0	0	0	0	0	0
Exports	0	0	0	0	0	0	0	0	0	0
Consumption	201	218	204	224	231	196	207	202	238	240
Ending Stocks	32	41	57	53	64	56	47	48	35	25
Production Capacity (Million Liters)										
Number of Biorefineries	11	11	11	11	12	13	13	13	13	13
Nameplate Capacity	585	575	575	575	608	708	708	678	678	678
Capacity Use (%)	34.9%	39.5%	38.3%	38.3%	39.8%	26.6%	28.0%	30.0%	32.2%	33.9%
Feedstock Use (1,000 MT)										
Coconut Oil	187	208	202	202	222	172	182	187	207	211
Market Penetration (Million Liters)										
Biodiesel, on-road use	201	218	204	224	231	196	207	202	238	240
Diesel Pool, on-road use	7,334	7,701	8,086	8,200	8,413	6,440	7,460	8,191	8,100	8200
Blend Rate (%)	2.3%	2.3%	2.0%	2.0%	2.0%	2.0%	2.0%	1.8%	2.1%	2.1%
Diesel Pool, total 1/	8,793	9,535	10,159	11,207	11,534	9,786	10,590	11,164	11,090	11,200

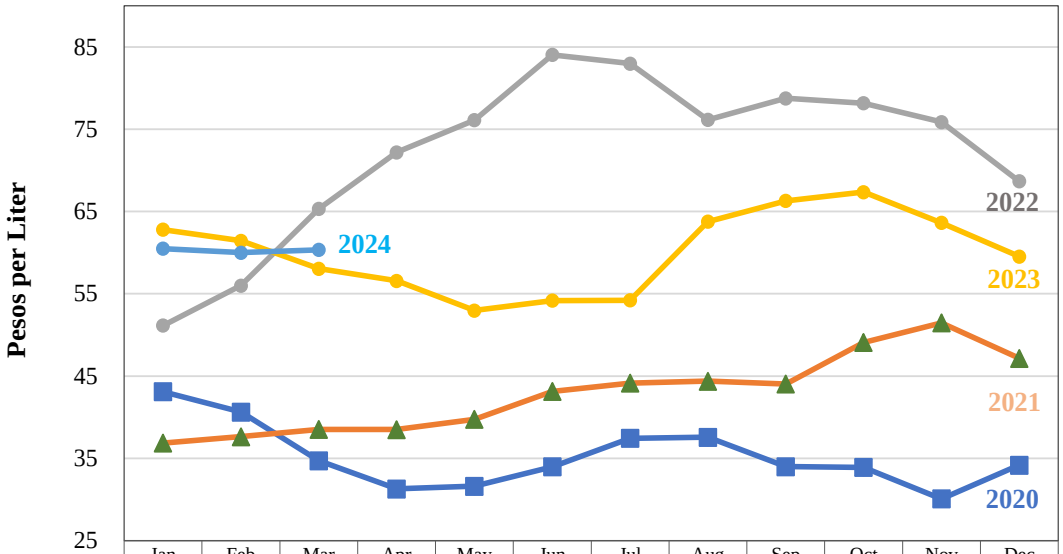
Note:
1/ Diesel pools include all blended biodiesel.
f-forecast.
Feedstock biodiesel conversion: 1 MT of coconut oil yields 1,090 liters of biodiesel.
Source: DOE, with Post estimates for 2024

Consumption

The Philippines Biodiesel Association (TPBA) advocates for a gradual increase from B2 to B3 to B5. The NBB endorsed to increase the blend mandate gradually starting with B3 implementation with a target date of October 2024. **Post forecasts biodiesel consumption to reach 240 million liters in 2024** due to the growth in the diesel pool. The implementing guidelines for the B3 roll-out are still under review and may take time until the DOE releases the Department Circular on the implementing rules and regulations for the B3 mandate.

Prices. Blended diesel is sold at retail stations for on-road and off-road use, including agricultural use (e.g. tractor, inland boats). Large mining companies maintain their own fuel depots on-site for their equipment, sourcing their supply directly from fuel companies.

Figure 4. Monthly Prices of Diesel



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	43.11	40.63	34.72	31.29	31.61	33.98	37.44	37.56	33.99	33.91	30.09	34.17
2021	36.87	37.63	38.52	38.50	39.74	43.14	44.14	44.38	44.04	49.09	51.47	47.16
2022	51.15	55.99	65.33	72.19	76.10	84.04	82.98	76.14	78.75	78.17	75.87	68.67
2023	62.79	61.45	58.05	56.58	52.96	54.17	54.21	63.78	66.29	67.36	63.63	59.54
2024	60.49	60.01	60.34									

2023 $/gallon	
Jan	3.52
Feb	3.87
Mar	4.51
Apr	4.94
May	5.17
Jun	5.69
Jul	5.72
Aug	5.13
Sep	5.25
Oct	5.21
Nov	5.15
Dec	4.68

Source: DOE-OIMB

Over the years, examining price trends and gaps in the Philippines between biodiesel and fossil diesel indicated raising the blend higher from B2 would lead to even higher diesel fuel cost. Biodiesel prices remain higher than the price of fossil diesel, often considerably higher unless the lower carbon intensity (CI) of biofuel is priced into the market thru a carbon credit/debit scheme or taxes that penalize higher carbon emission fuels. These schemes are common elsewhere. This price effect (which is relatively very small on low-blended biodiesel-diesel blends), however, does not prevent the PCA from pushing for the increase in the biodiesel blend in support of the livelihood of around 2.5 million coconut farmers. An evaluation of the effects in the coconut oil industry, however, and a calculation of diesel price increases are needed. That said, at low-blend rates, any price increase in the blended fuel over pure fossil diesel is largely 'washed-out' by

Table 12. Prices of Diesel, CME and CNO

Year	Diesel Price (a) (PhP/Li)	Biodiesel (CME) Price Range (b) (PhP/Li)	Crude CNO Local Price (c) (PhP/Kg)
2014	41.04	38 – 75	61.98
2015	27.46	43 – 72	55.25
2016	25.43	45 – 85	74.45
2017	31.78	45 – 92	90.41
2018	42.16	40 – 91	79.97
2019	41.60	35 – 70	51.73
2020	34.71	35 – 75	49.19
2021	42.16	58 – 90	97.16
2022	72.12 (b)	68 – 96	82.37
2023	60.07 (b)	53 – 62	65.97

Source: (a) ADB Key Indicators Database Philippines
(b) DOE
(c) United Coconut Association of the Philippines

the wide swings in oil and fossil diesel prices on the international market seen year after year. **By law, importation of biodiesel is not allowed, which could be the solution to manage the increase in diesel pump prices.**

Production

Should the government mandate B5, the available biodiesel plant capacity is more than enough to supply the requirement. However, while coconut production is abundant in the Philippines, the bulk of coconut oil goes to traditional exports, reducing the available supply for biodiesel producers. **Post forecasts a growth of 2 percent in biodiesel production to 230 million liters due to growth in consumption.** The DOE targets the increase in blending to B3 in October 2024. Whether this will happen remains a question. Given that it would occur in the last quarter of 2024, any volume uptake that would take effect would be minimal and growth would still be attributed to an increase in the overall diesel pool.

The PEP 2020-2040 has set the production capacity targets for biodiesel with cumulative targets under the Clean Energy Scenario (CES). Two prospective investors have signaled interest in constructing biodiesel facilities with a combined potential capacity of 127.65 MLPY. As of April 2024, there are 13 accredited biodiesel producers, with total production capacity of 678 MLPY, equivalent to about 34 percent of volume requirements for the B2 mandate. The overcapacity in serving the B2 blend is a result of the over expansion of the industry in anticipation of the shift to B5 as guided by the PEP.

Increasing the biofuels blend requires constant development of locally produced feedstock sources to ensure adequate supply. Research and development of biofuel production and utilization is one of the responsibilities of the DOST. Its recent project is called Biomass as Green Energy Source. The DOST-Industrial Technology and Development Institute (DOST-ITDI) completed in December 2019 the study entitled Characterization/Performance Testing of the Biodiesel/Diesel Blends from Combined Feedstock of Various Vegetable and Used Cooking Oils. Biodiesel was produced from various feedstocks, namely: refined palm oil, used cooking oil, and rubber seed oil through optimized processes. Results of the analyses showed methyl esters from palm oil, used cooking oil, and rubber seed oil can be blended with CME for use as fuel additive to petroleum diesel.

Trade

No trade is allowed under the Biofuels Act, although imported palm-oil biodiesel could offset the expected price increase of a higher blend mandate through lower-cost imported biodiesel.

V. Advanced Biofuels

The Philippines focuses on finding new feedstock to produce more biofuels. The National Bioenergy Research and Innovation Center (NBERIC) was established in 2018 to realize R&D projects in bioenergy. NBERIC collaborates with various institutions on bioethanol R&D to maximize the NBERIC facility located at the Mariano Marcos State University (MMSU) in Batac, Ilocos Norte in northern Philippines. The USAID-Science, Technology, Research and Innovation for Development (STRIDE) program has been instrumental in the establishment of NBERIC. The United States Grains Council (USGC) signed a Memorandum of Understanding with MMSU in July 2022 to establish a cooperative partnership, which facilitates the exchange of expert knowledge, technical information, and best practices as they relate to the biofuels industry and policy development.

The Pampanga State Agricultural University (PSAU) established the Bio-Energy Laboratory in 2017-2019 to determine the potential of the enormous volume of agricultural resources, products and wastes in Central Luzon as biofuels. The laboratory focuses on the thermal conversion and characterization of biomass used of agricultural wastes and other lesser studied agricultural resources.

The DOST-Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD) and the Industrial Technology Development Institute (ITDI) conduct R&D on biofuels in collaboration with other institutions such as DOE, DA, PCAARRD, and academia, particularly the UPLB and UP Visayas.

Bio-oil production from agricultural waste (2014-2020). Pyrolysis was conducted on corn stover using a prefabricated reactor. Optimum conditions on temperature, time, and catalyst have yielded corresponding improvements in bio-oil and char yields. Recommendations for further studies include scaling up of equipment and facilities to support bio-oil production from other agricultural waste sources, working on higher pyrolysis temperature, and economic analysis to determine cost efficiency of the bio-oil and char.

Fuel ethanol production from lignocellulosic feedstock (2009-2014). UPLB carried out the program on Fuel Ethanol Production from Lignocellulosic Feedstock aimed to determine possible candidates for feedstock, evaluation and optimization of pre-treatment methods, and development of micro-organism for the ethanol production. The project was able to produce ethanol and fermentation efficiencies were comparable with existing literatures, but further R&D is required to improve the yield.

Microalgae experiments were done by DOST and UP Visayas at the laboratory stage but the economic feasibility for commercial-scale production must be established. Likewise, studies on used vegetable oils, particularly from fast-food chains, were conducted by DOST, and more studies are needed on raw material quality control, and process optimization, since the resulting biodiesel had difficulty meeting standards. For bioethanol, DOST and UPLB have undertaken studies on sweet sorghum, and the economic feasibility of its cultivation vis-à-vis sugarcane needs to be ascertained.

A project funded by the National Biofuel Board (NBB) was completed by the ITDI in 2018 on multi-feedstock (coconut oil, palm oil, used oil, rubber oil) production of biodiesel, and further studies are needed for engine testing. These initiatives focused on viability of feedstocks and may not be considered advanced technology as has been solicited.

Sustainable Aviation Fuel (SAF)

The DOE‘s Renewable Energy Management Bureau (REMB) is currently drafting the roadmap on sustainable aviation fuel (SAF). SAF produced from coconut oil was initially intended for adoption as aviation fuel. Reduction in fuel prices at the time, however, redirected the project into the above-mentioned bio-oil production from agricultural waste.

Among local airlines in the Philippines, Cebu Pacific (CEB) has started to use SAF in its Airbus 320neo (New Engine Option). CEB has signed a memorandum of understanding (MOU) with NESTE, an oil refining and marketing company and a leading producer of SAF to explore the supply and purchase of

SAF in Asia Pacific in November 2023. CEB has laid out initiatives to address emissions footprint by integrating SAF in its operations. CEB seeks to further utilize SAF by launching green routes in approximately three years. One challenge, however, is the high price, making it uncertain if the higher use of SAF will impact CEB's low-cost business model. Philippine Airlines (PAL), the country's flag carrier, is also working toward developing sustainable fuel for its airline fleet. PAL supports the zero-emission initiative of the IATA. PAL announced it will invest in the use of SAF in its aviation operation during the Asia-Pacific Economic Cooperation (APEC) Summit in November 2023. PAL pledged to use five percent of SAF by 2030. SAF is a key part of the aviation industry's plan to reduce carbon emissions. SAF reduces the carbon intensity of air travel by up to 80 percent over its life cycle. Please see GAIN Report on SAF here.

The DOE aims to put in place regulations on SAF and collaborates with the aviation sector and international partners to decarbonize the aviation industry. A meeting was conducted last year among the DOE, Civil Aviation Authority of the Philippines (CAAP), Philippine National Oil Company, and other stakeholders to discuss the potential advantage of exploring SAF. The DOE acknowledges international initiatives such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), established by the International Civil Aviation Organization (ICAO), which offers a harmonized way to reduce carbon emissions in the aviation industry. The Philippines as an ICAO member joined CORSIA in December 2018 through CAAP. Under CORSIA's timetable, participating ICAO member states pledge to comply with the carbon dioxide offsetting requirements by 2024 to 2026. Mandatory compliance is set for 2027 to 2035. Philippine airlines such as PAL and CEB are mandated to implement CORSIA by 2027.

On November 13, 2023, in a session of the Trade and Industry Development Talks, experts proposed the crafting of a Philippine Sustainable Aviation Fuel Roadmap where the government can consider mandating and/or incentivizing the use of SAF. The DTI-Board of Investments (BOI) assured SAF investors that the Corporate Recovery and Tax Incentives for Enterprise Act will be available for them. The BOI also created a green lane for expedited processing of strategic investments through Executive Order No. 18.

Appendix A: Conversion Rates and Terms

Feedstock-to-Biofuel Conversion Rates
Use these conversion rates as a guide. The rates you use (or implied based on reported feedstock use) must match or come very close to these rates. Feedstock reported in the biofuels tables when added together should match reported biofuel production.

Ethanol

Sugarcane: 1 MT = 76-83 liters (used 80 in 2014 Baseline)
Molasses: 1 MT = 246 liters ethanol

Biodiesel

Coconut oil 1 MT = 1,090 liters of biodiesel.

Appendix B: Bioethanol Producers and Capacities

Year	Number of Distilleries	Annual Rated Capacity (million liters)	Annual Production (million liters)	Capacity Utilization (%)	Annual Blend Rate (%)
2008	1	Na	0.97	Na	Na
2009	2	39.00	23.23	59.6	2.3
2010	3	69.00	10.17	14.7	3.8
2011	3	69.00	4.14	6.0	5.6
2012	4	123.00	34.54	28.1	6.9
2013	4	123.00	71.54	58.2	8.5
2014	7	207.12	114.86	55.5	10.1
2015	8	222.12	167.87	75.6	9.3
2016	10	282.12	230.18	81.6	8.6
2017	10	282.12	234.65	83.2	8.2
2018	12	380.50	296.54	77.9	8.6
2019	12	380.50	346.14	91.0	8.8
2020	12	380.50	279.58	73.5	8.8
2021	13	425.50	354.60	83.3	8.6
2022	13	466.00	374.78	80.4	9.7
2023	13	478.00	386.51	81.0	7.9

Source: DOE and SRA

Attachments:

No Attachments