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Report Highlights:

Post sees Philippine biofuels consumption partially recovering in 2021 due to the loosening of quarantine restrictions, as ethanol demand grows 9 percent to 570 million liters and biodiesel increases 9 percent to 175 million liters. Blend rates remain unchanged. Ethanol production will grow 18 percent coming from a low base to 330 million liters while biodiesel will decrease by 4 percent to 180 million liters as existing inventories are distributed. Limited local ethanol feedstock continues to be a challenge, with local producers only able to supply half the requirements for gasoline blending; however, imported ethanol, estimated to stay flat in 2021 at 240 million liters, should continue to fill the gap and offset higher pump prices. In support of climate action, the Philippines calculated its carbon intensity of biodiesel from crude coconut oil and refined coconut oil at 32.8 gCO2e/MJ and 31.5 gCO2e/MJ, respectively, and ethanol at 46.8 gCO2e/MJ, all of which present significant GHG savings.

I. Executive Summary

Transport accounts for one-third of greenhouse gas (GHG) emissions in the Philippines. The country has passed two laws, the Biofuels Act of 2006 (RA 9367) and the Renewable Energy Act of 2008 (RA 9513) to promote renewable energy, reduce dependence on imported fossil fuels, and lower carbon emissions in response to climate change. Domestically produced bioethanol is derived from sugarcane (mostly molasses) and blended with gasoline, while biodiesel is from coconut oil (CNO) and blended with petroleum diesel. Imported ethanol serves an important role in supplementing local supply and keeping pump prices lower, whereas imported biodiesel is not permitted under the Biofuels Act.

The Department of Energy (DOE) is the lead agency in implementing the provisions of the Biofuels Act and its implementing rules and regulations (IRR). The National Biofuels Program consistent with the Philippine Energy Plan provides direction in the law's implementation guided by the National Biofuels Board (NBB) chaired by the DOE. In compliance with the law, a one percent biodiesel blend (B1) was implemented in 2007, followed by B2 and a five percent ethanol blend (E5) mandated in 2009. An E10 blend took effect in February 2012, one year later than the 2011 schedule. The mandated blends remain at B2 and E10, with higher targets since then not being met.

Most recently, the Philippines has calculated the carbon intensity of biodiesel from crude coconut oil and refined coconut oil at 32.8 gCO2e/MJ and 31.5 gCO2e/MJ, respectively, and ethanol at 46.8 gCO2e/MJ, all of which present significant GHG savings over fossil fuels (83.8 gCO2e/MJ). Post calculations further indicate any increase to the ethanol blend rate would result in immediate and long-term cost-savings for the Philippine consumer and increase financial incentives to boost local production. However, differences in biodiesel policy would result in marginally higher pump prices.

Post sees ethanol consumption growing by 9 percent to 570 million liters and biodiesel demand increasing 9 percent to 175 million liters in 2021. Following the strict movement restrictions placed to contain the spread of COVD-19 in 2020, the loosening of such measures in 2021 have resulted in a rebound that does not yet return consumption to pre-pandemic levels. Fuel ethanol imports in 2021 are forecast to stay flat at 240 million liters, with the United States as the primary supplier.

Post expects ethanol production to expand by 18 percent to 330 million liters in 2021 with biodiesel decreasing 4 percent to 180 million liters, taking into consideration existing inventories of 122 million liters. The Philippines' capacity of 707.9 million liters per year is a result of industry expanding in anticipation of the B5 blend. With the increased mandate not yet implemented, the capacity is more than enough to cover the required blending for 12 billion liters of diesel per year. The excess capacity of fuel ethanol plants compared to local feedstock available is due to the unexpected shift of seven potable alcohol producers to fuel ethanol due to the excise tax of 22 percent on potable alcohol.

Insufficient feedstock is a perennial issue for ethanol production. Philippine ethanol facilities are only equipped to use molasses and sugarcane, which face challenges in boosting production. On average, local producers can only supply half the required ethanol requirement for gasoline blending, with the remaining half filled by imported bioethanol. Industry proposed that the government temporarily allow importation of molasses to maximize plant capacity utilization. The DOE declined the proposal in 2020 and it was also opposed by sugar growers, millers, and the Sugar Regulatory Administration during a stakeholders' consultation in August 2021.

II. Policy and Programs

The Philippines has enacted two policies to promote renewable energy: the Biofuels Act of 2006 (RA 9367) and its implementing rules and regulations (IRR) and the Renewable Energy Act of 2008 (RA 9513) and IRR. The Biofuels Act seeks to reduce the country's dependence on imported fuels by promoting the development and mandating the use of locally-sourced biofuels. Domestically produced ethanol is derived from sugarcane (mostly molasses) and blended with gasoline, while biodiesel is from coconut oil (CNO) and blended with petroleum diesel.

BIOFUELS ACT OF 2006	
Key Features	**Institutions and Roles**
° Creation of the National Biofuels Board to monitor implementation of National Biofuels Program; recommends to DOE supply/production and utilization of biofuels and biofuel-blends. ° Mandatory use of biofuels in all liquid fuels for motors/engines sold in country. ° Phasing out of use of harmful gasoline additives and/or oxygenates. ° Security of local sugar, feedstock, and biofuels supply. ° One-Stop-Shop for processing of applications for feedstock production, biofuels and biofuel blends production and distribution. ° Fiscal incentives: zero specific tax on local/imported biofuels component per liter of volume (Note: 1% duty for ethanol for blending); VAT exemption for sale of raw materials used in biofuels production. ° Exemption from wastewater charges (under the Clean Water Act) for all water effluents as they are considered 'reuse'. ° Financial assistance: Government financial institutions extend financing in biofuel activities from production to transport, including blending of biofuels with petroleum. ° Social amelioration and welfare program for workers in the production of biofuels.	° **DOE** – lead agency in the law's implementation and IRR. ° **DA** – ensure biofuel feedstock supply; undertake biofuel R&D; coordinate with PCA and SRA to identify areas for feedstock production and other policies in support of the biofuels program; and certify feedstock for biofuels. ° **PCA** – develop and implement policies with the coconut industry in support of the NBP; require the registration of oil mills that supply CNO requirement of biodiesel. ° **SRA** – formulate guidelines to ensure domestic supply of sugarcane and molasses. ° **DOST** – coordinate with DA to identify and develop viable feedstock for biofuels; develop R&D program for sustainable biofuel production and utilization. ° **DAR** – approve conversion of agricultural lands for biofuel production sites. ° **DTI** – correspond with the mandated minimum biofuels blends; in coordination with the DOTr and DENR, formulate and implement a national motor vehicle inspection to reduce emission motor vehicles per the Clean Air Act of 1999. ° **DENR** – issue Environment Compliance Certificate (ECC), Forest Land Use Agreement (FLAg)/Special Land Use Agreement (SLUP) for areas in public domain. ° **NCIP** – issue Certificates for sites outside ancestral domain and if area is within/overlaps with ancestral domain. ° **DOF** – monitor production and importation of biofuels through BIR and BOC. ° **Tariff Commission** – establish tariff line for biofuels and biofuel blends. ° **DOLE** – recommend policies and programs to enhance social impact of the NBP, including promotion of gainful livelihood and employment opportunities, and social protection coverage.

Source: RA 9367 (2006) and IRR.

Note: DOE – Department of Energy
DA - Department of Agriculture
PCA - Philippine Coconut Authority
SRA - Sugar Regulatory Administration
DOST - Department of Science and Technology
DAR - Department of Agrarian Reform
DTI - Department of Trade and Industry
DOTr - Department of Transportation
DENR - Department of Environment and Natural Resources
NCIP - National Commission for Indigenous Peoples
DOF - Department of Finance
BIR - Bureau of Internal Revenue
BOC - Burau of Customs
DOLE - Department of Labor and Employment

Renewable Energy and Greenhouse Gas (GHG) Emissions

Transport accounts for one-third of GHG emissions in the Philippines. The Philippines has passed two laws with the goal of reducing carbon emissions. With the signing of the Paris Agreement, the Philippines pledged to reduce carbon dioxide (CO_2) and other GHG emissions by scaling up renewable energy activities, with biofuels as one of the solutions.

The Nationally Determined Contributions (NDC) quantify the Philippines commitment to reduce the CO_2 and other GHG emissions. The Philippines submitted its first 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 scenario of 2000-2030. Reduction of CO_2e emissions will come from energy, transport, agriculture, waste, and industry sectors.

The Biofuels Act implicitly provides that its provisions shall not be interpreted as prejudicial to Clean Development Mechanism (CDM) projects that reduce the emissions of CO_2 and other GHGs by means of biofuels used (Section 18). The CDM provides carbon credits and the RE law gives incentives for RE sources to make projects attractive and viable. The DOE evaluates energy-related projects prior to endorsement and registration with the CDM Executive Board. Currently, CDM projects focus on biomass, geothermal, solar, hydro, ocean, and wind energy (collectively called the BiGSHOW) and have not yet pursed biofuels initiatives.

Life Cycle Assessments

Biodiesel. The University of the Philippines Los Baños (UPLB) conducted a "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." Completed in July 2019, it calculated the 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, though this factor would grow to 12.6-12.9 percent under a B20 scenario as earlier envisioned by DOE.

Ethanol. UPLB also conducted a life cycle assessment of ethanol production using 10 of the 12 bioethanol distilleries during Marketing Year 2019-20 (September/August). The study calculated the Philippines' overall ethanol carbon intensity at 46.8 gCO2e/MJ, albeit wide ranging from 37 to 89

percent, depending on the ethanol plant observed. The study further estimated the adoption of an E20 mandate as earlier envisioned by DOE would result in 4.7 million tons of annual GHG savings by 2030.

Biofuels Framework and Mandates

Policy Framework. The DOE is the lead agency in implementing the provisions of the Biofuels Act and its IRR through Department Circular (DC) - DC 2007-05-006. The DOE prepared the National Biofuels Program (NBP) consistent with the Philippine Energy Plan (PEP). Established by the Biofuels Act, the National Biofuels Board (NBB) is chaired by the DOE with representatives from the DA, DTI, DOST, DOF, DOLE, PCA, and SRA. The Technical Secretariat assists the Board with monitoring implementation and recommending policy directions (Section 9).

The PEP set the bioethanol and biodiesel blend targets from 2019 to 2030. The revised PEP 2018-2040, however, changed the blend targets to production capacity targets. The Philippines met its 2019 and 2020 capacity targets.

Biofuels: Production Capacity Targets		
Year	Production Capacity (MLPY)	
	Biodiesel	Bioethanol
2019	607.90	380.50
2020	707.90	425.50
2025	885.55	519.50
2030	1,285.55	919.50
2035		
2040		

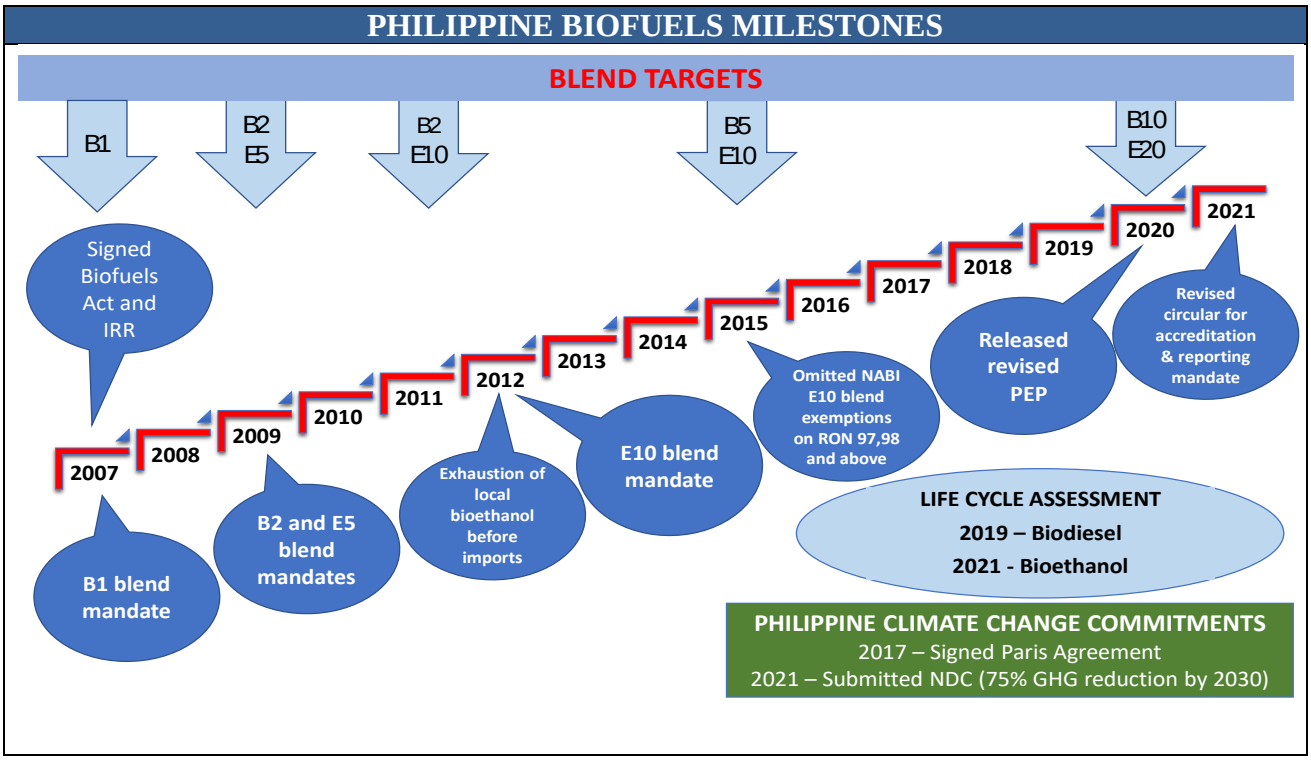
Source: Chapter V, PEP 2018-2040

Blend Mandates. The NBB determines the feasibility and recommends the increase in blend mandates. In compliance with the law, the five percent blend of bioethanol (E5) was mandated on February 2009, the second year from effectivity of the Act. The country mandated a 10 percent blend (E10) in 2011 (DOE DC 2011-02-0001) but took effect in February 2012. For biodiesel, three months after the effectivity of the Act in 2007, all diesel engine fuels sold in the country had a minimum of one percent biodiesel (B1). In February 2009, the blend was increased to two percent blend (B2) (DC 2009-02-0002).

BIOFUELS BLEND TARGETS		
Year	Biodiesel Target (%)	Bioethanol Target (%)
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

Although the Philippines initially set higher eventual blend targets of biodiesel and bioethanol, the mandated blends have remained at B2 and E10, with blend rates for both biofuels stalling in recent years. In a 2018 report, the Independent Philippine Petroleum Companies Association opposed the Philippine Coconut Authority's recommendation to DOE to increase the blend to B5, arguing it would increase diesel pump prices by PhP0.30/li ($0.006/li). Ethanol targets remain stagnant at E10 with no immediate plans to increase the blend. Post's contacts note that the long-term pathway to E20 blending will likely be through voluntary blending rather than increasing the blend mandate. DOE has released instructions to prepare the standards for E15 and E20.



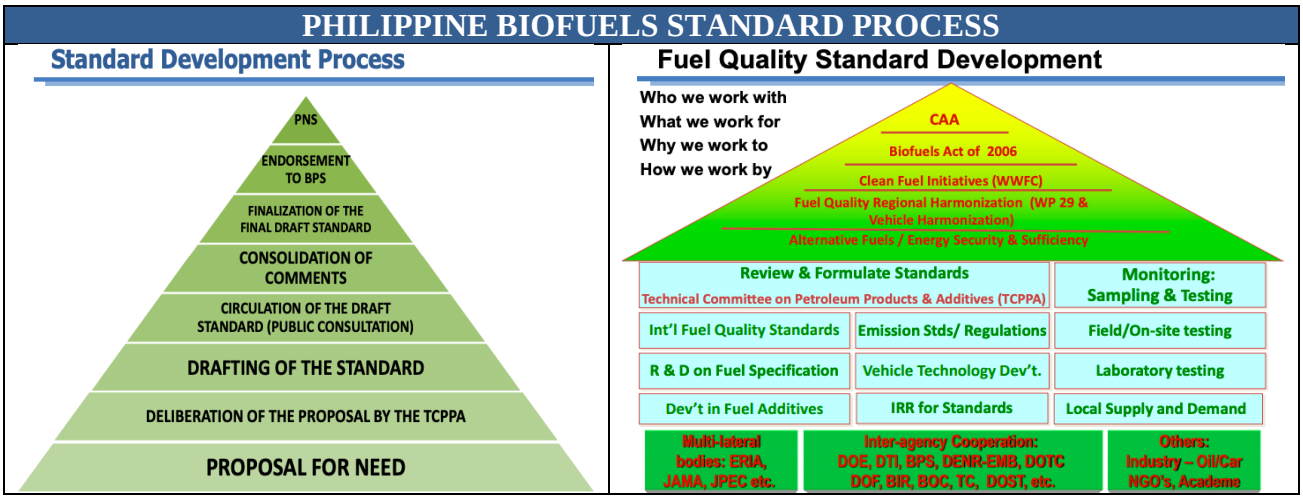
Economic Impacts of Higher Blend Rates. Had the Philippines maintained its earlier timeline to increase biofuels in the fuel supply, assuming pre-COVID average E10 pump prices from 2017 to 2019, unchanged local ethanol production and prices, a move to E15 and E20 would have decreased the pump price by 2 percent and 5 percent, respectively, resulting in average annual savings equivalent to PhP8.1 billion ($163 million) and PhP16.3 billion ($325 million). However, this environment would have also facilitated an opportunity to share a portion of gained consumer welfare with local ethanol producers via higher prices for locally produced ethanol, which in turn, would have encouraged local producers to maximize production and increase local investment.

PUMP PRICE IMPACTS OF HIGHER BLEND RATES			
Blend	Pump Price E10-Equivalent	Consumer Welfare	Equivalent Peso Value Pre-COVID (PhP Million)
E15	0.9756	.0244	8,134
E20	0.9511	.0489	16,268

Source of basic data: DOE and Trade Data Monitor, LLC

For 2021, under scenario of higher prices and lower demand, annual savings of E15 and E20 blend rates would generate savings of PhP 6.8 billion and PhP 13.7 billion.

Standards. The Biofuels Act mandates compliance with the Philippine National Standards (PNS). The standard setting mandate is provided in the Clean Air Act, while its enforcement is provided in the Oil Deregulation Law (RA 8479). The Technical Committee on Petroleum Products and Additives (TCPPA) created by virtue of the Clean Air Act undertakes the mandate.



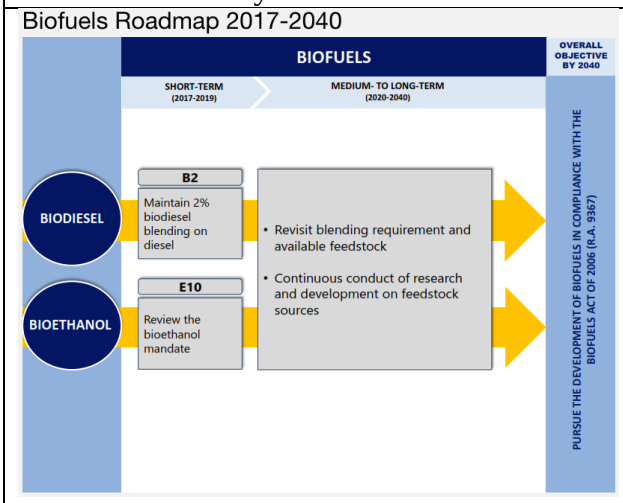
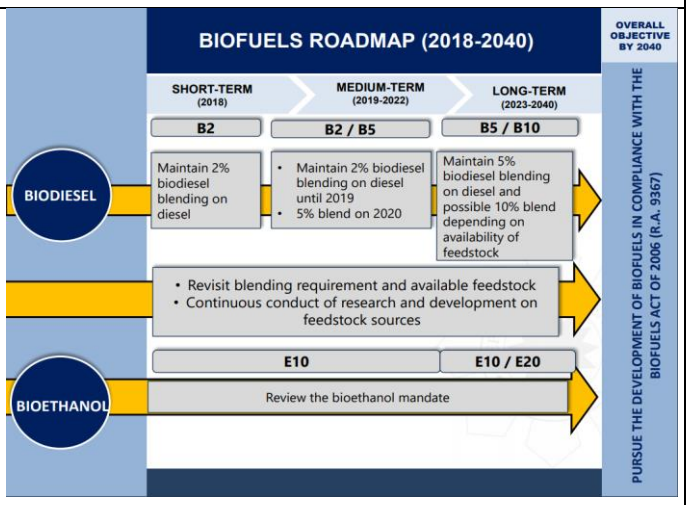
Source: DOE

The Bureau of Philippine Standards (BPS), promulgates the draft prepared by the TCPPA into a PNS which can only be enforced with a regulation issued by the DOE, usually in the form of a Department Circular (DC). Any update on the PNS is circulated through publication in major newspapers and a notice to the concerned entities through a DOE DC, after stakeholder consultations. Early this year, the DOE released an advisory on four Draft PNS specifications for quality standards (QS) of B3 and B4, soliciting public comments on the following.

- DPNS/DOE QS 015:2021 – Petroleum Products-CME-blended automotive diesel oil (ADOB3)
- DPNS/DOE QS 016:2021 – Petroleum Products-CME-blended industrial diesel oil (IDOB3)
- DPNS/DOE QS 017:2021 – Petroleum Products-CME-blended automotive diesel oil (ADOB4)
- DPNS/DOE QS 018:2021 – Petroleum Products-CME-blended industrial diesel oil (IDOB4)

In July 2019, The Philippine Biodiesel Association (TPBA) proposed a gradual annual increase of the current coconut methyl ester (CME) blend B2 by one percentage point over the next three years starting in 2019. This would have meant a CME blend of three percent (B3) in 2019, B4 in 2020 and B5 by 2021. The Philippine government did not pursue this request, with the DOE releasing the draft PNS for B3 and B4 only this year. Although PCA and TPBA advocate for B5, and it is undergoing DOE review, the DOE did not issue a draft PNS for B5.

The Philippines has stalled in its implementation of the biofuels roadmap targets. During the early part of this year, the B10 blend was marked "possible" in the roadmap depending on availability of feedstock. The E20 blend was placed in the long-term plan. Recently, the DOE revised again the biofuels roadmap posted on their website by simplifying the 2020-2040 targets.

Currently on DOE website	Posted on DOE website first half 2021
	

Source: DOE

Accreditation. Any individual or entity intending to engage in the production of biofuels shall apply for accreditation as a biofuel producer with the DOE. Biofuel producers are required to register their distributors with the DOE as well as submit monthly reports on production and sales, inventory, and weekly price of biofuels (Section 23.2, IRR).

Policy-related Operational Costs

Monitoring Fee and BRDE Liens. SRA requires bioethanol fuel producers using sugarcane and molasses to pay a monitoring fee and bioethanol research, development, and extension (BRDE) liens. SRA's Sugar Order No. 5 in 2016, amended in 2019, authorizes the collection of a monitoring fee of PhP0.05 ($0.001) per liter of bioethanol produced and a BRDE lien of PhP0.10 per liter of bioethanol from producers. The BRDE lien collected is set aside by the SRA in a trust fund for the purpose of funding R&D and extension projects of the fuel ethanol industry. All project proposals endorsed by the Ethanol Producers Association of the Philippines (EPAP) to SRA shall be accompanied by a Sugar Board Resolution. The EPAP and SRA then enter into a memorandum of agreement on the terms and conditions for the utilization of the BRDE liens, accompanied with project proposals, work plans, and other requirements pursuant to the Commission on Audit rules and regulations.

R&D and Technology Promotion. The R&D on biofuel production and utilization is one of the responsibilities of the DOST, which is also tasked with publishing and promoting related technologies, developed locally and abroad. Its recent project is called Biomass as Green Energy Source. 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 feedstock, including refined palm oil, used cooking oil, and rubber seed oil through optimized process developed by DOST-ITDI. Four combinations of the biodiesel from four plant oils, coconut (CME), palm (POME), used cooking oil (UCOME) and rubber seed oil (RSOME) were used. 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 diesel at the given blending ratio both for binary and tertiary blends.

The DOE has recent projects on biofuels on nipa sap as feedstock and cellulosic ethanol production technology.

Social Amelioration and Welfare Program (SAWP). In accordance with Section 17B of the Biofuels Act, the SAWP was enacted so that biofuel producers contribute a corresponding "lien" per liter of biodiesel and bioethanol produced and sold. Currently, DOLE imposes a lien of PhP 0.05 per liter of coco methyl ester (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 avail of assistance to support their livelihoods, training, education, social protection and welfare, and emergencies. The revised guidelines on the implementation of SAWP for biodiesel workers were issued on June 3, 2021, while revised SAWP for ethanol was issued in January 2021. Both provided increased social protection and benefits to workers. The sugarcane industry has its own SAWP helping the sugarcane farmers and sugar workers.

Financial Supports

To encourage investment, the law provides incentives as stated in Section 2.3. A Zero-VAT Rating is extended to the sale of raw materials used in the biofuels production under the National Internal Revenue Code, as amended by the Expanded VAT Reform Law of 2006. This is an additional incentive to what BOI already provided in accordance with the Omnibus Investment Code of 1987 (Executive Order No. 226).

The Act contains several incentives detailed in Section 6, such as tax exemption 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.

Environmental Sustainability and Certification

The Biofuels Act does not provide the DENR any specific mandates concerning its implementation. The production of biofuels, however, has possible effects on water discharges and effluents, which may be a source of water pollution. The Biofuels Act exempts biofuel investors from wastewater fees but does not exempt the obligation to secure a discharge permit. Under the Philippine Clean Water Act, the DENR requires facilities discharging regulated effluents to secure a permit to discharge (Section 14). Although exempt from discharge fees, biofuel plants must comply with the guidelines issued by the Philippine Clean Water Act, subject to the monitoring and evaluation of the DENR.

The implementation of the Biofuels Act is linked to the provisions and in accordance with the objectives of the Philippine Clean Air Act to develop and utilize cleaner alternative fuels. Manufacturers must comply with the standards to ensure its effectiveness when use as a blend.

The Philippines has no comprehensive land-use policy with regard to the 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 local governments through ordinances, if any. SRA monitors the sugarcane used for fuel ethanol production but there are no national standards or guidelines on how to decide whether farmland is to be used for

biofuel or food production. Local corn, however, can only be allowed as feedstock if coming from a new area and not from current corn areas.

Import Policy Including Duties/Export Taxes and Levies

In the event of supply shortage of locally produced bioethanol within the first four years of the Biofuels Act, oil companies are allowed to import bioethanol 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 prolonged insufficient feedstocks for bioethanol, however, oil companies are still allowed to import bioethanol to comply with the mandated E10 blend requirement. Oil companies are required to purchase the entire monthly allocation of local bioethanol before they can import fuel ethanol mandated in DOE DC 2011-12-0013. The quota allocation system ensures that imports do not displace locally produced fuel ethanol. DOE DC 2015-06-0007 or the revised guidelines on the utilization of locally-produced bioethanol in the production of e-gasoline amended DC 2011-12-0013, omitting the notice of allowable bioethanol importation (NABI) and special exemption of the Law of RON 97, 98, and above of E10 blend.

The HS Codes for fuel 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 duty of 1 percent duty is paid on imported ethanol destined for gasoline blending that the oil companies pay.

III. Ethanol

Ethanol Used as Fuel and Other Industrial Chemicals (Million Liters)										
Calendar Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021f
Beginning Stocks										
Fuel Begin Stocks	0	0	0	0	0	0	0	25	14	14
Production										
Fuel Production	35	72	115	168	230	235	297	346	280	330
Imports										
Fuel Imports	248	297	339	311	260	276	285	257	241	240
Exports										
Fuel Exports	0	0	0	0	0	0	0	0	0	0
Consumption										
Fuel Consumption	283	369	454	479	490	511	557	614	521	570
Ending Stocks										
Fuel Ending Stocks	0	0	0	0	0	0	25	14	14	14
Total Balance Check	0	0	0	0	0	0	0	0	0	0
Fuel Balance Check	0	0	0	0	0	0	0	0	0	0
Refineries Producing Fuel Ethanol (Million Liters)										
Number of Refineries	4	4	8	8	10	10	12	12	12	12
Nameplate Capacity	133	133	222	222	282	282	380	380	410	425
Capacity Use (%)	26.3	54.1	51.8	75.7	81.6	83.3	78.2	91.1	68.3	77.6
Co-product Production (1,000 MT)										
Bagasse	144	150	150	45	17	12	3	88	30	0
Feedstock Use for Fuel Ethanol (1,000 MT)										
Sugar Cane	480	500	500	150	55	40	200	190	502	340
Molasses	20	155	340	650	930	950	1,080	1,240	1,076	1,080
Sugar	2	10	5	0	0	0	0	0	0	0
Market Penetration (Million Liters)										
Fuel Ethanol Use	283	369	454	479	490	511	557	614	521	570
Gasoline Pool	4,098	4,358	4,505	5,174	5,692	6,199	6,441	6,973	5,936	6,477
Blend Rate (%)	6.9	8.5	10.1	9.3	8.6	8.2	8.6	8.8	8.8	8.8

f = forecast
Source: DOE and SRA, with Post estimates for 2021

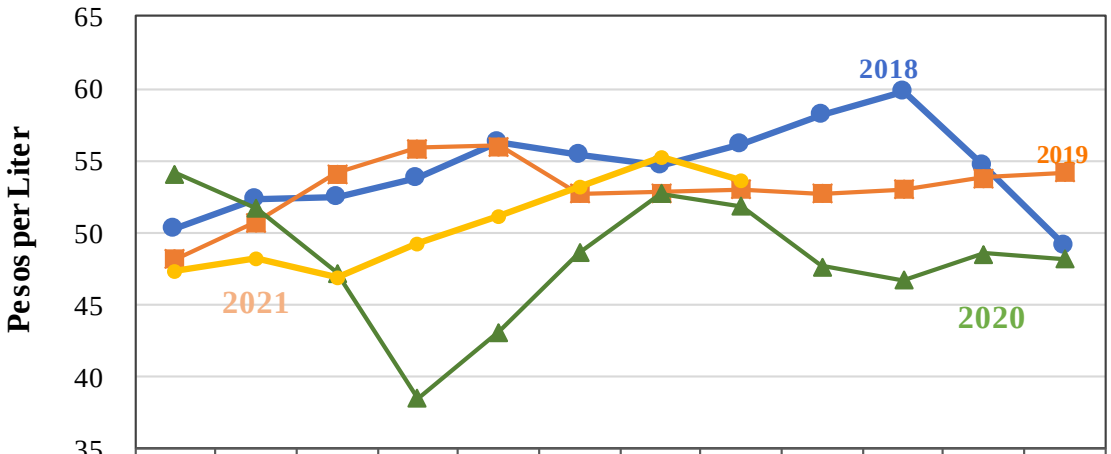
Domestic Consumption

The demand for fuel ethanol is a function of the blend mandate and fuel pool size. Following the strict measures to contain the spread of COVID-19, the gasoline pool plunged from 7 billion liters in 2019 to 6 billion liters in 2020. Post forecasts ethanol consumption in 2021 to rebound by 3.6 percent, attributed to the lifting of quarantine restrictions as the Philippines reopens the economy. Fuel ethanol use mirrored these adjustments with no change in blend rates over the same period.

Fuel ethanol is all sold at the pump. There is no data regarding off-road usage, as there is no monitoring of after-sales consumption.

Prices. As fuel demand starts to grow, corresponding price increases are also expected. The lowest gasoline prices were seen in April 2020 when the country imposed the strictest forms of lockdowns at the beginning of COVID-19.

MONTHLY GASOLINE PRICES, 2018-2021



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	50.26	52.31	52.54	53.76	56.30	55.36	54.70	56.07	58.11	59.75	54.68	49.05
2019	48.17	50.75	54.09	55.89	56.05	52.74	52.83	53.00	52.73	53.05	53.84	54.19
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	49.30	51.13	53.18	55.22	53.65				

Note: Using NCR prevailing retail pump prices for April to August, 2021
Source of data: DOE-OIMB

Production

Post estimates 2021 ethanol production will reach 330 million liters following the partial recovery of the gasoline pool, up 18 percent from last year. With the blend rate unchanged, driving the demand for fuel is the loosening of movement restrictions placed in 2020 to combat the spread of COVID-19. Ethanol production January through June 2021 was 182 million liters according to DOE, compared to 154 million liters during the same period in 2020. Capacity utilization in 2021 increased to 78 percent but have not reached the 90 percent level experienced in 2019 due to low sugarcane productivity. The local sugarcane industry's competitiveness remains a major challenge, with one of the lowest yields in Asia. From the Sugar Annual Report 2021, Post expects raw sugar production in Marketing Year 2020-21 to stay flat at 2.1 million metric tons, with cane production expected to be about 23.3 million MT.

Philippine ethanol production's longstanding constraint is insufficient feedstock. Around 81 percent of total molasses in the country is used for ethanol production. By law, importing molasses as a biofuel feedstock is not allowed. Local producers generally can only supply half of the annual ethanol requirement for gasoline blending. The remaining 50 percent is met with imported bioethanol. The Ethanol Producers Association of the Philippines (EPAP) proposed in 2020 to temporarily allow

importation of molasses to maximize plant capacity. The DOE declined the proposal in 2020, with sugar growers, millers, and SRA also opposed during a stakeholder consultation in August 2021. EPAP also discussed the proposal with the Philippine Senate.

According to SRA, during the initial years of the Biofuels Act there was sufficient molasses for feedstock, which prompted SRA to encourage more producers to go into fuel ethanol production. In 2015, however, annual production reached 222 million liters and pushed the price of molasses up, leading SRA to issue a moratorium on the registration of new ethanol producers. Moreover, the excise tax enacted on potable alcohol resulted in an unexpected shift of some producers to fuel ethanol. However, due to the current pandemic, seven bioethanol producers shifted back and are now engaged in the production of potable alcohol.

Feedstock Prices and Bioethanol Reference Price

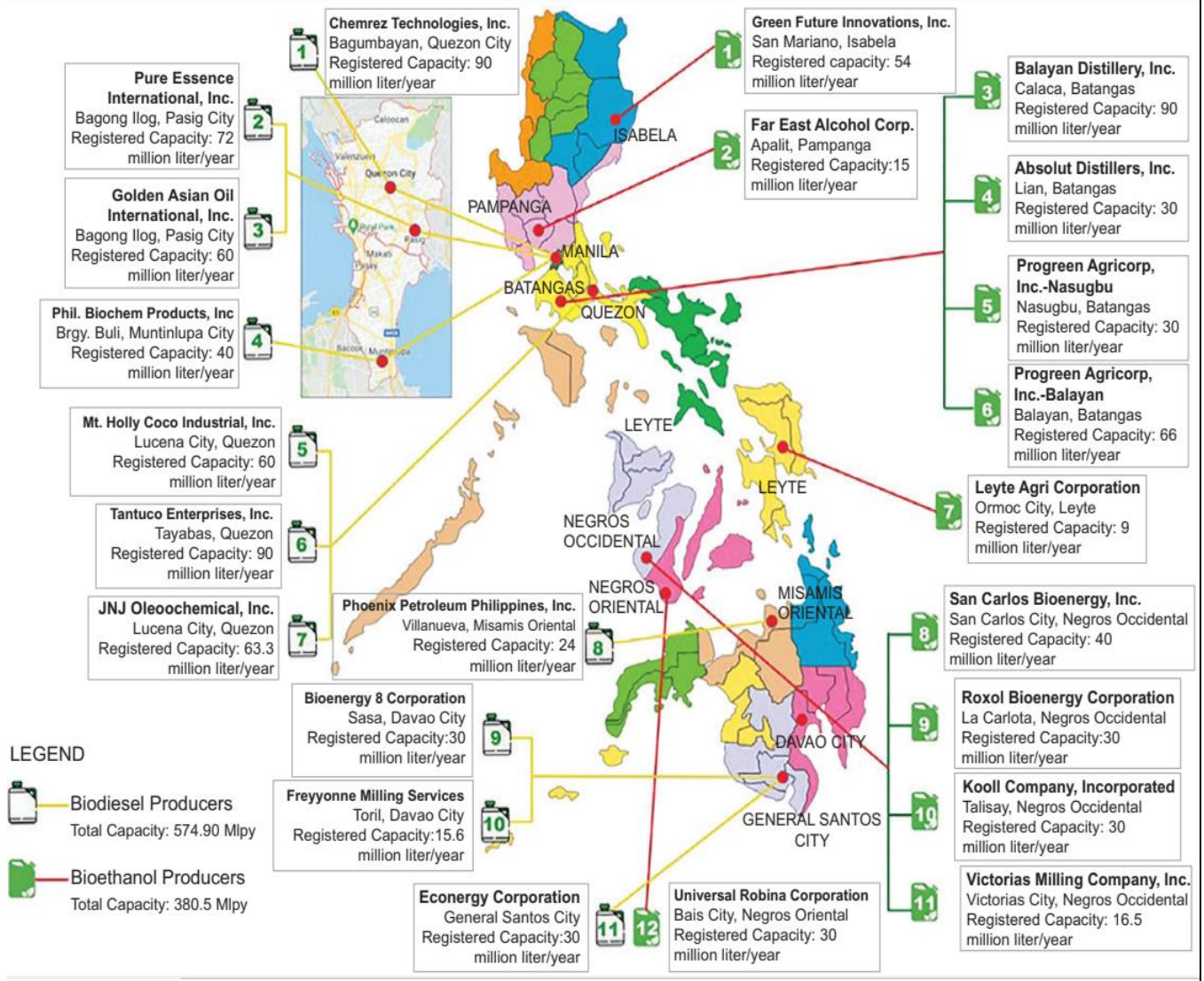
Marketing Year	Molasses Price (PhP/MT	Sugar Composite Price (PhP/Lkg)	Bioethanol Reference Price (PhP/Li)
2015-2016	9,134.51	1,794.09	46.76
2016-2017	8,543.92	1,429.89	53.68
2017-2018	6,363.96	1,440.47	50.96
2018-2019	9,693.99	1,532.32	57.40
2019-2020	11,828.02	1,483.87	61.07
2020-2021	9,352.00	1,500.00	57.07

Source: SRA

The industry is also looking at corn and other potential feedstocks, such as sweet sorghum, cassava, nipa, and sweet potato. These are still in the research stage and will take time to produce commercially for bioethanol processing. Corn is not included in the list of crops in the guidelines governing biofuels feedstock production (DOE JAO No. 2008-1). Corn could be used for ethanol production from newly opened corn areas, but not from existing corn production areas. If corn were to be used, existing bioethanol plants would need to invest in updating their feedstock line.

There are 13 accredited bioethanol producers in the Philippines with a total production capacity of 425.5 million liters in 2020. Due to COVID-19, a number of distilleries shifted a portion of their capacity to alcohol disinfectant or rubbing alcohol, amounting to about 75 million liters.

PHILIPPINE BIOFUELS PRODUCERS



Source: PEP 2018-2040

Trade

Post expects fuel ethanol imports in 2021 to reach 240 million liters, flat with the previous year's level.

FUEL ETHANOL IMPORTS, In Million Liters						
	2016	2017	2018	2019	2020	Jan-Jun 2021
Australia	17	4				
South Korea	2	6		6	4	
USA	241	263	285	251	237	140
Vietnam		3				
Total	260	276	285	257	241	140

Source: SRA and DOE

The NBB determines if there is a shortage and allows fuel oil companies to import in order to comply with the mandated E10 requirement. EPAP has requested for the reinstatement of the net allowable bioethanol import (NABI) as stated in DC 2011-12-0013, which was omitted in the amended DC 2015-07-0007 or 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 the Biofuels Act. The circular reinforces the DOE's mandate to strictly monitor the DOI. For more information, see the corresponding GAIN report here.

Ethanol for Non-Fuel Use (Disinfectant)

The DOE allowed bioethanol producers to repurpose their production processes from fuel use to medical use. Five ethanol producers went into production of medical grade alcohol or rubbing alcohol to increase the country's supply of the needed alcohol/hand sanitizers due to COVID-19. The Philippine Food and Drug Administration 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 2020, about 75 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.

IV. Biodiesel

BIODIESEL (MILLION LITERS)										
Particular	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021f**
Beginning Stocks	17	18	20	29	32	41	57	71	95	122
Production	138	155	172	204	227	220	220	242	188	180
Imports	0	0	0	0	0	0	0	0	0	0
Exports	0	0	0	0	0	0	0	0	0	0
Consumption	137	153	163	201	218	204	206	218	161	175
Ending Stocks	18	20	29	32	41	57	71	95	122	127
Balance Check	0	0	0	0	0	0	0	0	0	0
Production Capacity (Million Liters)										
Number of Biorefineries	9	9	11	11	11	11	11	12	12	12
Nameplate Capacity	393	393	585	585	575	575	575	608	708	708
Capacity Use (%)	35.1	39.4	29.4	34.9	39.5	38.3	38.3	39.8	26.6	24.4
Feedstock Use for Fuel (1,000 MT)										
Coconut Oil	127	142	158	187	208	202	202	222	173	165
Market Penetration (Million Liters)										
Biodiesel, on-road use	137	153	163	201	218	204	206	218	161	175
Diesel, on-road use	5,819	6,187	6,579	7,334	7,701	8,086	8,200	8,413	6,440	6,862
Blend Rate (%)	2.35	2.47	2.48	2.74	2.83	2.52	2.51	2.59	2.51	2.55
Diesel, total use	7,004	7,394	7,778	8,793	9,535	10,159	11,207	11,534	11,141	11,872

f-forecast; diesel use includes biodiesel
Source: DOE, with Post estimates

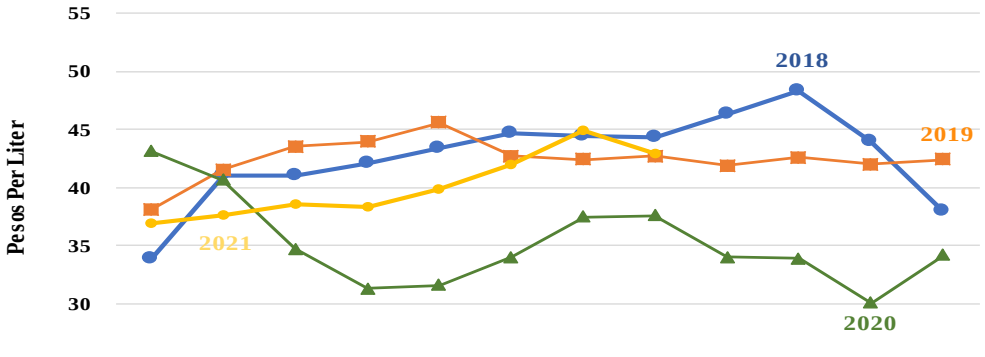
Domestic Consumption

Post projects 2021 biodiesel consumption will reach 175 million liters, 9 percent higher than 2020. Consumption will increase significantly in 2022 if the biodiesel blend mandate is raised from B2 to B5. The Philippine Coconut Authority and The Philippine Biodiesel Association advocate for the adoption of B5, arguing that domestic production can supply the greater biodiesel requirement. The DOE, however, cannot confirm if the increased blend mandate will be implemented next year, with B3 and B4 also being considered.

COVID-19 greatly affected the economy and restricted movements, resulting in 2020 diesel sales plunging 26 percent to 161 million liters, from 218 million liters in 2019. Consumption will partially recover in 2021 as public transit is allowed to operate to a greater degree, driving the growth in diesel demand and the corresponding increase in diesel prices. Diesel prices went down dramatically to a low of PhP30/Li ($0.60/Li) in November 2020, with prices recovering since the earlier days of COVID-19.

Diesel is sold at the pump for on-road and off-road use. The diesel demand for agricultural use (e.g. tractor fuel) is also sourced at the pump. Large mining companies maintain their own fuel depots on-site for their equipment, sourcing their supply from fuel companies.

MONTHLY DIESEL PRICES, 2018-2021



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	33.81	41.02	40.97	42.02	43.37	44.71	44.41	44.31	46.35	48.31	43.98	37.93
2019	38.11	41.53	43.50	43.91	45.55	42.70	42.40	42.68	41.89	42.60	41.96	42.38
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	36.86	37.63	38.52	38.35	39.85	41.94	44.95	42.90				

Note: Using NCR prevailing retail pump prices for April to August
Source of data: DOE-OIMB

While PCA continues to advocate for the larger blend mandate in support of the livelihood of about 2.5 million coconut farmers, examining the price spread between biodiesel and diesel prices over past years indicates increases in the blend rate will lead to higher diesel fuel cost, though the impact is likely to be marginal at low blend rates and insignificant relative to oil price volatility. See also "The Economic Impact of Higher-Blend Biodiesel on the Philippine Coconut Industry and end-Users amid Rising Oil Prices & Falling Prices of Coconut Oil." The importation of biodiesel is not legally permitted, although importing lower-priced biodiesel could be a way to balance the higher diesel pump prices from a larger blend mandate.

COMPARATIVE PRICES

Year	Diesel Price (a) (PhP/Li)	Biodiesel Price Range (b) (PhP/Li)	Crude CNO Local Price (c) (PhP/Kg)
2011	43.94	57 – 106	78.25
2012	43.67	30 – 88	48.15
2013	41.93	29 – 60	39.73
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	42.70	40 – 91	79.97
2019	42.13	35 – 70	51.73
2020	35.16	35 – 71	49.19

Source: (a) ADB Key Indicators Database Philippines, Row 206
(b) DOE
(c) United Coconut Association of the Philippines

Production

Post forecasts a decrease in biodiesel production of 4 percent in 2021 to 180 million liters, to give way to the 122 million liters in inventory, which need to be distributed for blending. There are 13 accredited biodiesel producers, with a total rated production capacity of 707.9 million liters per year (MLPY), or almost 300 percent of the required B2 volume for the 12 billion liters of automotive diesel per year. The excess capacity in serving the B2 blend is a result of the expansion of the industry in anticipation of the shift to larger blend mandates as guided by the PEP. Additional capacity of 277.65 MLPY is also expected between 2021 and 2022.

In 2020, Philippine production of biodiesel decreased by 22 percent to 188 million liters compared to 2019. This production represents only 27 percent of registered annual capacity of the sector, and is attributed to the dramatic slowdown in diesel demand due to the pandemic. See Biofuels Annual 2020 for more information.

Trade

Biodiesel trade is minimal. Imports are not allowed under the Biofuels Act, although by permitting importation the Philippines could offset the expected price increase of a higher blend mandate through lower-cost biodiesel imports.

V. Advanced Biofuels

The Philippines has had little success to-date bringing advanced biofuel solutions to market but offers strong opportunities for (1) scientific exchanges and (2) commercial opportunities for U.S. and European companies seeking to set up joint ventures with proven advanced biofuel technologies.

The DOST-Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD) is the primary agency conducting R&D on biofuels in collaboration with other institutions such as DOE, DA, PCAARRD, and academia, particularly the University of Philippines Los Baños (UPLB) and UP Visayas. According to PCIEERD, recently conducted research includes:

1. 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.
2. Fuel ethanol production from lignocellulosic feedstock (2009-2014) was carried out by UPLB to determine possible candidates for feedstock, evaluation, and optimization of pre-treatment methods, development of micro-organism capable of utilizing lignocellulosic hydrolysates and optimization of saccharification, fermentation, and purification process for the ethanol production. Further R&D is required to improve the yield.

DOST has conducted research on various biofuel feedstocks (2005-2009) such as Jatropha, but all were shelved due to lacking economic viability.

1. Microalgae experiments were done at the laboratory stage, but DOST determined that the techno-economic feasibility must be studied further, particularly the controlled environment microalgae production and oil extraction.
2. Used vegetable oils were studied, particularly from the fast-food sector, but concluded more studies were needed on raw material quality control and process optimization as the resulting biodiesel had difficulty meeting the required standards.
3. DOST studied sweet sorghum for ethanol, but the economic feasibility of its cultivation needs further study.
4. A project funded by the National Biofuel Board (NBB) was completed by the DOST-Industrial Technology Institute in 2018 on multi-feedstock (coconut oil, palm oil, used oil, rubber oil) production of biodiesel, ultimately determining that further study is needed for engine testing.

Sustainable (bio-based) Aviation Fuel (SAF) is not produced or used on flights in the Philippines. Currently, there are no reports of planned investments in SAF and renewable biodiesel.

Attachments:

No Attachments