

MULTIPLE BENEFITS OF THE PALM OIL BIODIESEL MANDATORY POLICY

By
PASPI-Monitor

RESUME

The biodiesel mandatory policy in Indonesia in the last 10 years (2010-2020) has experienced rapid development from B-1 to B-30. This success is supported by the availability of palm oil as the main raw material as well as export tax policies and financing facilities from the Palm Oil Fund for the purchase of biodiesel by Pertamina following the HIP biodiesel set by the government.

The implementation of mandatory biodiesel policies in Indonesia has been proven to provide economic, social, and environmental benefits. The mandatory biodiesel has created various economic benefits for Indonesia. These benefits referred to are reducing dependence on imports of fossil diesel so it can save foreign exchange on fossil diesel imports and improve the oil and gas balance, creating added value and economic growth.

The social benefits generated by biodiesel mandatory including creating job opportunities and poverty alleviation. The creation of job opportunities is greater along with the increasing blending rate.

The implementation of the mandatory palm biodiesel policy also produces environmental benefits, such as reduction in GHG emissions. The reduction in GHG emissions is also getting bigger along with the increasing blending rate of biodiesel with fossil diesel. GHG savings achieved in 2020 (B30) can contribute around 59 percent of the GHG emission reduction target in the Energy and Transportation Sector in Nationally Determined Contribution (NDC).

INTRODUCTION

Since 2004, Indonesia has become a net importer of fossil fuels. Along with population growth and economic development, consumption of fossil fuels also increases every year. Meanwhile, domestic fossil fuel production is relatively stagnant, so the gap between consumption and production is getting bigger. This causes the import of fossil fuels to increase every year which causes a deficit in the oil and gas balance every year and becomes an inevitable economic burden.

On the other hand, Indonesia is also the largest palm oil producer country in the world since 2006. This provides a solution for the national energy strategy, namely "run out of oil below, replaced by oil above". The existence of abundant domestic palm oil production has opened opportunities for Indonesia to produce palm-based biodiesel which can substitute the use of fossil fuels (diesel).

Efforts to reduce dependence on imports of fossil fuels by utilizing palm oil biodiesel as an import substitution have become the spirit and target of biodiesel development policies in Indonesia since 2004. Substitution of fossil fuels with palm oil biodiesel that is guaranteed to come from 100 percent local content will create various benefits.

Apart from aiming to reduce dependence on fossil fuels (energy security), biodiesel development in every country, including Indonesia, is also aimed at encouraging rural development by expanding the market for agricultural commodities as raw material for biodiesel (rural development). Another goal that is no less important than the development of biodiesel as a substitute for fossil fuel is to reduce greenhouse gas (GHG) emissions to mitigate global warming and climate change (global climate change mitigation).

It is interesting to know how much benefit is created in Indonesia's biodiesel mandatory policy. Therefore, this article will

discuss the multiple benefits created by the mandatory biodiesel policy. The benefits referred to include economic benefits, social benefits, and environmental benefits.

IMPLEMENTATION OF THE BIODIESEL MANDATORY POLICY IN INDONESIA

Biodiesel development in Indonesia is still relatively recent compared to other countries such as the European Union, the United States, or Brazil. Initially, biodiesel development in Indonesia was carried out voluntarily because it was still on trial and error period.

The biodiesel mandatory policy was implemented in 2009 with a blending rate of one percent palm biodiesel with 99 percent of fossil diesel (B-1) in the PSO (Public Service Obligation) sector. The blending rate was increased to B-2.5 during the period 2010-2012 and then again increased to B-10 in the 2013-2014 period. In August-December 2015, the biodiesel blending rate was again increased to B-15. Although the blending rate continues to increase and is mandatory, the realization is still far from the expected target due to Pertamina's lack of support in implementing mandatory biodiesel (Sipayung, 2018).

The mandatory biodiesel policy in Indonesia made significant progress when the mandatory biodiesel B-20 was implemented in 2016, where the utilization of B-20 was limited to the PSO sector in 2018 and then expanded to the Non-PSO sector in 2019. The commitment of the Indonesian Government getting stronger in implementing the mandatory biodiesel B-30 in the PSO and Non-PSO sectors by 2020.

The seriousness of the government in developing palm biodiesel can be seen from only within 10 years has succeeded in implementing B-1 into B-30. This is reflected in the increasing consumption of domestic palm oil biodiesel which continues to increase (Figure 1).

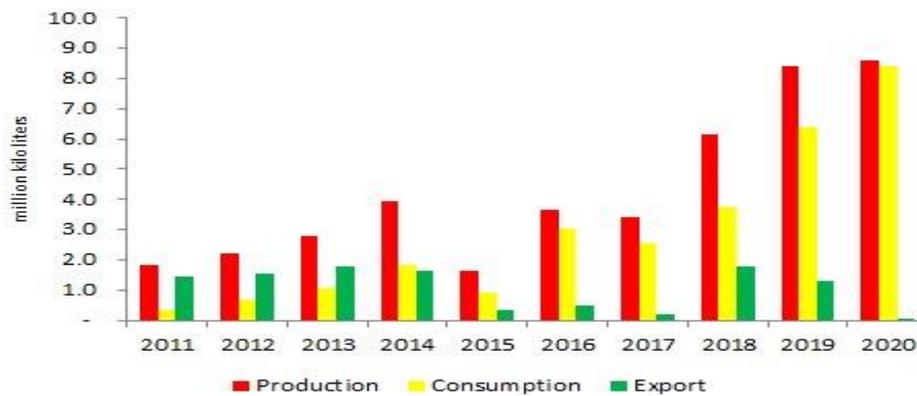


Figure 1. Production, Consumption and Export of Palm Oil Biodiesel in Indonesia during 2009-2020 (Source: Ministry of Energy and Mineral Resources)

Biodiesel production increased from 243 thousand kiloliters in 2010 to 8.6 million kiloliters in 2020. This means that in 10 years, biodiesel production has increased by around 400 percent. Meanwhile, domestic biodiesel consumption also increased from 223 thousand kiloliters to 8.4 million kiloliters or an increase of around 400 percent in the same period.

Based on these data, it shows that most of the domestic biodiesel production is consumed domestically. The data also shows evidence that the mandatory biodiesel policy program established by the government is an important instrument in the success of biodiesel development in Indonesia. Meanwhile, Indonesia also exports biodiesel, but only if the mandatory domestic biodiesel needs are met.

The successful implementation of the mandatory biodiesel policy is also inseparable from important policies undertaken by the government are the export tax policy (duty and levy), where the CPO/PKO export tariff is higher than biodiesel export tariff. This export levy fund (palm oil fund) is managed by the Palm Oil Plantation Fund Management Agency (BPDPKS) which is used, among other things, for subsidies for Pertamina to buy

domestic biodiesel according to the Purchasing Index Price (HIP biodiesel) that is set by the government.

ECONOMIC BENEFITS

One of the objectives of the mandatory biodiesel policy in Indonesia is to reduce dependence on imports of fossil fuels (diesel). Biodiesel as a substitute for fossil diesel is reflected in the increase in biodiesel consumption year on year. The increase in biodiesel consumption reflects a decrease in imports of fossil diesel.

Within 10 years of implementing the biodiesel mandatory policy in Indonesia, it has been able to reduce dependence on imports of fossil diesel quite drastically (Figure 2). In 2010, the percentage of imported fossil diesel volume from total domestic fossil diesel consumption was still quite high, reaching 46 percent, but it continues to decline rapidly so that the percentage in 2020 is estimated to be below 10 percent. This shows that the biodiesel mandatory policy from B-1 to B-30 has succeeded in significantly reducing the level of dependence on imports of fossil diesel.

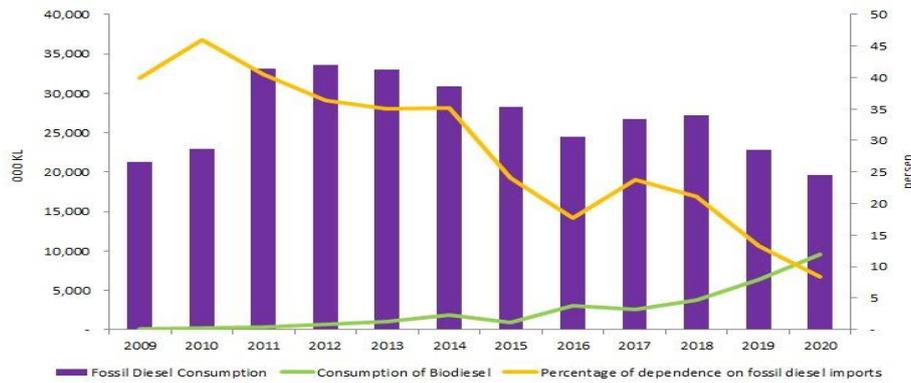


Figure 2. Reduced Dependence on Diesel Imports as the Impact of the Biodiesel Mandatory Policy (Source: Ministry of Energy and Mineral Resources, processed)

The study of Jafar et al. (2010) also proved that blending between fossil diesel and biodiesel can reduce the pressure to decrease the supply of petroleum, improve energy security and reduce dependence on imported diesel.

The decline in imports of fossil diesel also directly saves foreign exchange for

imports of fossil diesel. In the last five years, foreign exchange savings have increased from USD 0.34 billion in 2015 to USD 3.3 billion in 2019 and USD 3.09 billion in 2020 (Sipayung, 2018; Ministry of Energy and Mineral Resources, 2021; Tjakrawan, 2021).

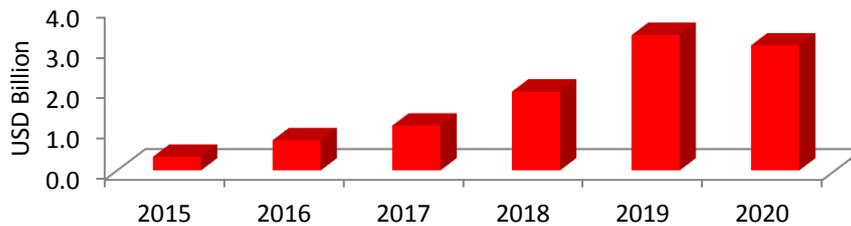


Figure 3. Fossil Diesel Import Foreign Exchange Savings as the Impact of Biodiesel Mandatory Policy in 2015-2020 (Source: Sipayung, 2018; Ministry of Energy and Mineral Resources, 2021; Tjakrawan, 2021)

The savings in foreign exchange on imports of fossil diesel has also contributed to the improvement of the oil and gas trade balance and the total trade balance (Sipayung, 2020, Tjakrawan, 2021, PASPI, 2021). In 2020, the contribution of saving on foreign exchange on fossil diesel imports could reduce the oil and gas balance deficit from USD 8.6 billion to USD 5.9 billion (Table 1).

The economic benefits of developing palm oil biodiesel are not only about saving imports and improving the trade balance.

Based on data from the Ministry of Energy and Mineral Resources (2021), the impact of biodiesel mandatory can increase the added value from palm oil (CPO) to biodiesel by IDR 5.7 trillion (2018), increasing to IDR 9.5 trillion (2019) and IDR 13.8 trillion (2020). The increase in added value is also in line with various studies which reveal that palm biodiesel production in Indonesia has an impact on increasing economic growth (Susila and Munadi, 2008; Joni et al., 2010; Singagerda et al., 2018).

Table 1. The Impact of Biodiesel Mandatory on Indonesia's Net Trade Balance in 2020 (USD Million)

Net Exports of Oil and Gas	
- Without B-30	(8,608)
- With B-30	(5,948)
Net Exports of Non-Oil and Gas	
- Without Palm Oil	4,727
- With Palm Oil	27,686
NET TRADE	
- Without Palm Oil and B30	(3,881)
- With Palm Oil and B30	21,738

Source: BPS, Aprobi, processed data

The increase in biodiesel production also has a large multiplier effect. The study of Jafar et al. (2010) also revealed that the biodiesel output multiplier was 2.8, while the petro-diesel output multiplier was only 1.61. This means that for every IDR 10 trillion of biodiesel consumed, it will create an economic output of IDR 20.8 trillion. If we compared it with petrodiesel (diesel) which only able to creates economic output only of IDR 16 trillion.

Soya-based biodiesel in the United States also produces a large multiplier impact. Su Ye's study (2017) states that every one million gallons of biodiesel production can create an economic output of USD 22.8 million. Likewise, the study of Ditzel et al. (2018) revealed that biodiesel production of 1.6 billion gallons would create an economic output of USD 21.6 billion and a GDP of USD 6.5 billion.

SOCIAL BENEFIT

Biodiesel also produces social benefits such as job creation and poverty reduction. According to the Ministry of Energy and Mineral Resources (2021) the B20 mandatory creates job opportunities for 834.7 thousand people in 2019 and the B30 mandatory biodiesel creates job opportunities for 1.2 million people in 2020.

Various previous studies have also revealed that palm biodiesel development creates job opportunities, reduces rural and urban poverty (Susila and Munadi, 2008; Joni et al., 2010; Arndt et al., 2010; Singagerda et al., 2018). Increased employment opportunities and poverty alleviation due to increased biodiesel

consumption occur not only in the biodiesel industry (direct effect) but also in industries that supply raw materials to the biodiesel industry (indirect effect) as well as in all sectors of the national economy (induced effect).

The development of biodiesel in countries with labor-efficient technology also able to creates new jobs. Ditzel et al's (2018) study revealed that every 1.6 billion gallons of biodiesel consumed in the United States as a whole create new jobs for 62.9 thousand people. At the level of the state of Minnesota of the United States of America, Su Ye's study (2017) also reveals that every one million gallons of biodiesel create new jobs opportunities for 60 people.

ENVIRONMENTAL BENEFIT

Another benefit of the development of palm biodiesel in Indonesia is the environmental benefit. Fossil diesel is one of the main contributors to greenhouse emissions in every country, including Indonesia. Palm biodiesel is superior to petrodiesel in terms of clean-burning, non-toxicity, renewability, sustainability and acceptability, and cheapest (Zahan et al., 2018). So that the substitution of fossil diesel with palm biodiesel will reduce greenhouse gas emissions.

During the 2010-2020, the implementation of biodiesel mandatory policy significantly increased emission savings (Figure 5). GHG emission reduction increased from only around 592.3 thousand tons of CO₂ eq in 2010 to 22.3 million tons of CO₂ eq in 2020 or an increase of 400 times.

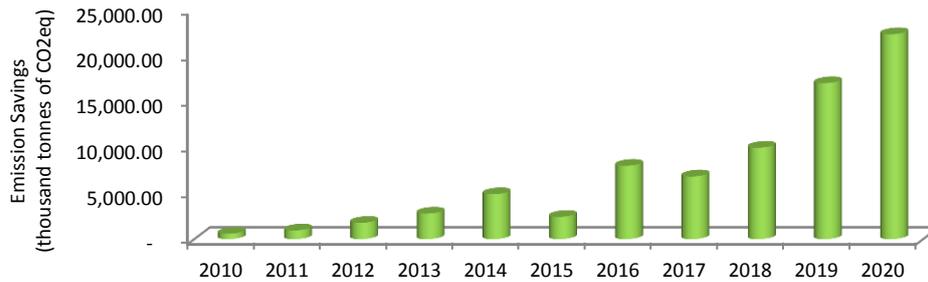


Figure 5. Reduction of GHG Emissions from Mandatory Biodiesel has Increased during 2010-2020 (Source: Ministry of Energy and Mineral Resources)

The reduction of GHG emissions from biodiesel has been widely researched by experts. Various studies (Figure 6) show that GHG emission savings from palm biodiesel range between 40-70 percent. The difference

in GHG emission savings depends on the management of raw material production (CPO) and the origin of fossil diesel production as a comparison.

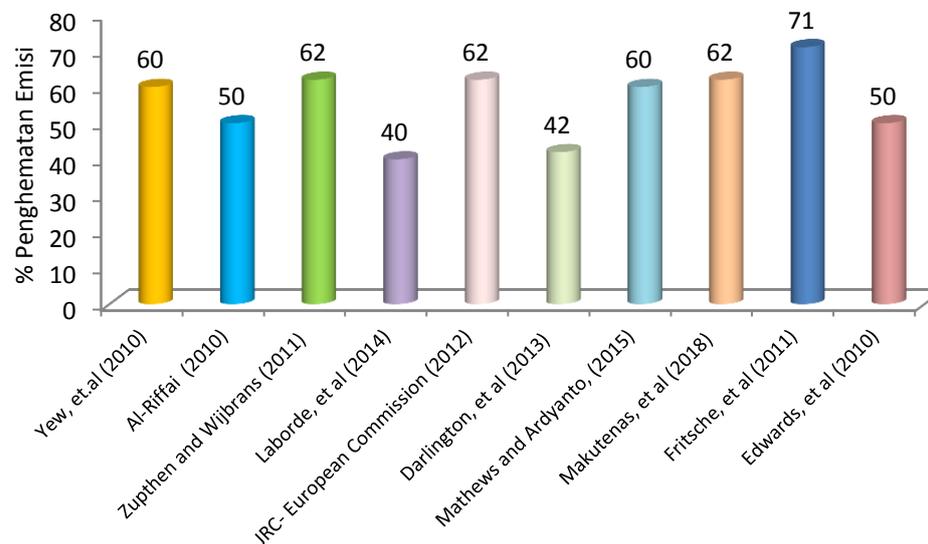


Figure 6. GHG Emissions Savings in Palm Oil Biodiesel from various Researcher

The GHG emission savings from the biodiesel mandatory contributed significantly to the achievement of the Paris Agreement. In the Nationally Determined Contribution (NDC) document, Indonesia's GHG emission reduction target reaches 29 percent on its initiative (BaU) to 41 percent by 2030 with the support of international cooperation.

To achieve the NDC target, GHG emission reduction from the Energy and Transportation sector in 2020 is targeted at 0.038 Giga Ton CO₂ eq. The B30 mandatory can reduce emissions of 22.3 million tons of CO₂ eq in 2020, or about 59 percent of the energy and transportation sector target.

Thus, palm oil biodiesel has helped Indonesia to achieve the NDC target.

CONCLUSION

The implementation of biodiesel mandatory policy in Indonesia has been proven to provide economic, social, and environmental benefits. The mandatory of biodiesel has created various economic benefits, namely reducing dependence on imports of fossil diesel which has implications for reducing imported foreign exchange, creating added value and economic growth.

The social benefits generated by the biodiesel mandatory include creating job opportunities and reducing poverty. In addition, the implementation of the mandatory palm biodiesel policy also produces environmental benefits, namely the reduction of GHG emissions. GHG savings achieved in 2020 (B30) are able to contribute around 59 percent of the GHG emission reduction target in the Energy and Transportation Sector in Nationally Determined Contribution (NDC).

REFERENCES

- Al-Riffai P. 2010. *Global Trade and Environmental Impact Study of the EU Biofuels Mandate*. International Food Policy Institute (IFRI), Final Report, March 2010
- Arndt C, Benfica R, Tarp F, Thurlow J, Uaiene R. 2010. Biofuels, Poverty, And Growth: A Computable General Equilibrium Analysis Of Mozambique. *Environment and Development Economics*. 15(1): 81-91.
- Ditzel K, M Nagle, S Nystrom, K O'Hare, V Venkateshwara. 2018. *The Biodiesel Industry: Impacts on The Economy, Environment and Energy Security*. FTI Consulting.
- European Commission. 2012. *Global Emission Edgar*. Joint Research Centre European Centre: <http://www.globalcarbonproject.org/europeancommission/carbonbudget/12/data.html>
- Fritsche UR, Wiegmann K. 2011. *Indirect Land Use Change and Biofuels*. European Parliament's Committee on Environment
- Jafar AH, NHM Salleh, BA Talib. 2010. Economic Impact of Biodiesel Development Program in Malaysia. *Prosiding*. 5(2): 382-391.
- Joni RE, Gumbira S, Harianto, N Kusnadi. 2010. Impact of Palm Oil Based Biodiesel Industry Development on Palm Plantation and Its Industry in Indonesia. *Jurnal Teknologi Industri Pertanian*. 20 (3): 143-151.
- Kementerian ESDM. 2021. *Pengurangan Emisi pada Program Mandatori Biodiesel*. Kementerian Energi dan Sumberdaya Mineral. Jakarta.
- Laborde D. 2011. *Assessing the Land Use Change Consequences of European Biofuel Policies*. International Food Policy Institute (IFRI). Final Report, October 2011
- Makutenas V, Miceikiene A, Svetlanska T, Turcekova N, Sauciunas T. 2018. The Impact of Biofuels Production Development in the European Union. *Agric Econ - Czech*. 64: 170-185.
- Mathews J, Ardiyanto A. 2015. Estimation Of Greenhouse Gas Emissions For Palm Oil Biodiesel Production: A Review And Case Study Within The Council Directives 2009/28/Ec Of The European Parliament. *Journal of Oil Palm, Environment & Health*. 6:25-41
- Mizik T, Gyarmati G. 2021. Economic and Sustainability of Biodiesel Production— A Systematic Literature Review. *Clean Technology*. 3: 19-36
- [PASPI] Palm Oil Agribusiness Strategic Policy Institute. 2020. Export of Palm Oil Products and Implementation of Mandatory B30 Policy More Increasing Indonesia's Net Trade Surplus in Q3-2020. Available on: https://palmoilina.asia/palmoil_monitor/export-palm-oil-and-mandatory-b30/
- [PASPI] Palm Oil Agribusiness Strategic Policy Institute. 2020. The Mandatory Policy Of Biodiesel As "The Anchor" Of Indonesian Economy. Tersedia pada: https://palmoilina.asia/palmoil_monitor/mandatory-policy-of-biodiesel/
- Singagerda FS, TY Hendrowati, A Sanusi. 2018. Indonesia Growth of Economics and the Industrialization Biodiesel Based CPO. *International Journal of Energy Economics and Policy*. 8(5): 319-334.
- Sipayung T. 2018. *Politik Ekonomi Perkelapasawitan Indonesia*. Bogor. IPB Press
- Sipayung T. 2020. *Ketahanan dan Kegairahan Industri Sawit pada Masa Pandemi Covid-19*. Dipresentasikan pada Pekan Riset Sawit tanggal 20 Oktober 2020
- Su Ye. 2017. *Economic Impact of The Minnesota Biodiesel Industry*. America's Advance Biodiesel.

- Susila WR Munadi E. 2008. Impacts Of The Development of CPO-Based Biodiesel On Poverty In Indonesia. *Informatika Pertanian*. 17(2):1173-1194.
- Tjakrawan P. 2021. *Peluang dan Tantangan Pengembangan Industri Fatty Acid Methyl Ester di Indonesia*. Asosiasi Produsen Biofuel Indonesia. Jakarta.
- USDA [United States of Departement Agricultural]. 2019. *Oilseed: World and Market Trade 2019* [internet]. Tersedia pada:
<https://www.fas.usda.gov/data/oilseeds-world-markets-and-trade>
- Zahan KA, M Kano. 2018. Biodiesel Production from Palm Oil, Its By-Products, and Mill Effluent; A Review. *Energies*. 11: 213