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Potential Alternatif Sources of Financing in Biofuel Development in Indonesia

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Abstract

Biofuels have been developed in many countries including Indonesia, which is an effort to reduce dependence on fossil energy sources. As one of the countries with a high population, has a large agricultural area and forest area, making Indonesia has the potential to become the highest biofuel producing country in the world. Since the government launched its energy policy in 2006 it seems interesting that, biofuel progress in Indonesia has not progressed well. The obstacles in the development of biofuels in Indonesia are government policies and infrastructure development funding systems. The target of the biofuel program in Indonesia seems very ambitious, therefore it needs alternative financing support outside the State Budget that can support the development of biofuels in Indonesia, which is the focus of this study. The research method is descriptive qualitative with a study that is, the potential for alternative sources of financing in the development of biofuels in Indonesia. The alternative financing taken is PINA (Government Non-Budget Investment Financing) which can contribute to financing the development of national strategic infrastructure projects with commercial value that has an impact on improving the economy in Indonesia.

Key words : Biofuels, PINA, Alternative Energy, Alternative Finance, Infrastructure Financing

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INTRODUCTION

In the early 19th century, the term fossil fuel referred to fuels derived from coal, petroleum, natural gas formed from plant and animal remains buried beneath the earth's surface over millions of years. In the 1970s, a new word 'biofuel' began to be heard and used to define renewable fuels to refer to solid, liquid, or gaseous fuels, produced from biomass (Fatih, 2011).

Currently there are many alternative energy sources to replace fossil fuels such as gas, fuel cells, geothermal, marine power, solar power, wind power, coal, nuclear fusion, and biofuels (Abbaszaadeh et al., 2012). Among these alternative energy sources, biofuels have advantages to overcome problems in the energy sector (Putrasari et al., 2016). The advantages of biofuels (biofuels) are as follows: (1) is a renewable biofuel (Zhang et al., 2013), (2) biofuel resources are abundantly available (Zhang et al., 2016), (3) neutral to gree-

nhouse gases (GHG) (Zhang et al., 2012), (4) produces negligible or even zero SOx emotion (Zhang et al., 2016) (5) produces lower NOx emissions (Zhang et al., 2018), (6) environmentally friendly fuels (Suganya et al., 2016), (7) can be produced locally (Zhang et al., 2017), (8) are biodegradable (Chew & Bhatia, 2008), (9) sustainable (Zhang et al., 2018), and (10) livestock production processes and/or biofuels are generally safe (Alaswadet al., 2015).

Biofuels can be obtained simply such as by cultivating food crops and raising farm animals. The advantages of energy from other biofuels are, more environmentally friendly and cheaper than complicated and expensive battery energy, or like coal which has billions of tons of harmful carbon, the use of natural gas which requires large capital, geothermal energy that is not simple is also very expensive, and the use of solar energy although abundant but requires expensive costs. For this reason, biomass (biofuel resource) is the only renewable energy source that has great potential to replace fossil fuels in various types (Harsono & Subroto, 2013).

Biofuels are classified into two groups, namely, conventional biofuels and advanced biofuels, with the following levels of value (commercialization), commercial > initial commercial > demonstration > research (Ruan et al., 2019). The conventional biofuels include, (1) bioethanol, sugar-based, and starch, (2) transesterification-based biodiesel, and anaerobic digestion biomethane (biogas). While advanced biofuels, namely vegetable oils, treated with water are in the early commercial stage; cellulose bioethanol (lignocellulose), biomass to liquid biodiesel/ BtL (Biomass to Liquid), microalgae biodiesel, and biohydrogen, especially at the demonstration and research stage, are presented in figure 1 below:

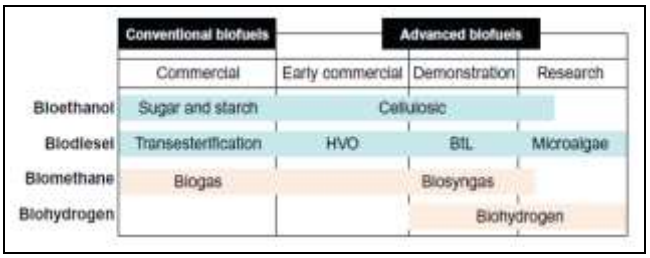


Figure 1. Biofuels are classified according to commercialization status (Ruan et al., 2019)

Based on feedstock and conversion technology, biofuels can be classified into four groups, namely first-generation biofuels, second-generation biofuels, third-generation biofuels, and fourth-generation biofuels (Demirbas, 2011). The composition and calories depend on the type of biomass and the process used (Sikarwar, 2017). The scope of the classification of biofuels is presented in the following figure:

Figure 2. Biofuel Classification
Source: Ruan et al. (2019)

In Indonesia, bioenergy is included in the group of biofuels which are part of new and renewable energy. The development of biofuels is also inseparable from the driving factors, motivations, and benefits that arise afterwards. One of the products of biofuel that is widely developed in Indonesia is biodiesel derived from the main raw material palm oil, which reaches 90%. So far the domestic market has consumed 25% of domestic CPO production in 2016 and the largest use of CPO (crude palm oil) is for biodiesel production (Harahap et al., 2019). The use of palm oil main raw materials is influenced by the supply of palm oil raw materials in Indonesia which is quite large, more competitive than commercial scale, and more efficient. Indirectly, this can improve the economy of the community and the region. The increase in biofuel energy is also a means of connecting the domestic market to the international market with the demand for renewable

energy based on biofuels (biofuels) and derivatives in the world market (Nuva et al., 2019).

In addition, the expansion of the use of B-30 to B40 and B50 in the country is believed to save the country's foreign exchange to reach 63 trillion rupiah. Downstream palm oil began to be intensively developed domestically to increase added value in biofuel products and also as an effort to increase the absorption of CPO which is the main commodity of biofuel development. Indonesia has been utilizing palm head-based biodiesel as a mixture in fossil diesel since the issuance of mandatory biodiesel policy in 2008.

Table 1. Total CPO-Based Biofuels in Indonesia

No	Desc.	Years (Million Ton)		
		2017	2018	2019
1	Target (Million ton)	4.2	3.92	7.37
2	Realization (Million ton)	3.42	6.17	8.39
3	Achievement percentage (%)	81.42%	157.39%	113.84%

Source: Sudjoko et al. (2022)

The target achievement of palm oil-based biofuel development is increasing from year to year. The development of palm-based biofuels is targeted at 7.6% in 2020, 13.2% in 2025, in 2030 with a target of reaching 19.7% and 32.3% in 2040. This is expected to provide benefits for Indonesia in the future. The use of renewable fuels that are environmentally friendly, and can reduce dependence on fossil-based fuels. CPO is the main raw material to meet the Indonesian government's target of 30% biodiesel blending by 2025 (Harahap et al., 20 19).

For biofuel development in Indonesia to be commercially successful, biomass processing facilities must operate similarly to conventional oil refineries. Biorefineries have a cell similar to a crude oil processing plant with a substrate of crude oil, natural gas, or other fossil energy sources. Biorefinery is a complex technological system that combines the biomass conversion process and further processing of the conversion product into fuels and chemicals, both final and intended for further processing (Biernat & Grzelak, 2015).

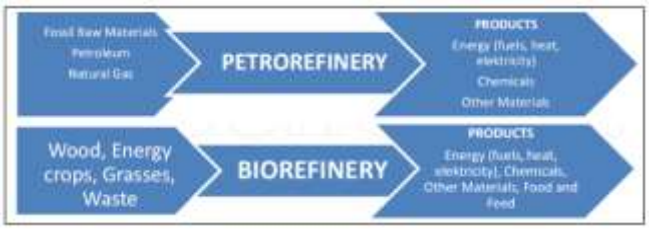


Figure 3. Basic Scheme of Conventional Oil Refineries and Biorefinery Schemes
Source: Biernat and Grzelak (2015).

In the biorefinery system, resources are processed in the petro refinery process on various products, especially fuel, electricity, heat, chemicals, and various other types of biomass materials. The substrate of the biorefinery is organic materials such as wood, energy plants, grass, and organic waste, which are processed in a biorefinery process similar to the refining process used in conventional petroleum refineries. Similar to conventional refineries that produce energy and chemical products from petroleum, biorefineries will produce various industrial products from biomass.

In Indonesia, biorefinery is known as a green refinery, which is a strategy in accelerating the national EBT (New Renewable Energy) mix target in 2025. Currently, the green refinery is managed by Pertamina, with refinery processing using new materials in the form of renewable feedstock such as RBDPO (palm oil), to UCO (used cooking oil) to produce more environmentally friendly fuel. This is also part of the National Strategy Project (PSN) which is in line with the Regulation of the Minister of Energy and Mineral Resources (E-SDM) of the Republic of Indonesia No. 12 of 2015 concerning the Supply, Utilization, and Commerce of Biofuels.

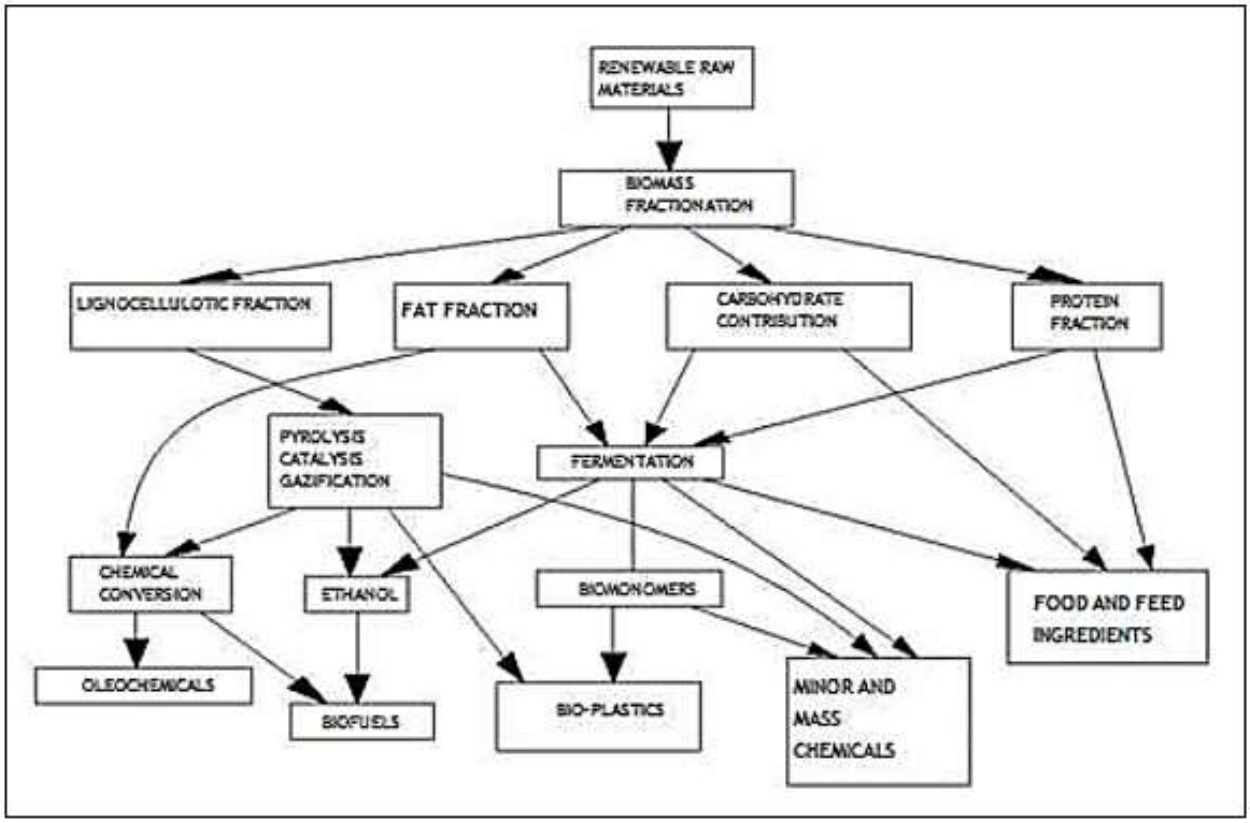


Figure 4. Comprehensive Concept of Biorefinery
Source: Biernat and Grzelak (2015)

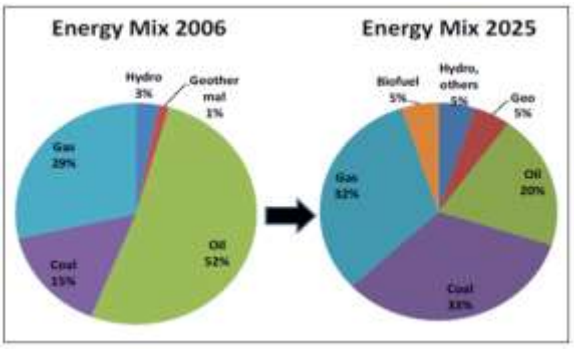


Figure 5. Energy Policy Mix in Indonesia
Source: Jupesta (2010)

The development of biorefineries leads to the production of petrochemicals substitution. Biorefinery projects can grow due to the need for products, but the existence of raw materials is also the basis for biorefinery development, by taking into account economic feasibility, can anticipate differences in harvest seasons from various raw materials, and the fulfillment of environmental aspects also needs to be improved. Biorefinery is expected to meet market needs and can operate continuously to create non-seasonal jobs (Pertiwi, 2013).

The construction and development of biorefineries (green refineries) in Indonesia has technical, economic, and non-technical obstacles such as government regulations and policies, stakeholders, job creation arrangements, and manpower to meet the demands of biorefineries commercially. Behind the obstacles that accompany the development of biofuel energy, of course, there are strengths that must be firmly held, namely, the necessity to towards, with the aim of alleviating poverty by creating added value from local resources, empowering local communities by creating jobs, saving foreign exchange reserves replacing fossil fuel oil with biofuels, and increasing income through the export of biofuel products (Jupesta, 2010).

Biofuel development in Indonesia is a complex one loaded with high technology and strategy, so development has high consequences on the state budget. The limitations of the state bu-

dget and the need for the state to build infrastructure create a financial gap that can be overcome by providing alternative funds through public private partnerships and other procurements from the bank and capital market sectors (Putri & Wisudanto, 2017). Based on the description above, the author intends to raise a problem study, namely, the potential for alternative sources of financing that can be utilized for biofuel development in Indonesia.

METHOD

This research is qualitative, which is descriptive analytical research. The objective to be achieved from descriptive research is the formation of an overview of a concept and thought, which in this case is the potential for alternative sources of financing, which can provide a further picture of the relationship between potential alternative sources of financing to biofuel development in Indonesia.

The research analysis focused on policy options that can be taken by the government regarding potential alternative sources of financing in the development of biofuel-based energy in Indonesia. The analysis was conducted by examining the discourse on government policy choices related to potential alternative financing with laws and regulations, sustainability, renewable energy, community norms, and potential sources of funds in the development of renewable energy infrastructure in Indonesia.

In this research study, the data used are primary data and secondary data. The collection of primary data and secondary data is carried out by, (1) literature studies including related laws and regulations, as well as scientific articles, and information from various media; (2) Focus Group Discussion (FGD) and/or in-depth interviews with several academics, practitioners, employers' associations, government structural officials, and other key resource persons to develop potential alternative sources of financing in biofuel development in Indonesia.

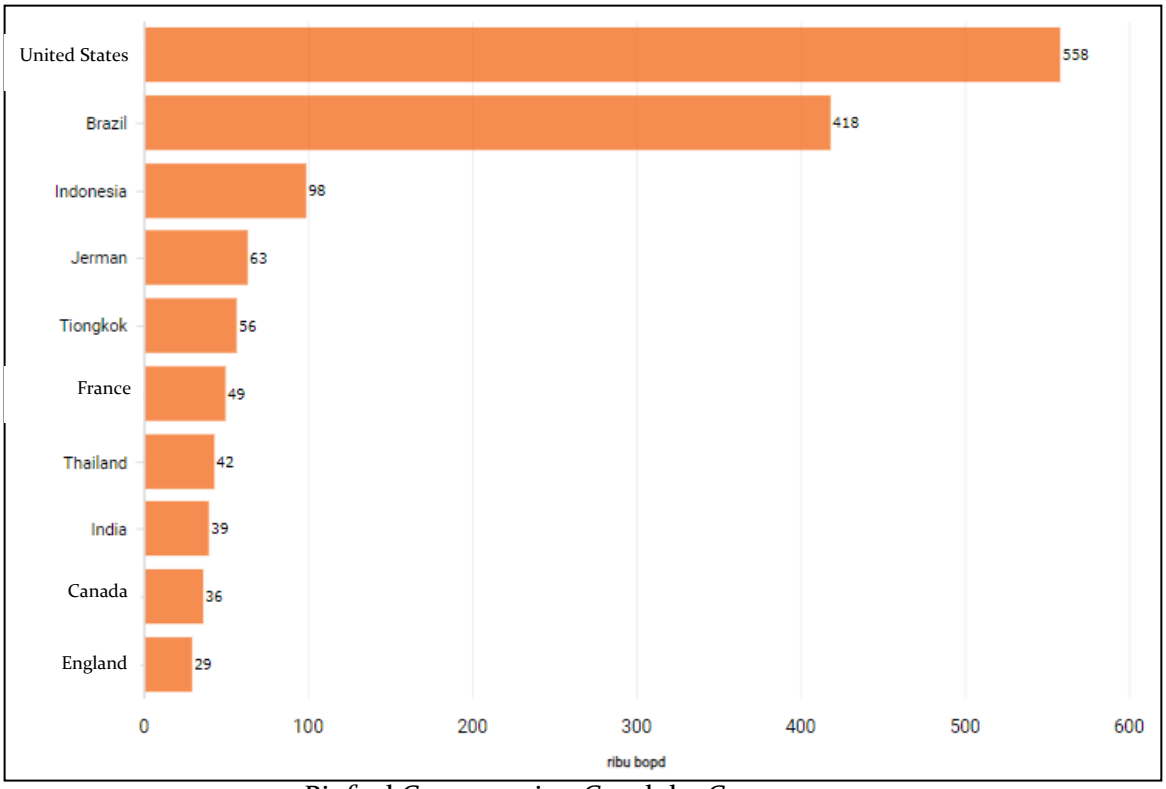
RESULTS AND DISCUSSION

This section describes the research report, including describing the research data and the description of the required analysis which is an empirical answer to the question on the subject matter and/or research hypothesis.

Europe is currently a key player in the global biofuel market that plays a role in overcoming the impact of biofuel sustainability itself (Nuva et al., 2019). If described globally as a whole, global consumption of biofuel or BBN (Biofuel) reached 1.68 million barrels of oil equivalent per day or bopd throughout 2020. BP Statistical Review of World Energy noted this number was down 5.2% from 1.77 million bopd in 2019. In Indonesia, BBN is divided into two, biogasoline is used in gasoline-fueled engines and biodiesel is used for diesel-fueled engines.

The United States is the country that consumes the highest biofuel. The number reached 558 thousand bopd throughout 2020. This consumption accounts for 33.2% of the world's total biofuel consumption. Brazil followed in second place with consumption of 98 thousand bopd throughout last year. Brazil's consumption accounts for 24.9% of the world's total biofuel consumption.

Indonesia is in third position with consumption of 98 thousand bopd in 2020. Indonesia's biofuel consumption accounts for 5.8% of total world consumption. Germany occupies the fourth position with consumption of 63 thousand bopd. China ranks fifth with biofuel consumption of 56 thousand bopd with consumption of 3.8% of the world's total biofuel consumption. France consumed 49,000 bopd (2.95%), Thailand consumed 42,000 bopd (2.5%), India consumed 39,000 bopd (2.3%), Canada 36,000 bopd (2.2%) and the United Kingdom 29,000 bopd (1.8%).



. Biofuel Consumption Graph by Country 2020

Source: databoks.katadata.co.id. (2022)

Indonesia is the third largest producer of biofuels (BBN) in the world. Fuel production in Indonesia is 126 million barrels of oil equivalent per day (bopd) in 2020 (Katadata, 2022). BBN production in Indonesia is currently only inferior to the United States and China. Since 2011 Indonesia has downstreamed palm oil domestically through three downstream channels, namely, the downstream path of the oleofood industry, the downstream path of the oleochemical industry, and the downstream path of biofuel. This downstream aims to increase added value and also to reduce Indonesia's dependence on the world CPO market. The downstream biofuel pathway is associated with mandatory biodiesel policies from B-5 (2010), B-10 (2012), B-15 (2014), and B-20 (2016). This downstream route aims to reduce dependence on fossil fuel imports as well as reduce emissions from fossil fuels.

The downstream policy of palm oil in the country has succeeded in improving the composition of Indonesian palm oil exports from the dominance of crude palm oil to the dominance of refined palm oil.

In 2018, biodiesel consumption was recorded at 3.55 million kilo liters, up 49% compared to the realization in 2017 of 2.37 million kilo liters. Biodiesel consumption skyrocketed again in 2019 to 6.37 million kilo liters. In semester 1 of 2020, biodiesel absorption was recorded to have reached 4.36 million kilo liters or reached 68% of the absorption rate throughout 2019 (Indonesia.go.id. 2021).

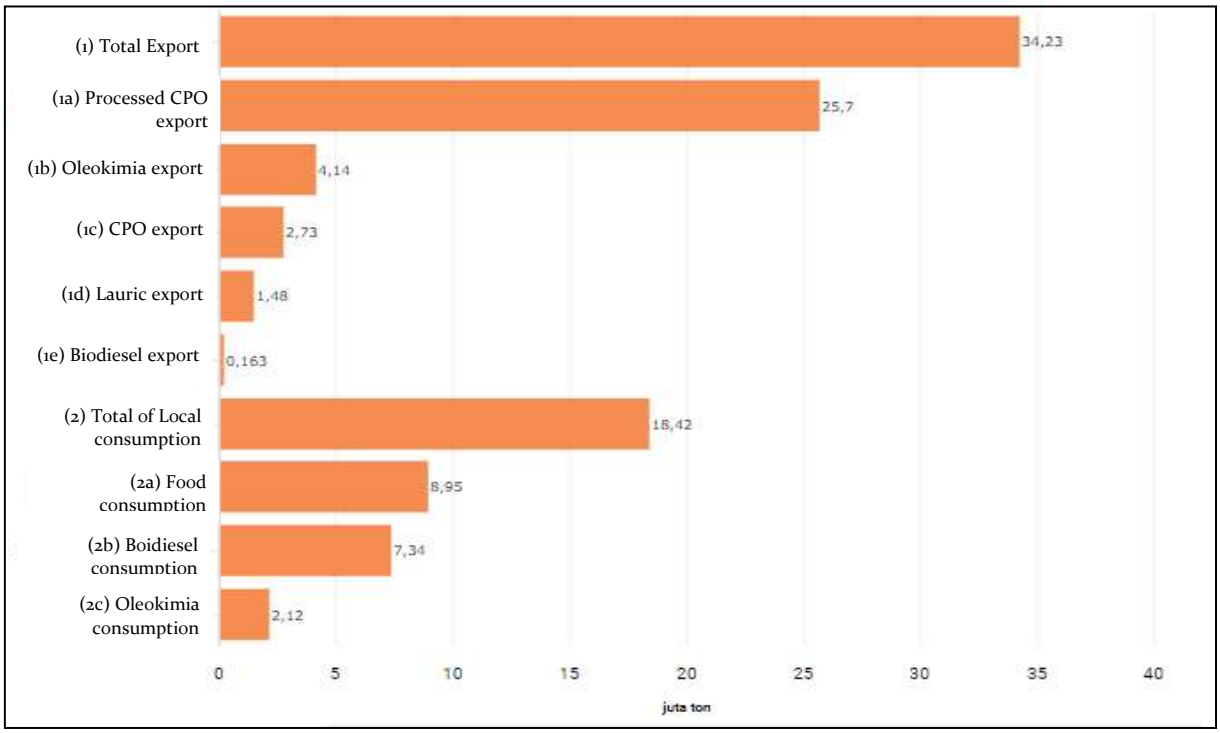


Figure 7. Indonesian Palm Oil Consumption by Product Use, 2021
Source: Katadata (2022)

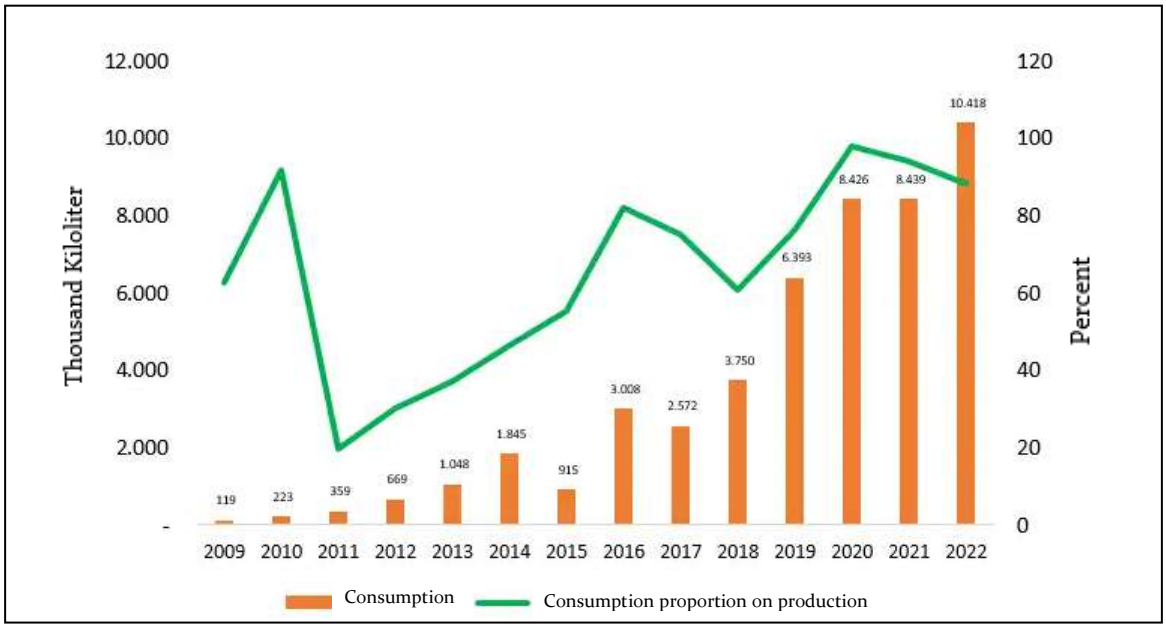


Figure 8. Development of Biodiesel Consumption in Indonesia
Source: Palmoilina.asia. (2023).

Energy policy can be expressed as a public economic policy related to various issues and issues that surround it, such as environmental issues, social issues, and politics. Various rules and policies are certainly issued by the government as a guarantor of energy security, including in finding various new and renewable alternative energies to support national energy mix policies, such as the development of biodiesel as a blending material for diesel fuel. This effort continues to be strengthened by the issuance of Government Regulation (PP) No. 79 of 2014 concerning National Energy Policy which contains optimal energy mix policies, with the

role of renewable energy at 23% in 2025 (biofuel 4.7%) and increased to 31% in 2050.

The policy of utilizing biofuels (biofuels) is also affirmed by the issuance of Presidential Instruction (Inpres) No. 1 of 2006 concerning the Supply and Utilization of Biofuels (biofuels) as Other Fuels. Article 3 Paragraph 2 of the Regulation of the Minister of Energy and Mineral Resources (ESDM) Number 25 of 2013 concerning the Supply and Utilization, and Biofuel Commerce as Other Fuels, business entities holding fuel trading business licenses are required to use biofuek as other fuels in stages (Nuva et al., 2019). In addition, Presidential Regulation (Perpres) No. 1 of 2014 concerning the Preparation of the General Plan of National Energy (RUEN), General Plan of Provincial Regional Energy (RUED-P), and General Plan of National Energy of District/ City Areas (RUED Kab/Kota) was also issued. The main policy for the development of biofuels in Indonesia is Presidential Regulation No. 18 of 2020 concerning the Plan for the Development of Palm Oil-Based Renewable Energy to Become One of the National Strategic Projects. The establishment of the Palm Oil-Based Renewable Energy Program is aimed at supporting an increase in the share of new renewable energy in the national energy mix towards 23% by 2025.

One of the mandates of Presidential Regulation No. 61/2015 jo. Presidential Regulation No. 66/2018 is that palm oil funds are used as the supply and utilization of biodiesel type biofuels, with the program carried out is mandatory biodiesel, namely, marrying the mixing of diesel fuel with palm-based biodiesel which was implemented in 2008 with a biodiesel mixture content of 2.5%. Biodiesel levels increased by 7.5% in 2020. In the period from 2011 to 2015 the percentage of biodiesel was increased from 10% to 15%. Furthermore, in 2016 biodiesel was increased to 201% (B20) and on December 23, 2019 President Joko Widodo inaugurated the use of B30 (KESDM, 2019).

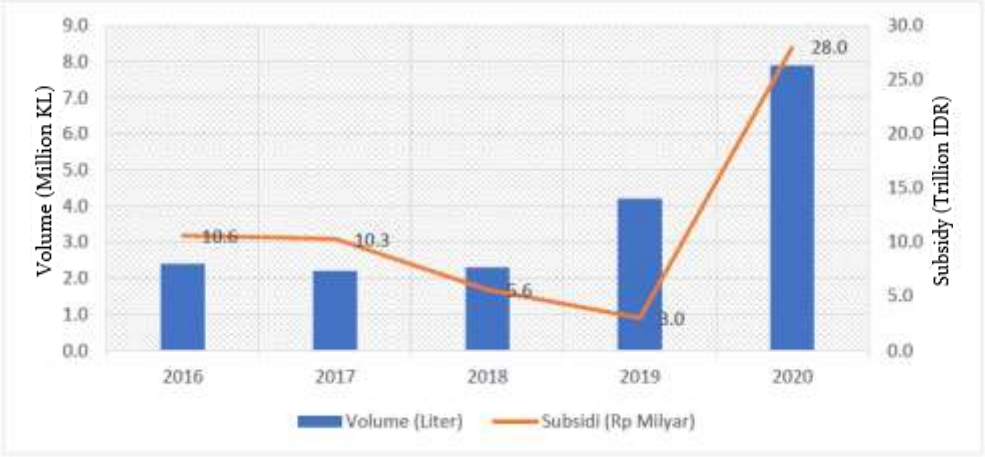


Figure 9. Subsidy Value and Volume of Biodiesel Distribution, 2016-2020
Source: Saputra (2021)

Since the implementation of the B30 Program in 2020, the government recorded an increase in biodiesel by 8.4 million kiloliters (Directorate General of New Renewable Energy and Energy Conservation, 2019a). This has an impact on decreasing diesel imports, which has been one of the causes of the current account deficit (Saputra, 2021). The B30 program is able to reduce imports by USD 2.53 billion (Directorate General of Oil and Gas 2021). One of the successes of the B30 Program is influenced by the provision of subsidies by the government to Biofuel Business Entities (BU-BBN). Subsidies are a way for the government to increase the economic value of biodiesel (LPEM FEB UI, 20 20). The mechanism is that subsidies are given

to BU-BBN based on the difference between HIP (Market Index Price) and the realization of its distribution (LPEM FEB UI, 2020). The planning, implementation, supervision, and monitoring of the subsidy program are carried out by EBTKE (Directorate General of New Energy and Energy Conversion), Directorate General of Oil and Gas, and BPDPKS (Directorate General of New Renewable Energy and Energy Conservation, 2019a.)

As for funding support for the current mandatory biodiesel program, in accordance with Presidential Regulation number 66 of 2018 concerning the Second Amendment to Presidential Regulation Number 61 of 2015 concerning the Collection and Use of Palm Oil Plantation Funds and Minister of Energy and Mineral Resources Regulation Number 41 of 2018 concerning the Supply and Utilization of Biodiesel Type Biofuel in the Framework of Financing by the Palm Oil Plantation Fund Management Agency (BPDPKS) the flow is described as follows.

Pertamina as the main buyer of biodiesel in the country currently needs to make a balanced policy related to the purchase price of biodiesel by collaborating with the central government and the Ministry of Energy and Mineral Resources in determining the price of biodiesel. This is an effort to support the national energy mix that is aligned vertically and horizontally with various parties, both between producers and between consumers. The development of palm oil-based biodiesel in Indonesia is certainly determined by high quality governance in the development and implementation of biofuels in Indonesia.

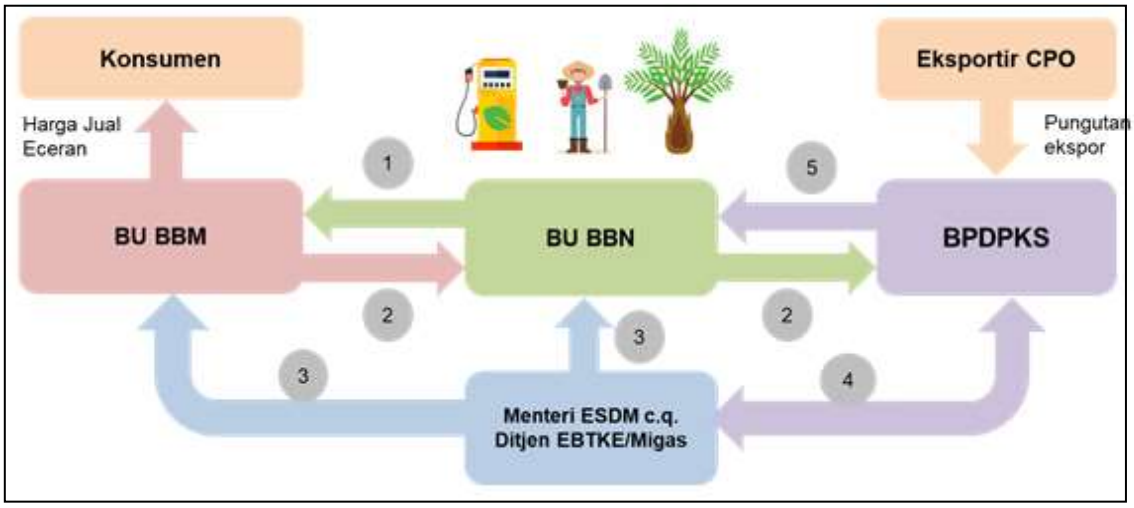


Figure 10. Financing Framework Scheme
Source: BPJS Sumber (Palm Oil Fund Management Agency, 2020)

The biofuel program in Indonesia was initiated as an alternative to reduce dependence on fuel and fuel imports (Caroko et al., 2011). Increase tax revenue, reduce fuel subsidies, provide alternative markets for oil palm farmers, job creation, rural development, decentralized energy systems, smallholder inclusion (Hunsberg et al., 2017), and climate change mitigation. Governments need to set better articulated goals for biofuel programs and stronger parameters to measure their success (German et al., 2017).

Returning to the issue of financing, a series of efforts that have been made by the government have not been enough to meet the target costs needed for infrastructure development in biofuel development in Indonesia. Based on calculations, the ability of the State Budget even though it is added to the Regional Budget (APBD) is estimated to only be sufficient for around 41.3% of the total infrastructure develop-

ment financing in Indonesia (Ananda, 2018). The rest is expected from cooperation with other parties such as private companies and SOEs (State-Owned Enterprises) in order to avoid debt growth. The government's latest efforts to attract investment interest or infrastructure financing can be done by refreshing the PINA (Government Non-Budget Investment Financing) scheme (Ananda, 2018).

PINA is a financing scheme that does not involve the State Budget. The concept used is to cooperate with investors to increase capital. PINA is a facility for the private sector and SOEs to give birth to creative and alternative financing (Ananda, 2018). PINA can be used to contribute to financing national strategic infrastructure projects that have commercial value and have an impact on improving the Indonesian economy. PINA is important to implement because the fiscal space of the government budget is very limited due to the limitation of the width of the budget deficit. The need for infrastructure investment is so large that the government budget is focused on infrastructure that cannot be managed commercially (filling the gap).

Infrastructure and non-infrastructure development that brings benefits to the people of Indonesia can be carried out without using government budgets. The PINA scheme complements the Government and Business Entity Cooperation Scheme (PPP) as an alternative to infrastructure financing. With the aim as, (1) support the achievement of national development targets; (2) meet the financ-ing needs of domestic investment; (3) consoli-date long-term funds; (4) increase Indonesia's competitiveness in the international market; (5) mobilize strategic sectors of the domestic economy; (6) optimize the contribution of Capital Revenue and Investment to Indonesia's development projects; and (7) increase investment financing capacity through asset optimization to achieve national development goals.

The important role of PINA is to optimize the role of SOEs and the Private Sector in development financing, in fulfilling 58.7% of development financing or Rp. 2817 trillion in the RPJMN (National Medium-Term Development Plan) for 2015-2019. Increasing development financing capacity, through (1) Mobilization of potential long-term funds such as bonds, investment funds, such as pension funds and insurance funds; (2) encourage recycling investment in brownfield category projects (development projects); (3) Private corporations have better leveraging capacity than the government so that the same funding can be used to invest several times more. The private sector also has a greater opportunity and flexibility to attract funds from abroad (due to low investment returns) and take advantage of tax amnesty funds.

PINA also has the potential to accelerate the implementation of priority projects, where infrastructure development involves multi-stakeholders so that a special mechanism is needed to coordinate and encourage related parties.

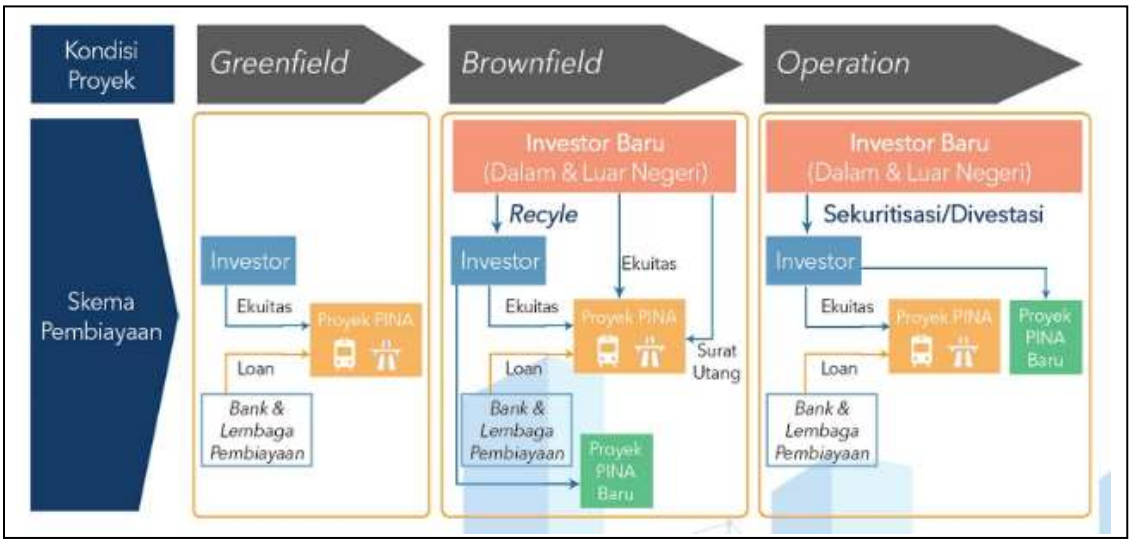


Figure 11. Potential Capital Gains during Investment Recycle Brownfield Project
Source: BAPPENAS (2017)

PINA's project priorities have the following characteristics, (1) support the achievement of priority development targets; (2) have economic and social benefits for the people of Indonesia; (3) has commercial viability; and (4) meet readiness criteria.

PINA does not use the government budget, but is implemented by utilizing financing sources derived from, (1) investment; (2) managed funds; (3) banking; (4) capital markets; (5) insurance; (6) financing institutions; (7) other financial service institutions, including pawnshops, guarantor institutions, Indonesian export financing institutions, housing secondary finance companies, and institutions that carry out compulsory management of public funds, including providers of social security, pension, and welfare programs.

Infrastructure plays an important role in a country's economic growth. Proper and adequate infrastructure is able to increase the acceleration of a country's economic and social development through the creation of effectiveness and resulting efficiency. One of the important components in the development of good state infrastructure is supported by proper financing in the planning stage, the construction process, to the operational and maintenance stage.

CONCLUSION

Indonesia is the country that consumes the third largest biofuel after Brazil and America, with consumption of 98 thousand bopd in 2020. Biofuel consumption in Indonesia accounts for 5.8% of total world consumption. Biofuels in Indonesia are divided into two, namely biogasoline and biodiesel. Since the implementation of the B30 program in 2020, the increase in biodiesel has increased by 8.4 million kilo liters, which has an impact on decreasing diesel imports, which has been one of the causes of the current account deficit. Infrastructure development as an effort to increase biofuel commercialization in Indonesia is not only sufficient if you rely on APBN and APBD funds, but also the potential alternative costs that can be taken are the PINA scheme. The important role of PINA is to optimize the role of SOEs and the Private Sector in development financing, in fulfilling 58.7% of development financing or Rp. 2817 trillion in the 2015-2019 RPJMN.

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