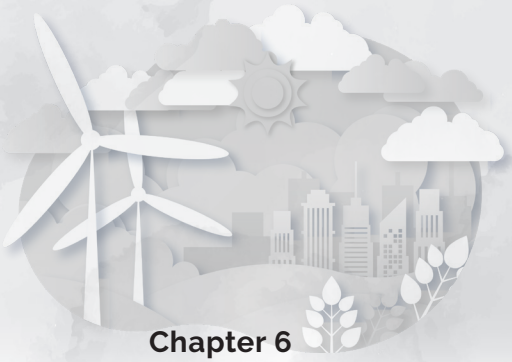

Chapter 6

Green and Renewable Energy Financing Policy in Indonesia

Eko Eddya Supriyanto

A. Introduction

As the national energy demand increases year on year, the search for new renewable energy alternatives is being reconsidered. In addition, international agreements to reduce the use of fossil energy to promote clean and carbon-free energy are also important to complete. Based on data from the Ministry of Energy and Mineral Resources, Indonesia's total energy consumption is about 909.24 million barrels of oil equivalent (BOE) in 2021. Meanwhile, Indonesia's energy consumption increased by 0.4% year-on-year from 905.6 million BOE (Dewan Energi Nasional, 2022).

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Many countries in Asia are working to reduce greenhouse gas emissions to net zero. For this to become a reality, annual investment in renewable energy would need to increase from $62.3 billion in 2022 to $138.6 billion from 2026 to 2030 and $165.8 billion from 2031 to 2035 (Razzaq et al., 2023). According to Table 6.1, the People's Republic of China (PRC) currently accounts for almost 80% of all investments in Asia. China's share is expected to decline to 62% between 2026 and 2030 and 57% between 2031 and 2035 as other Asian countries need to step up investment in clean facilities. From 2031 to 2035, the rest of Asia will require an investment that is six to eight times the investment it is currently receiving. Even excluding the People's Republic of China, Asia will invest the most in emerging market and developing economies (EMDEs).

The use of renewable energy in Indonesia has increased significantly in recent years, thanks to the government's commitment to achieving net-zero emissions targets. Based on data from the Central Bureau of Statistics from 2015 to 2021, this figure continues to rise to 12.16% of the country's energy mix. The potential of new renewable energy (NRE) is being fully exploited and will likely accelerate the energy transition. In 2060, the NRE generation capacity is expected to be 700 GW from solar, hydro, wind, bioenergy, ocean, and geothermal energy (including hydrogen and nuclear).

Table 6.1 Annual Clean Investment Required under the Net-Zero Scenario ($ billion)

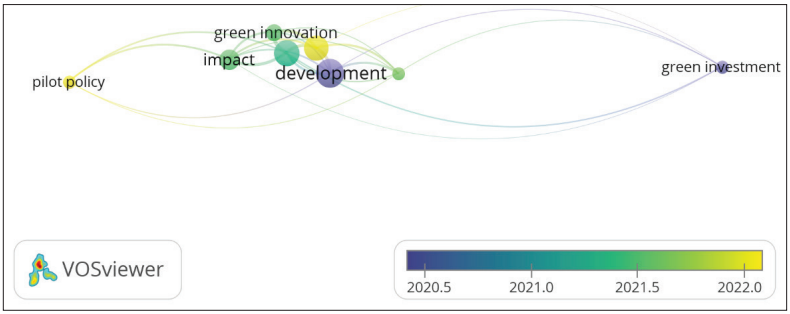
			Net Zero Scenario		
	2015	**2022**	**(1) 2026–2030**	**(2) 2031–2035**	**(2) 2020 level**
EMDEs	538	773	2.222	2.805	4
People's Republic of China (PRC)	287	511	853	947	2
EMDEs excluding the PRC	251	262	1.369	1.858	7

			Net Zero Scenario		
	2015	2022	(1) 2026–2030	(2) 2031–2035	(2) 2020 level
Southeast Asia	28	30	185	244	8
India and Other Asia	76	82	348	467	6
Africa	26	32	203	265	8
Latin America	63	66	243	332	5
Middle East and Eurasia	57	52	390	550	11
Asian EMDEs	391	623	1.386	1.658	3

Source: Razzaq et al. (2023)

This chapter discusses green finance and new renewable energy in the form of policy. Over the past decade, academic literature on green energy investments has proliferated and has attracted the attention of the academic community for several reasons. First, renewable energy stocks are becoming an important asset class due to a significant increase in investment (Dutta et al., 2023). Second, research on sustainable finance is also increasing as concerns about climate change and its potential impact on the economy and social welfare (Sharif et al., 2023). Third, socially and environmentally conscious investors plan to enter the green energy industry to build low-carbon portfolios (Belgacem et al., 2023). Fourth, investors and policymakers are interested in whether green energy stocks can hedge traditional and nontraditional asset classes (Barbier, 2022).

Research related to green energy, renewable energy, and green finance brings together several researchers from multiple disciplines and interdisciplinary backgrounds. After processing 100 manuscript articles on ScienceDirect containing keywords related to renewable energy, green energy, low carbon emissions, green policy, and green finance using the VOSviewer application, we found many topics were widely covered from 2020 to 2022. These include pilot policies, green innovation, impact, development, green investment, etc.



Note: Data processed with the VOSviewer application

Figure 6.1 Research Theme Data Processing based on ScienceDirect Manuscripts

Human activities, especially economic, domestic, industrial, business, and transportation activities, require energy. The majority of the world's energy supply comes from fossil fuels, which are nonrenewable resources. Energy demand is expected to continue increasing as oil and coal reserves decline. Additionally, the use of fossil fuels for energy results in excess carbon in the atmosphere, leading to global warming (Belgacem et al., 2023). Therefore, alternative energy supplies other than oil and coal are needed (Pan & Dong, 2023). New energy and renewable energy are alternative energies that not only have a low impact on the environment but also can contribute to the realization of a sustainable energy supply in the future.

Energy sustainability is a global issue, and its implementation requires the involvement of national and local governments, so access to clean and affordable energy is key to sustainable development by 2030 (UNDP Indonesia, 2015). In Indonesia, a new and renewable energy policy is included in Government Regulation No. 79 of 2014 on the National Energy Policy. The plan sets new renewable energy targets of 23% in 2025 and at least 31% by 2050. Meanwhile, dependence on oil and coal should be reduced by 20% and 25%, respectively. Achieving this goal requires a variety of initiatives and programs, the development and implementation of which are outlined in the

National Energy Master Plan (NEGP) and the state-level Regional Energy Master Plan (Kementerian ESDM, 2019).

The introduction of new and renewable energy requires a financial plan for a certain period of time. Indonesia's energy financing indicators should also be determined based on national energy needs and national energy security (Tanasya & Handayani, 2020). Aspects of renewable energy financing include a variety of issues related to the financing, investment, and financial management of renewable energy projects. Some aspects to consider regarding renewable energy financing are as follows.

1. Sources of financing for renewable energy projects include internal funds, debt, equity, and third-party funds such as banks and other financial institutions (Vargas-Hernándezet al., 2022).
2. Project scale. The size of a renewable energy project affects the type of financing available. Small projects may require funding from private investors or crowdfunding, whereas large projects may require funding from banks or institutional investors (Sun etal., 2022).
3. Costs and risks. The cost of renewable energy projects varies widely depending on the type of technology used, the location of the project, and other factors. Additionally, project financial planning should also consider risks such as political risk, operational risk, and financial risk (Lenaerts et al., 2022).
4. Incentives and regulations. Some countries have established incentives and restrictions to support renewable energy development. These include policy regulations such as tax incentives, subsidies, feed-in tariffs, and renewable portfolio standards (Jauhari et al., 2023).
5. Maintenance and operation. In addition to construction costs, financial planning must also consider the maintenance and operation of renewable energy projects. These costs may include routine maintenance, component replacement, and operating costs.

6. Financial management. Proper financial management is essential for the successful implementation of renewable energy projects. This includes cash management, risk management, and accurate and transparent financial reporting.
7. Assessment and risk mitigation. Renewable energy projects can be exposed to a variety of risks, including credit risk, operational risk, and market risk. It is important to conduct a risk assessment and take appropriate corrective actions to reduce the risk.

Potential areas for development in Indonesia include an estimated 23.7 gigawatts (GW) of geothermal energy, 154.9GW of wind energy, 75,000 MW of hydropower potential that will only be used by 7,572 MW (10%), and potential solar energy of 4.8 KWh/m^2 or equivalent with 112,000 GWp, of which approximately 10 MWp was used only in 2022. Renewable energy financing is based on policies and programs issued by the Indonesian government to build a green economy framework in the form of low-carbon green energy in the National Energy Plan, import tariff policy, green energy tax reduction policy, and equal distribution of electricity in rural areas, etc. (Kementerian ESDM, 2019).

B. National Energy General Plan 2019–2038

The 2019–2038 National Energy General Plan (NEGP) by the Indonesian government aims to increase renewable energy's role in the country's energy production to 23% by 2025 and 31% by 2030. The plan includes increasing the use of new and renewable energy, natural gas use as clean energy, energy efficiency, electricity access, developing energy infrastructure, and building nuclear reactors as well. The plan aims to achieve sustainable development goals, increase energy independence, and strengthen Indonesia's position as a country with abundant energy resources. The plan aims to achieve these goals over the next 20 years.

1. The Bright Electricity Program and the Village Electricity Program

The Indonesian government has launched the Bright Electricity Program and the Village Electricity Program to increase electricity access in rural areas, particularly those not covered by the national electricity network (Supriyanto, 2022). The Bright Indonesia Program targets 12,695 villages in six provinces in eastern Indonesia, focusing on renewable energy sources like micro-hydro, wind, and solar power. The country's electrification ratio has increased by 14.54% in the last five years, with 29 provinces reaching over 95% registered exporter (RE). Four areas, i.e., Central Kalimantan, Southeast Sulawesi, Maluku, and Papua, have reached 90%–95% RE, while East Nusa Tenggara still has an 85% RE. The government aimed to achieve 100% RE by 2020.

PLN (Perusahaan Listrik Negara/State Electricity Company), state-owned enterprises, and local governments are working together to provide access to electricity for rural communities and remote areas using renewable energy sources like solar panels and wind turbines. Investment cooperation is being conducted for turbine development in South Sulawesi and solar panels in Kalimantan and the islands. The Bright Electricity Program was launched in 1989 to provide electricity to people living in remote areas and outer islands using a micro-hydro power generation system and solar panels. The Village Electricity Program was launched in 2015 to provide electricity to all villages that the national electricity network has not touched, using various energy sources like solar panels, micro-hydro power plants, and generators. To encourage the development of these programs, the Indonesian government has established policies and regulations, including subsidies for renewable power plant development and increased investment in the renewable energy sector (Sari & Setiyono, 2022). Additionally, the government has facilitated the formation of village electricity cooperatives as PLN partners in operating power plants in isolated areas.

2. Feed-in Tariff and Purchase Price of Electricity

The Indonesian government has introduced higher tariffs for renewable energy purchases, aiming to encourage investment in the sector. The Ministry of Energy and Mineral Resources (ESDM) is implementing new rules regarding the purchase price of renewable energy-based power plants (NRE), using a feed-in tariff scheme. The Feed-in Tariff (FiT) and Purchase Price of Electricity are two key concepts in renewable energy development. FiT is a payment mechanism that encourages renewable energy providers to receive higher prices for each unit of energy produced, promoting the development of renewable energy sources like solar, wind, and hydropower (Triyanti et al., 2023).

Electricity Purchase Price is the price paid by electricity companies to renewable or conventional energy producers, which can vary depending on the type of energy and market conditions (Yangchongthuochuaya & Chaiyat, 2023). The Indonesian government has implemented a FiT mechanism through Regulation No. 49/2018 concerning the Construction of Small-Scale Solar Power Plants with Electricity Tariffs Provided by PT PLN.

The Purchase Price of Electricity is crucial for ensuring renewable energy's sustainable investment and development (Setyono et al., 2019). A high purchase price encourages renewable energy producers to increase production (Zhu et al., 2022), while a low purchase price can hinder investment and development. In Indonesia, the government has set a purchase price for electricity from renewable power plants, such as solar and wind power plants, which will be valid for a certain period, as stated in the Minister of Energy and Mineral Resources Regulation No. 50/2017 concerning the Purchase Price of Electricity from Solar and Wind Power Plants.

3. Tax Policy

The Indonesian government is committed to reducing greenhouse gas emissions and reducing fossil fuel consumption to combat climate change. There are various policies to implement this commitment,

such as Government Regulation No. 79 of 2014 on National Energy Policy. The target mix of new and renewable energy is at least 23% in 2025 and 31% in 2050.

The Indonesian government imposes tax incentives on companies investing in the renewable energy sector. Indonesia, a country with rich natural resources and vast landscapes, has huge potential for NRE as a source of clean energy, also known as green energy. Based on data from the Ministry of Energy and Mineral Resources, a total of 442 GW of renewable energy potential can be used for electricity generation: hydropower, geothermal, bioenergy, solar, wind, and marine energy.

Tax incentives provided by the country to support the expansion of new renewable energy power plants include income tax relief, import relief in the form of exemptions from import duties and taxes related to imports, property taxes, and building tax compliance relief (Norouzi et al., 2022). President Jokowi also directed the Minister of Finance to support tax incentives in accordance with the presidential decree.

In order to assist in the implementation of this Presidential Regulation, the Minister or agency head and relevant local government shall immediately enact provisions for the granting of incentives within the scope of their specified powers within one year of the entry into force of this regulation. Governments can promote the development of green finance and renewable energy through appropriate tax policies. Below are some tax policies that can be introduced to support the development of renewable energy and green finance.

a. Tax incentives for investing in renewable energy

Governments may offer tax incentives, such as income tax exemptions and reduced tax rates, to companies or individuals investing in the renewable energy sector (Sharif et al., 2023). The Indonesian government offers several tax incentives to encourage investment in the renewable energy sector as follows.

1) Exemption from import taxes

   The government exempts machinery, equipment, and raw materials used in renewable energy projects from import taxes.

2) Value Added Tax (VAT) Exemption

The government exempts the sale of renewable energy from her VAT.

3) Income tax deduction

The government will provide income tax relief to companies that invest in renewable energy projects.

4) Regional tax incentives

Some regions in Indonesia offer additional tax benefits, including property tax exemption for companies investing in renewable energy projects.

5) Electricity pricing

The state charges higher electricity rates for renewable energy than for conventional electricity.

6) Ease of financing

The government provides easy financing through programs such as the People's Enterprise Credit (*Kredit Usaha Rakyat*/KUR) and the Renewable Energy Revolving Fund (*Dana Energi Baru Terbarukan*/DEBT). Of course, this opportunity is provided in the form of cooperative economic units or village enterprises (BUMDes).

This tax incentive is expected to increase investment in Indonesia's renewable energy sector and contribute to achieving Indonesia's renewable energy share target of 23% by 2025. In summary, this system aims to build a sustainable economy by maintaining the balance of nature. The green economy is considered the best solution to exploitative economic systems that have traditionally tended to have a negative impact on the environment.

b. Carbon Tax

Carbon tax is levied on CO_2 emissions associated with industrial activities. The purpose of this tax is to reduce greenhouse gas emissions and encourage companies to use greener technologies such as renew-

able energy. The Indonesian government designed and implemented a carbon tax policy to reduce greenhouse gas emissions and promote the use of clean energy. Issues related to carbon tax in Indonesia include:

1) CO_2 tax policy

   The Indonesian government established a carbon tax policy in Law No. 11 of 2020 on Job Creation. The policy imposes a tax on greenhouse gas emissions equivalent to Rp75,000 per ton of carbon dioxide, or 5.35 US cents per kilogram.

2) Implementation plan

   Although the carbon tax policy has been approved, the implementation plan has not yet been implemented. The government is conducting further research and discussion on the implementation of this policy, including how to effectively calculate and apply tax rates.

3) Potential impact

   The carbon tax is expected to reduce greenhouse gas emissions and promote the use of clean energy in Indonesia. However, these taxes can affect the prices of fuels and carbon-based goods, so the economic and social impacts need to be carefully considered.

4) International support

   The Indonesian government has also received support from the international community in introducing a carbon tax. Several international organizations, such as the World Bank and the IMF, have advised and supported the implementation of a carbon tax in Indonesia.

Carbon taxes are an essential policy tool to achieve the goal of reducing greenhouse gas emissions. However, in order for the introduction of a carbon tax to positively contribute to Indonesia's sustainable development, the introduction of a carbon tax must be carried out carefully and the possible impacts must be taken into account.

c. Air Pollution Tax

Governments can impose air pollution taxes on companies and individuals that use fossil fuels such as coal and oil. The purpose of this tax is to reduce the use of fossil energy and encourage businesses to switch to renewable energy. An air pollution tax is a tax on activities that cause air pollution that can be harmful to human health or the environment. The Indonesian government has introduced the following policies related to air pollution tax.

1) Fuel Tax Policy

The Indonesian government taxes motor fuels based on carbon monoxide (CO), hydrocarbon (HC), and nitrogen oxide (NOx) emission levels. This tax is known as an "emissions tax" or "green tax" and is intended to encourage the use of cleaner, more environmentally friendly fuels.

2) Motor Vehicle Tax Policy

In addition to the fuel tax, the Indonesian government also imposes a vehicle tax based on emissions. This tax is known as the "vehicle emissions tax" and is intended to encourage the production and use of more environmentally friendly vehicles.

3) Government Regulation No. 41 of 1999

This regulation regulates air quality management, including the regulation of exhaust gases from automobiles. The regulation also provides sanctions and fines for noncompliance with established emission standards.

4) Law No. 32 of 2009 on Environmental Protection and Environmental Protection

This law empowers the government to enact regulations and policies related to environmental management, including air pollution control. Governments may impose taxes and fines on violators who do not comply with established regulations.

The air pollution tax is an important policy tool to control air pollution in Indonesia. Additionally, public education and awareness

must be strengthened to ensure sustainable reductions in air pollution. The existence of tax incentives to encourage the development of renewable energy power plants is expected to have synergistic effects in other areas such as enabling better electricity supply to areas that are still under-served, fostering growth in the industrial sector, and creating employment opportunities.

d. Import Tax

Governments impose import duties on products that use fossil fuel sources or that are not environmentally friendly, potentially making those products more expensive and less attractive to consumers. Import duties are taxes levied on goods imported into a country. In Indonesia, the government has the following policies related to import taxes:

1) Import Tax

   Import duty tariff (BM) is a tax levied on goods imported into Indonesia. BM rates vary depending on the type of goods being imported and are regulated by the Ministry of Finance. BM tariffs are aimed at protecting domestic industry and stimulating the production of domestic products.

2) Value-Added Tax

   Value-added tax (VAT) is a tax levied on the added value of goods or services at each stage of production or sale. VAT is also levied on imported goods into Indonesia. VAT is a source of government revenue.

3) Import Income Tax

   Import income tax (import PPh) is a tax levied on income from the importation of goods or services. Import PPh is calculated from the price of imported goods or services and is set by the importer.

4) Preferential Tariff Policy

   Preferential regulations grant special duties or discounts on goods imported from aparticular country. The policy aims to increase

trade between countries and strengthen economic ties between Indonesia and partner countries.

Import taxes play an important role in Indonesia's trade policy. The taxes not only provide state revenue but also protect domestic industry from unhealthy competition from imported goods. However, it should also be noted that import tax policies must be carefully and proportionately regulated so as not to disrupt trade relations between countries or worsen the global economic situation.

e. Import duty exemption

Governments can waive import duties on imports of renewable energy-related goods, such as solar panels and wind turbines, to make investment costs more affordable. Indonesia's Import Duty Waiver (BM) is a government policy that reduces import taxes on certain goods imported into Indonesia. BM exemptions are granted in various forms, including:

1) Exemption from import duties on imports of capital goods

   The government provides BM exemption for the import of capital goods to meet the needs of businesses, increase production, and expand their operations. The BM exemption for capital goods imports is aimed at promoting investment and industrial development in Indonesia.

2) Exemption from import duties on basic foodstuffs

   The government has provided BM exemption for the import of essential items such as rice, sugar, and edible oil. The BM exemption on imports of essential goods is aimed at maintaining the availability of essential goods in the domestic market and curbing inflation.

3) Exemption from import taxes on imports of raw materials

   The government exempts the import of raw materials for manufacturing products in the country from BM. The BM exemption for raw material imports is aimed at promoting domestic production and increasing the competitiveness of domestic industry.

4) Exemption from import duties on imports of special goods

The government provides BM exemptions for the import of special goods such as medicines and medical devices. The BM exemption for imports of special goods is intended to improve public health and welfare.

Import duty exemption in Indonesia is one of the government's measures to promote economic growth and improve the welfare of the people. However, exemptions from import duties must be carefully and proportionately regulated to avoid disrupting trade between countries or harming domestic industries.

4. Program for the Acceleration and Expansion of New and Renewable Energy Development

This program aims to increase the production of renewable energy and reduce dependence on fossil energy (Pan & Dong, 2023). The challenges associated with new and renewable energy are indeed quite draining of funding. A tough challenge for the current transition is creating opportunities for renewable resources to expand their contribution to the power generation mix. Figure 6.2 shows that, in 5 years from 2015 to 2020, renewable energy had increasing shares in the national energy mix.

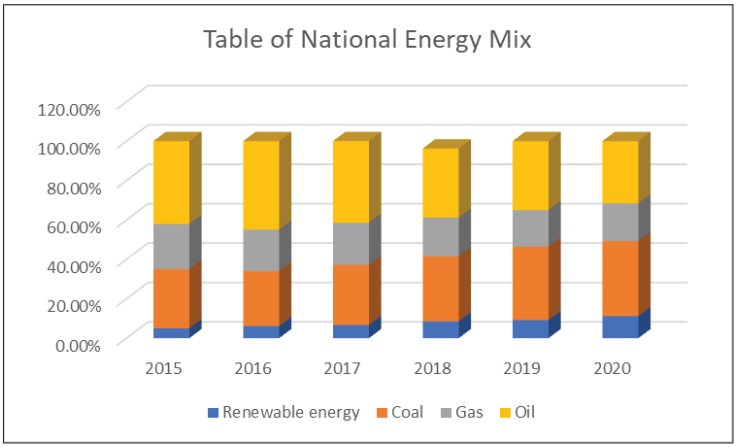


Figure 6.2 Development of NRE Share in the National Energy Mix

The Indonesian government has set a target to increase new and renewable energy use in the national energy mix to 23% by 2025 (Swainson & Mahanty, 2018), in line with global efforts to reduce greenhouse gas emissions and dependence on fossil fuels. To accelerate and expand NRE development in Indonesia, several steps can be taken, including increasing investment in new and renewable energy, encouraging technological innovation, improving regulation and supervision, increasing public awareness, and encouraging public-private partnerships. Emission reductions require the application of different clean energy technologies, such as hydrogen and hydrogen-based fuels, electrification of some industrial processes, and carbon capture, utilization, and storage (CCUS). By 2060, approximately 190 Mt CO_2 was extracted by CCUS, nearly one-third of current emissions. The total power generation devoted to hydrogen production is about 220 kW in 2060, almost as much as the total demand today across all sectors.

Energy is a fundamental resource that drives our modern society (Kasali, 2016). However, how we generate and consume energy has significant implications for the environment and our future (Logman, 2019). Reinventing energy means finding new and sustainable ways to power our homes, businesses, and transportation systems that reduce greenhouse gas emissions and preserve natural resources.

Renewable energy sources, such as solar, wind, geothermal, and hydropower, can reduce dependence on fossil fuels and lower carbon emissions. Governments and companies worldwide are investing in renewable energy technologies to meet their energy needs sustainably. Energy storage technologies, such as batteries and pumped hydro storage, can store excess energy generated by renewable sources for later use, ensuring a steady electricity supply. Energy efficiency measures can reduce energy consumption by increasing the efficiency of buildings, equipment, and transportation, reducing overall energy demand, and lowering carbon emissions.

A smart grid is a modern electricity grid that monitors and optimizes energy usage in real time, integrating energy storage, renewable

energy sources, and electric vehicles. Carbon sequestration and storage (CCS) systems store underground carbon dioxide emissions from industrial operations, reducing greenhouse gas emissions. Reinventing energy requires collaboration from governments, companies, and individuals.

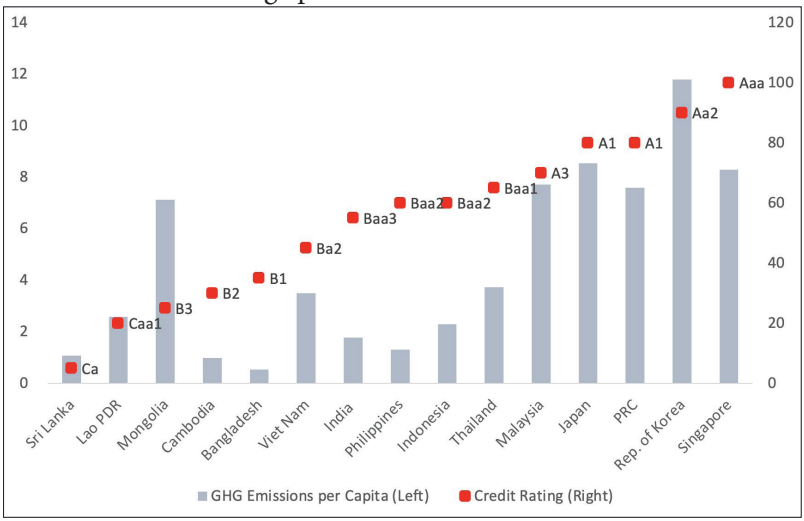
Governments can provide incentives and regulations to encourage renewable energy technologies, companies can invest in research and development, and individuals canreduce energy consumption by adopting energy-efficient behaviors and supporting sustainable energy policies. These steps aim to accelerate renewable energy development in Indonesia and help achieve the national energy mix target.

C. Proposal for a future Indonesian Renewable Energy financial policy scheme

The idea that financing renewable energy is more expensive than financing fossil energy is beside the point. This is because fossil energy cost calculations only account for fossil energy and do not account for future impacts. Impacts include the loss of green space due to land clearing for coal exploration, air pollution from the burning of coal in power plant turbines, and the process of transporting coal by ships that fall into the ocean after being hit by waves, leading to marine pollution and other negative effects (Ramirez et al., 2022).

Excluding the People's Republic of China, EMDEs account for approximately 70% of the world's population, yet only 20% of global clean energy investment comes from these countries. This indicates a lack of private capital due to economic, political, and exchange rate threats. Blended financing could benefit these countries by providing more public funding initially and gradually reducing funding as private capital increases based on track record and project expertise (Shirai, 2023). Through grants, technical assistance, loans, guarantees, and equity investments, public funds can reduce the risks borne by private investors.

Figure 6.3 shows Asia's per capita greenhouse gas emissions and sovereign debt valuations. Emissions-intensive countries with lower credit ratings may find it more difficult to attract private investment and require more public funding. Blended financing may not be suitable for low-income countries under severe debt pressure. These countries could consider climate change debt exchanges and subsidies based on climate change performance.



Note: The sovereign credit rating is adjusted to a numerical number ranging from 0 to 100.
Source: Shirai (2023)

Figure 6.3. Asia's Per Capita GHG Emissions (tons of CO_2 equivalent) and Sovereign Credit Ratings

A collective financing instrument called Just Energy Transition Partnership (JETP), announced at COP 26 in 2021, will help EMDE meet greenhouse gas reduction targets by replacing coal-fired power plants with clean energy sources. The Glasgow Financial Alliance for Net Zero Working Group is a coalition made up of Bank of America, Citi, Deutsche Bank, HSBC, MUFG, and Standard Chartered, as well as the UK, Germany, Japan, France, United States, and European Union, and others have pledged to fund on behalf of developed countries. They are also working together to mobilize funds from other public

and private funds to meet their commitments. Agreements were reached with South Africa in 2021 worth $8.5 billion, in 2022 with Indonesia and Vietnam worth $20 billion, and in 2023 with Senegal worth €2.5 billion. Beneficiary countries need to develop plans to reduce their dependence on coal and ensure a smooth transition for affected companies and employees (Shirai, 2023).

Indonesia needs to build a financing system for renewable energy from upstream to downstream. Improving the efficiency of renewable energy financing in Indonesia also requires funding for renewable energy research. Policies to phase out coal-fired power plants should be replaced with renewable energy power plants. Currently, the construction of renewable energy power plants requires large amounts of capital and mutual cooperation from all involved parties to ensure the availability of energy from renewable sources.

Financing renewable energy is very complex, given that this policy requires political will and commitment from national leaders. So far, renewable energy is still financed from the national budget. If we look at a country like China, they have policies in the following areas: (1) energy saving and environmental protection industry; (2) clean manufacturing; (3) clean energy industry; (4) fields related to ecology and the environment; (5) sustainable infrastructure development; (6) environmentally friendly services (Ling et al., 2022). Meanwhile, the European Union commissioned her EU Technical Expert Group on Sustainable Finance to issue a final report on his EU classification (Lenaerts et al., 2022). They implement green finance for renewable energy through private and government investment programs in the form of green bonds determined by several project financing criteria (Wang et al., 2022).

We need to implement some of these plans and consider a few things. First, the concept and the NRE project being built must be carefully planned. Both from a development, risk mitigation, and operational perspective. Second, technology is essential because its use in NRE development also affects the level of funding. Third, project demand and location also influence financing levels. A weak market

prevents one from making EBT loans in locations with low demand. On the other hand, regions with high demand can definitely expect stable EBT economic sales, so many investors will be interested in raising funds. Fourth, the price of electricity and the development of NRE must also take into account the cost of electricity. They assume that the NRE development capital is quite large.

Previously, foreign funds were more dominant in financing democracy, but now the direction of foreign funds has changed. However, today, these developed countries have an increasing tendency to finance the energy transition, especially in the application of development law, as this concept aims to advance the issue of energy transition, and today there is a lot of activity and funding from around the world. One example is the birth of Presidential Decree 112/2022, which was created to disburse $20 billion in international funds (Susanty et al., 2022). The terms of this loan can be fluid, with regulations and guarantees from governments committed to implementing the energy transition. Moreover, the government is also currently trying to increase the number of PLTUs retiring (Fitrady et al., 2021).

The proposals we would like to put forward concern renewable energy financing assessed on the basis of the resulting carbon footprint and measurement of private investment on an environmental, social, and governance (ESG) basis. As regulators, governments must be able to bridge the gap between renewable energy suppliers and financiers. Both funds are provided by the government and the private sector (Sun et al., 2023). Green energy and renewable energy support projects need to take into account the framework conditions of the energy and economic sectors, particularly reflecting the Indonesian government's commitment to efforts to reduce national emissions and adapt to the effects of climate change. The government aims to reduce greenhouse gas emissions by 41% with international support through climate finance, or 29% through business as usual, technology transfer, and capacity building from developed countries.

Table 6.2 Potential for Renewable Energy Funding in Indonesia

No	Types of Renewable Energy	Potency	Utilization	Location	Budget Requirements	Financing Potential
1	Geothermal energy	23,7 GW	2.343 MW (9,8%)	Sumatra, Java, Bali	$14 M	Ministries/Agencies BUMN/D Overseas Private
2	Wind energy	154.9 GW	23%	Sulawesi, Lombok, Java, NTT , Sumatra	$12 M	Ministries/Agencies BUMN Foreign and national private
3	Waterpower Energy	75.000 MW	7,572 MW (10%)	Java, Bali , Sumatra	$17.6 M	Ministry BUMN Overseas Foreign and national private
4	S o l a r Energy	4,8 KWh/ m2 atau 112.000 GWp	10 MWp	All islands in Indonesia	$40 M	Ministry BUMN Overseas Foreign and national private
5	Bioenergy	32,6 GW	10 GW	All islands in Indonesia	$10 M	CSR Overseas Foreign and national private WAQF Cash *Sukuk*

Source: Ditjen EBTKE (2022)

Table 6.2 shows the potential for renewable energy financing, which is available for both government-to-government (G to G), government-to-business (G to B), and business-to-business (B to B) investment programs, but still requires government oversight. Of course, the procurement of renewable energy meets the country's energy needs, but this energy can also be used for export to neighboring countries. Some new renewable energy financing models can be implemented through a number of mechanisms. Of course, there are advantages and disadvantages to this financing model, and we can learn from other countries' experiences in promoting renewable energy.

1. State Treasury Financing

Financing from national resources is what governments traditionally do. However, the number of problems facing the government means that the national budget is limited. However, funding from government budgets is an alternative, as is crowdfunding through both government-to-government and government-to-business projects. For example, the Ministry of Energy and Mineral Resources and the Provincial Government of Jambi have co-financed UNDP and BAZNAS with the equivalent of $350,000 and Jambi Bank's CSR funds worth $281,357 to generate a total of 180 kW of small hydropower for regeneration. This funding is a community idea made possible through a multi-party financial partnership. The concept of government funding does not have to be mandatory, and renewable energy can be financed in cooperation with other funding agencies. However, APBN's financing could act as an impetus for other lending institutions to co-finance the region's potential being developed for renewable energy at both micro and macro levels, as a government initiative towards the development of renewable energy.

2. International Funding

There are different types of international finance, including grants, and some borrow money. Foreign financing usually requires several clauses. For example, the government is committed to achieving the energy transition, which is why it issued Executive Order No. 112 of 2022 and signed the disbursement of $20 billion in global funds. The Indonesian government also signed an external financing agreement through thestate-owned electricity company to finance the development of pumped storage power plants in the Java-Bali system project worth USD 610 million and a capacity of 1,040 Megawatt (MW) units in 2022. This is in anticipation of the planned closure of several power plants in the Java-Bali region in 2025 and the net zero emissions target for 2060.

3. Sovereign Wealth Funds

A sovereign wealth fund (SWF) is an investment fund managed by a sovereign government that collects income from government-controlled assets (Kamiński, 2017). Most commonly, these funds are raised from the sale of natural resources for the purpose of investing in the interests of future generations, promoting government development goals, and/or serving as an economic stabilization tool. For example, what the United Arab Emirates did when it diverted revenues from its oil assets to finance the energy transition (Koch, 2022). This could serve as an example for Indonesia, where the government could encourage the Indonesian Investment Authority (INA) to facilitate a financing mix for new and renewable energy investments. Perhaps investing in renewable energy infrastructure could start with a blended financing model.

4. Banking Financing

Bank lending is traditional and has a long tradition of financing fossil fuels and renewable energy. Although the Indonesian financial industry remains subject to various obstacles, significant steps have been taken towards green lending from both banks and the government. Similarly, banks have begun to introduce various "green" requirements that take more account of the environmental aspects of lending. However, green finance efforts need to be accelerated.

Bank financing systems for new and renewable energy are very diverse. There is financing for infrastructure projects, green ecosystem capital financing in the energy sector, and *sukuk*. One of the banks that is currently stepping up green lending is UOB. With UOB's sustainable financing, companies that want to work on green energy can easily apply to UOB. The reason often lies in integrating sustainability concepts into business strategies. UOB's sustainable finance frameworks include the Green Trade Finance Framework, the Smart City Sustainable Finance Framework, the Real Estate Sustainable Finance Framework, and the Green Circular Economy Framework.

5. Green Bonds and Mutual Funds

Green finance schemes are currently being used as an alternative source of financing for low-carbon investments, including investments in the development and construction of renewable energy plants. The Indonesian government issued regulations on green bonds and green *sukuk* in 2017. Additionally, the Indonesian government launched a $3 billion green *sukuk* in 2018.

OJK said that as of the third quarter of 2021, the value of sustainable finance in Indonesia reached USD 55.9 billion or Rp809.75 trillion equivalents (exchange rate Rp14,440/USD). The issuance of green bonds in the domestic market was $35.12 million (Rp500 billion), representing 0.01% of the total outstanding bonds.

Meanwhile, the blended finance portfolio has received commitments worth $2.46 billion or Rp35.6 trillion. Regarding stock indexes related to governance and clean energy, the SRI-Kehati ESG Index showed its resilience during the pandemic and outperformed the Jakarta Composite Index (IHSG). In the banking sector, total loans related to sustainable finance amounted to $55.9 billion (Rs. 809.75 trillion).

6. Corporate social responsibility (CSR)

Corporate social responsibility can be a means of financing renewable energy. CSR of state-owned enterprises, domestic enterprises, and multinational private enterprises can be aimed at financing new renewable energy subsectors. Examples of CSR financing for renewable energy include financing biogas from household waste in Karang Asem, Bali, and energy-efficient and healthy stoves in Kulon Progo, Yogyakarta (Widjanarta, 2020).

7. Crowdfunding & Crowdsourcing

Crowdfunding, raised through public funds and charities, has the potential to be a highly effective resource for renewable energy financing (Ari & Koc, 2021). With an average share of 16% of total investments from 2018 to 2021, crowdfunding, especially through

debt-based models, has become an important source of financing in the energy access sector. The research highlighted in this report shows that in 2021, energy access projects raised $61.5 million on crowdfunding platforms, making it a record year for energy access crowdfunding (Cogan et al., 2022).

According to the findings of the Purnomo Yusugiantro Center (PYC), a large number of respondents are in the next generation. This research could provide a perspective for communities that increasingly support green projects and renewable energy. Based on the funding from the study, approximately 5,949.1 MW off-grid solar power plants could be built. This amount could also finance 830 micro-hydropower plants with a capacity of 10 MW, which, if installed, could help provide energy to frontier, outermost, and less-developed areas.

8. Funding of Waqf *Sukuk*

Indonesia, with a Muslim and religious population of about 230 million and a middle class of about 74 million, can raise money in the form of waqfs to fund new renewable energy. As was done in Jambi province, BAZNAS, as the institution that administers zakat and cash waqf for Indonesian Muslims, is able to raise funds through renewable energy financing, which has a social and economic impact on surrounding communities.

The potential of waqf in the Islamic social sector includes the waqf system with a potential of around Rs 217 trillion. For the government, WAQF is a very cheap source of funds to finance SDG projects. Waqf can be used to support the achievement of the Sustainable Development Goals (SDGs). Examples include reducing poverty, providing health and education facilities, providing clean water and adequate sanitation, improving the quality of education and sanitation, improving economic well-being, and reducing economic inequality (Swastika & El Maza, 2019). Waqf may also be used to finance new renewable energy mixes.

D. Closing

Despite policies to promote renewable energy development in Indonesia, many challenges need to be overcome, such as rising production costs and infrastructure limitations. Therefore, ensuring the success of accelerating renewable energy developmentin Indonesia requires cooperation between the government, investors, and the public.

Compared to non-green investments, green investments in Indonesia are still developing slowly. Compared to the nonrenewable energy sector, investment in renewable energy is low. Indonesia has several measures to promote green investment through legislation and government initiatives, including energy programs, sustainable landscapes, special economic zones, and a green climate fund. This tax system can reduce greenhouse gas emissions and air pollution while promoting the growth of green finance and renewable energy. However, governments must consider the impact of this tax system on industry and the economy and ensure that the tax system is consistent with national energy policy. The most important thing in the development of renewable energy is the financing sector and the government's capacity and commitment to make this energy transition work according to the prescribed goals.

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