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# Potential For Financing New Renewable Energy Solar Energy in Supporting Green Banking

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## Abstract

Indonesia, with great potential in the use of solar energy due to its position at the equator, has significant opportunities in developing the renewable energy sector. This journal will explore the potential of solar energy financing in supporting green banking initiatives in Indonesia. Through an analysis of government policies, economic benefits and environmental impacts, this journal and journal highlights how solar energy can contribute to sustainable development and carbon emission reduction. The banking sector has a key role in providing various financing products for solar energy projects. These products include green investment loans, People's Business Loans for small and medium enterprises and the issuance of green bonds. Solar energy financing is not only profitable from an environmental perspective but also offers portfolio diversification and improved bank image. The journal identifies key challenges in the implementation of solar energy financing, such as high initial costs and lack of public understanding as well as offering solutions such as education and attractive financing schemes. By harnessing the potential of solar energy, banks in Indonesia can support the transition to a green economy and contribute to climate change mitigation.

## Keywords

Green Banking, New Renewable Energy, Solar Energy.

## 1. Introduction

In an increasingly complex era of globalization, sustainability and corporate social responsibility have become important for various industries, including the banking sector. The concept of Environmental, Social and Governance (ESG) has become the main benchmark in assessing the sustainability performance and operational ethics of an institution (Lalon, 2015; Hoque et al., 2019). The implementation of ESG principles in banking not only enhances reputation and credibility, but also makes a real contribution to environmental preservation and social welfare. Indonesia is located on the equator, so Indonesia has abundant solar energy sources with a solar radiation intensity of around 4.8 kWh/m2 per day throughout Indonesia (Bahl, 2012; Hidayat,2018). With the abundance of solar energy sources that have not been utilized optimally, while on the other hand there are some areas of Indonesia that have not been electrified because the PLN power grid does not reach them, so Solar Power Plants (PLTS) with their modular and easy-to-move systems are one of the solutions that can be considered as one of the alternative power plants. Unfortunately, the cost of solar power generation is still more expensive when compared to the cost of generating conventional power plants, because until now the main tool to convert solar energy into electrical energy (photovoltaic modules) is still equipment imported from abroad (Grover & Kaur, 2019).

Although the use of solar power plants has not been optimal, it has been widely used in housing or often called Solar Home System (SHS), water pumps, televisions, communications in several regions of Indonesia, especially in remote areas that are far from PLN's electricity range. Solar power plants are environmentally friendly technology because they do not release pollutants like fossil power plants (Rahardjo, 2005). Along with economic growth and population increase, energy needs in Indonesia continue to increase. Conventional energy such as fossil fuels is not only limited in source, but also has a negative impact on the environment (Jayabal & Soundarya, 2016). Therefore, more sustainable and environmentally friendly energy solutions are needed. The Ministry of Energy and Mineral Resources, Directorate General of New Renewable Energy and Energy Conversion (EBTKE), on January 17, 2022 said that the capacity of the latest power plants (PLT NRE) in 2021 reached 11,157 Megawatts. This capacity is below the target set for the year, which is 11,357 Megawatts (MW). Several efforts have been made by the Ministry of Energy and Mineral Resources to increase the NRE mix to reach 23% by 2025, including the completion of the Draft Presidential Regulation (Peraturan Presiden/Perpres) on NRE Prices, the implementation of the Ministerial Regulation (Peraturan Menteri/Permen) of Energy and Mineral Resources for rooftop solar PV, mandatory BBN, the provision of Fiscal and Non-Fiscal incentives for NRE, ease of business licenses, and encouraging demand for electrical energy, for example for the needs of electric vehicles and electric stoves (Aubhi, 2016; He et al., 2019).

The Indonesian government has shown a strong commitment to increasing the use of renewable energy through various policies and regulations. Programs such as the National Energy General Plan (RUEN) and the Presidential Regulation on New and Renewable Energy (NRE) show policy directions that support the development of solar energy. The use of solar energy is widely used for household appliances, for example water heaters. In addition, because the heat temperature produced is not too high (up to 90°C), thermal solar is widely used for drying various agri-food commodities, fisheries, plantations, and small industries (Aulia Masyithah, Hariyadi, Hendra, Burhanudin, 2021). The banking sector has an important role in supporting the financing of renewable energy projects. By providing appropriate financing schemes, banks can help overcome financial barriers that are often a major barrier to the development of solar energy projects (Miah et al., 2021).

The development of solar energy not only offers economic benefits in the form of reduced energy costs in the long term, but also environmental benefits by reducing greenhouse gas emissions and air pollution (Rahman et al., 2023). This is in line with the goals of sustainable development and climate change mitigation. While there are many benefits, solar energy financing also faces various challenges such as high initial costs, lack of public awareness, and technological risks. However, with the right approach, these challenges can be overcome, and great opportunities can be leveraged to drive the growth of the renewable energy sector. The writing of this journal aims to identify and analyse the financing potential of renewable energy, especially solar power in supporting green banking in Indonesia by providing a comprehensive overview, this journal is expected to be a reference for policymakers, industry players and financial institutions in encouraging the development of renewable energy in Indonesia.

## 2. Method

The methodology can be adjusted with a focus on existing green banking initiatives and the financing potential of solar energy projects in Indonesia. This research can be started by examining policies related to NRE by collecting and analysing academic literature, industry reports and policy documents, such as: annual bank reports, energy industry statistics, government policy reports and other relevant publications so that clear hypotheses can be formulated, such as: what is the market potential for solar energy financing in the Indonesian banking sector and the obstacles and opportunities faced by banks in financing solar energy projects.

## 3. Result and Discussion

New renewable energy financing, including solar energy, has great potential in supporting green banking. Green banking in banking that supports environmental sustainability by financing environmentally friendly projects. The Ministry of Energy and Mineral Resources, Directorate General of New Renewable Energy and Energy Conversion (EBTKE), on January 17, 2022, said that the capacity of the latest power plants (PLT NRE) in 2021 reached 11,157 Megawatts. This capacity is below the target set for the year, which is 11,357 Megawatts (MW) (renewableenergy.id, 2024). The following is a graph of NRE power plant capacity.

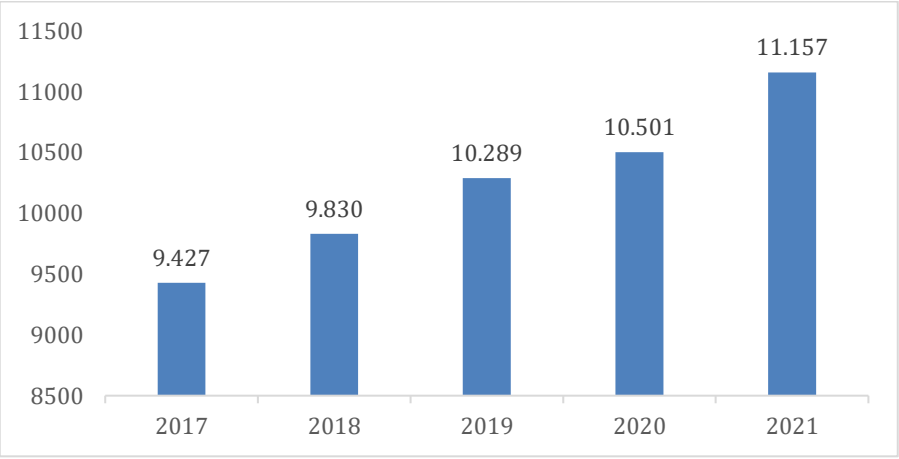


**Figure 1.** NRE Power Plant Capacity

### *3.1. Potential Solar Energy Source*

Solar energy is one of the most abundant and sustainable sources of renewable energy. The sun prepares enough energy to meet global energy needs several times. The potential for solar energy in Indonesia is very large, which is around 4.8 KWh/m2 or equivalent to 112,000 GWp, but only about 10 MWp has been utilized. Currently, the government has issued a roadmap for the use of solar energy which targets the installed capacity of Solar Power Plants (PLTS) until 2025 to be 0.87 GW or around 50 MWp/year. This number illustrates the picture of considerable market potential in the development of solar energy in the future (esdm.go.id, 2012). Indonesia has a very large NRE resource capital consisting of various NRE sources. NRE resources are abundant and scattered with the potential to reach 3680 GW which can be optimized to supply national energy needs in the future. Meanwhile, in the energy transition roadmap, Indonesia has determined that the construction of power plants after 2030 will only come from NRE sources. It is projected that by 2060, the installed capacity of NRE plants will reach 350GW with Solar Power Plants (PLTS) increasing significantly starting in 2030 (ebstke.esdm.go.id, 2024). The portfolio composition of financing (loans and bond & stock issuance) of fossil energy and renewable energy companies, it can be seen that financing for renewable energy is still quite low. Of the total financing reaching US$25 billion between 2016 and June 2022, financing for the fossil energy sector is still very large.

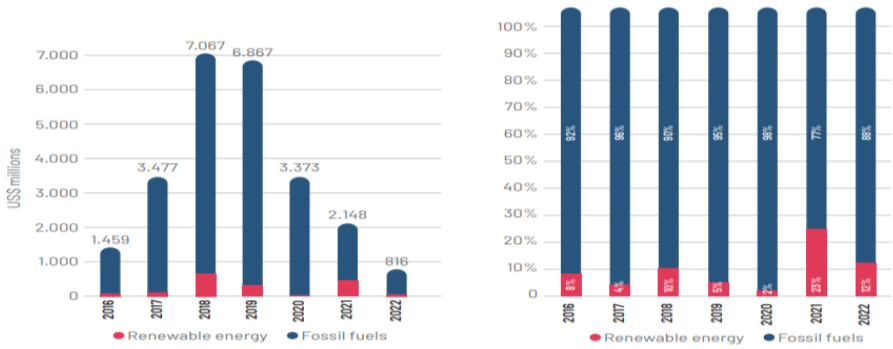


**Figure 2.** Total Loans and Issuance of Shares & Bonds to Fossil and Renewable Energy Companies (2016 – 2022)

### *3.2. Increasingly Affordable Technology*

The cost of solar panel technology has declined drastically in recent years. This makes solar energy projects more economical and attractive to investors. The main component of the solar PV system using photovoltaic technology is solar cells. Currently, there are many technologies for manufacturing solar cells. Conventional solar cells that are already commercial today use crystalline silicon wafer technology whose production process is quite complex and expensive. In general, the manufacture of conventional solar cells begins with a silica purification process to produce solar-grade silica (ingot), followed by cutting the silica into silica wafers. Next, silica wafers are processed into solar cells, then solar cells are arranged to form solar modules. The last stage is to integrate the solar module with BOS (Balance of System) into a solar PV system. BOS is a supporting component used in solar PV systems such as inverters, batteries, control systems, and others (esdm.go.id, 2012).

### *3.3 Diverse Project Scales*

Solar energy projects can vary from small-scale (such as rooftop installations) to large-scale (such as commercial solar power plants). This provides flexibility in financing. The installation of this rooftop solar power plant can technically reduce the cost of monthly electricity bills by around 30% of PLN's electricity consumption.

This depends on the power capacity of the rooftop solar power plant installed and the electricity consumption each month. Even if there is an excess of electricity, 65% of the value of kWh exported becomes a reduction in the next month's electricity bill, taking into account distribution costs and PLN's generation costs of around 2/3 of the electricity tariff price. In addition, the value of 35% is considered as compensation for the cost of storing electricity from rooftop solar power at PLN. Seeing the efficiency and maintaining the sustainability of PLN's business, the capacity of the Rooftop Solar PV system is limited to a maximum of 100% of the connected power of PLN consumers. On the basis of these savings, the results of the Advocacy and Education analysis of the Indonesian Solar Energy Association (AESI) stated that rooftop solar PV investment is considered more attractive than deposit interest. Of course, this condition is accompanied by support from the banking sector so that it becomes an initiative in the development of renewable energy in Indonesia. This support has at least been provided by PT Bank Rakyat Indonesia (BRI) by signing a memorandum of understanding with the National Energy Council (DEN) and PT Len Industry (Persero). The Himbara Bank (a group of state banks) is committed to financing the installation of rooftop solar power plants with low interest rates and loan terms of up to 15 years. Solar energy itself has the greatest potential in Indonesia, which is around 207.8 GW. The government also targets an additional 138.8 MW power plant from Solar Power Plant. This addition is in line with the target value of NRE investment in 2021 to USD2.05 billion or around IDR 28.9 trillion (assuming an exchange rate of IDR 14,100 per dollar) or up from the 2020 investment achievement of USD1.36 billion or around IDR 19.2 trillion.

Despite the great potential, there are major challenges in the implementation of solar energy financing, including the high initial cost of the initial installation of solar panels and the lack of public understanding of the benefits of solar energy which makes them hesitant to invest in the technology. In addressing these challenges, the banking sector contributes to sustainable development through approaches in supporting solar energy financing, as follows:

1. Offering Special Financial Products
    - Solar Energy Loans: Banks can offer low-interest loans or special subsidies for solar panel installation projects, whether for residential, commercial, or industrial.
    - Green Mortgages: Mortgage products that offer incentives to homebuyers who choose to install solar panels on their properties.
    - Leasing and Power Purchase Agreements (PPAs): Banks can provide leasing services for solar energy systems, or facilitate power purchase agreements (PPAs) that allow users to pay for the solar energy they use from systems owned by third parties.

2. Green Bonds
   Issuance of Green Bonds: Banks can issue green bonds to raise funds that will be used for renewable energy projects such as solar panel installations. Investors who buy these bonds support the development of clean energy and receive competitive returns.
3. Partnerships and Collaborations
    - Cooperation with Solar Energy Companies: Banks can partner with companies that provide solar energy solutions to offer attractive financing packages to consumers and businesses.
    - Government Subsidy Programs: Banks can work with governments to take advantage of subsidies and incentives available for renewable energy projects.

4. Education and Awareness

- Customer Education: Banks can educate customers about the benefits of solar energy and how they can access financing for solar panel installations.
- Awareness Campaigns: Banks can hold campaigns to raise awareness of the importance of renewable energy and how society can contribute through the use of solar energy.

5. Technological and Process Innovation
   - Fintech utilization: Banks can leverage financial technology to simplify the application and valuation process of solar energy loans, as well as to improve administrative efficiency.
   - Data Analytics: Use data and analytics to assess the potential and risks of solar energy projects, as well as to monitor the performance of projects that have been financed.

6. Operational Support and Internal Policies
   - Implementation of Solar Energy in Bank Offices: Banks can lead by example by installing solar panels in their offices, which not only reduces operational costs but also demonstrates their commitment to sustainability.
   - Green Policy: Adopt internal policies that support green practices and encourage staff to participate in green initiatives.

7. Economic and Environmental Benefits
   - Reduced Energy Costs: The use of solar energy can help reduce long-term energy costs for customers, which can increase their purchasing power and financial stability.
   - Carbon Emission Reduction: Investments in solar energy help reduce carbon emissions and support global efforts to combat climate change.

By adopting these approaches, the banking sector can play a key role in promoting and supporting the adoption of solar energy, which in turn will support green banking initiatives and contribute to a more sustainable future. The results of the upgrade carried out on 10 banks in Indonesia related to financing to fossil energy and renewable energy in the period 2016 – 2022 show that the average for renewable energy is still below 20%. Of all loans and underwriting, some are dominated by Bank Mandiri, BRI and BNI.

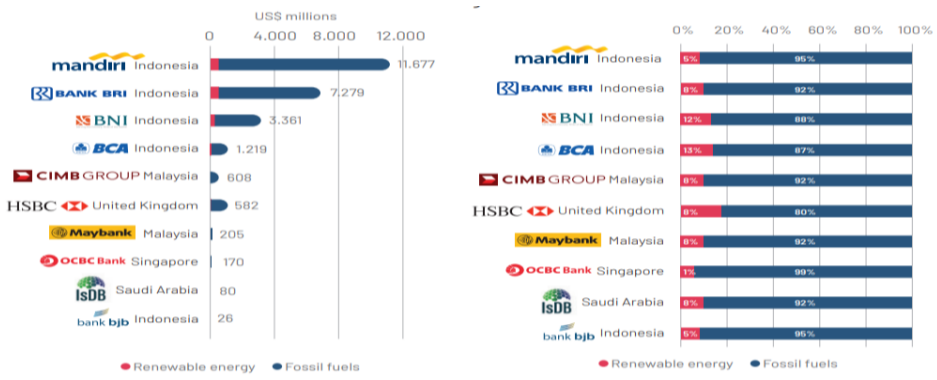


**Figure 3.** Ranking of 10 Banks in Indonesia related to fossil and renewable energy financing

In Figure 2, it can be seen that throughout 2016-2022, Bank Mandiri distributed financing of up to US$ 11.68 million with a proportion of around 95% for financing the fossil energy sector and 5% for renewable energy. As for BRI, the total financing disbursed reached US$7.28 million with a share of 92% for fossil energy financing and 8% for renewable energy financing. Based on the Sustainability Report from each bank in Indonesia, such as Bank Mandiri, BRI and BNI, it can be seen that the contribution to sustainable development through sustainable financial performance in supporting green banking in Indonesia is:

1. Bank Mandiri
   Until December 2023, Bank Mandiri has disbursed Sustainable Financing according to the Sustainable Business Activity Category (KKUB) of IDR 264.08 trillion or 18.8% of total loans and increased by 15.4% YoY, but for renewable energy financing it is only IDR 9.7 trillion. In addition, in 2023 Bank Mandiri will also launch Phase 1 green bond instruments amounting to IDR 5 trillion (Sustainability Report, 2024)

2. Bank Rakyat Indonesia (BRI)
   In 2023, BRI has disbursed Sustainable Financing of IDR 777.28 trillion or 67.11% of BRI's total corporate bond loan and investment portfolio, but for renewable energy financing it is only IDR 6.02 trillion. BRI launches environmentally friendly bonds of IDR 8.5 trillion (Sustainability Report, 2024)

3. Bank Negara Indonesia (BNI)
   Total green loans (Environmentally Friendly Business Activities / KUBL) at the position of December 31, 2023 amounted to IDR 67.8 trillion or 9.8% of total loans, but for renewable energy financing of IDR 10.2 trillion. BNI has allocated 77% of the proceeds of green bonds to 5 sectors, namely: 61.8% for Sustainable Transportation; 15.3% for waste management into energy and waste management; 11.2% for renewable energy; 10.3% for environmentally friendly buildings and 1.4% for sustainable natural resource use and land use (Sustainability Report, 2024)

## 4. Conclusion

The financing potential for renewable energy, especially solar energy, is still very large, but the banking sector still finances renewable energy projects on a relatively small scale. With innovative and sustainable strategies and approaches, such as: offering special financial products, issuing green bonds, collaborating with solar energy companies or government subsidy programs, educating customers, utilizing technological innovations and internal policies, it is hoped that the banking sector can be more optimal in supporting renewable energy financing, especially solar energy. This will bring great benefits not only to banks and customers but also to the environment and long-term economic sustainability.

## References

Aubhi, R. U. (2016). The evaluation of green banking practices in Bangladesh. *Research Journal of Finance and Accounting*, *7*(7).

Aulia, M. A, Hariyadi., Hendra, S. P. (2021). *Pembangkit Listrik Tenaga Surya Bagi Pembangunan Berkelanjutan.* Jakarta Pusat: Pusat Penelitian Badan Keahlian Setjen DPR RI.

Bahl, S. (2012). Green banking-The new strategic imperative. *Asian Journal of Research in Business Economics and Management*, *2*(2), 176-185.

Grover, S., & Kaur, H. (2019). Green banking: A strategic response to environmental turbulence. *Journal of Management Research and Analysis*, *6*(2), 120-123.

He, L., Liu, R., Zhong, Z., Wang, D., & Xia, Y. (2019). Can green financial development promote renewable energy investment efficiency? A consideration of bank credit. *Renewable Energy*, *143*, 974-984.

Hidayat, N. (2018). Green Banking: How to Enhance Banking Policy on Sustainable Development, Renewable Energy, and Biodiversity in Indonesia. *Indonesian Journal of Islamic Economics and Finance*, *1*(1), 54-68.

Hoque, N., Mowla, M., Uddin, M. S., Mamun, A., & Uddin, M. R. (2019). Green banking practices in Bangladesh: a critical investigation. *International Journal of Economics and Finance*, *11*(3), 58-68.

Jayabal, G., & Soundarya, M. (2016). Green banking: As banks initiative for Sustainable development. *International Journal of Management (IJM)*, *7*(7), 276-280.

Kementrian Energi dan Sumber Daya Mineral. (2012). *Matahari Untuk PLTS di Indonesia*. Available at: https://www.esdm.go.id/id/media-center/arsip-berita/matahari-untuk-plts-di-indonesia

Lalon, R. M. (2015). Green banking: Going green. *International Journal of Economics, finance and management sciences*, *3*(1), 34-42.

Miah, M. D., Rahman, S. M., & Mamoon, M. (2021). Green banking: The case of commercial banking sector in Oman. *Environment, Development and Sustainability*, *23*, 2681-2697.

Pahlevi, Reza. (2022). *Kapasitas Pembangkit Listrik EBT Capai 11.157 MW pada 2021*. Diambil Available at: https://databoks.katadata.co.id/datapublish/2022/01/25/kapasitas-pembangkit-listrik-ebt-capai-11157-mw-pada-2021#:~:text=Kementerian%20ESDM%20mencatat%20kapasitas%20pembangkit,sebesar% 2011.357%20MW%20untuk%202021

Perkumpulan PRAKARSA. (2022). *Melacak Kemajuan Sektor Perbankan dalam Pembiayaan*

Rahardjo, I., & Fitriana, I. (2005). Analisis potensi pembangkit listrik tenaga surya di Indonesia. *Strategi Penyediaan Listrik Nasional Dalam Rangka Mengantisipasi Pemanfaatan PLTU Batubara Skala Kecil, PLTN, dan Energi Terbarukan, P3TKKE, BPPT, Januari*, 43-52.

Rahman, M. H., Rahman, J., Tanchangya, T., & Esquivias, M. A. (2023). Green banking initiatives and sustainability: A comparative analysis between Bangladesh and India. *Research in Globalization*, 100184.

*Transisi Energi Indonesia untuk Mempercepat Net Zero Emission*. Jakarta: Perkumpulan Prakarsa.