

Implementation of Renewable Energy Policy: A Case Study of Solar Panel Electricity on DPR RI

Waluyo¹, M. Baharudin Zubakhrum Tjenreng²

^{1,2}Institut Pemerintahan Dalam Negeri, Sumedang, Indonesia

Email: dip.13.818@ipdn.ac.id

Abstract

The implementation of renewable energy policies in public institutions is crucial to achieving national energy transition goals. This study examines the solar rooftop photovoltaic (PV) project at the Indonesian House of Representatives (DPR RI) as a concrete example of policy realization. Through a qualitative case study approach, supported by document analysis and literature review, the research analyzes how the DPR project operationalizes Presidential Regulation No. 22/2017, which mandates the use of solar panels on at least 30% of government building rooftops. The project, implemented via a public-private partnership, achieved an installed capacity of 1.955 MWp, supplying approximately 25% of the DPR's electricity demand and generating annual savings of over Rp 4 billion. It also contributes to national emissions reduction by avoiding more than 2,000 tons of CO₂ annually. The findings highlight the effectiveness of leadership-by-example strategies, the role of supportive regulations (such as net metering), and the viability of innovative financing models in overcoming barriers to renewable energy adoption. This case underscores the importance of consistent policy frameworks and suggests replicability across other government institutions as a key strategy for accelerating Indonesia's renewable energy transition.

Keywords: *Renewable Energy Policy, Solar PV, Energy Transition.*



A. INTRODUCTION

The global urgency to transition away from fossil fuels toward renewable energy has become increasingly critical in the face of escalating climate challenges. As a signatory to the Paris Agreement, Indonesia has responded by setting ambitious renewable energy targets through its national energy policy framework. One of the key milestones outlined in the National Energy Plan (RUEN), mandated under Presidential Regulation No. 22 of 2017, is to achieve a 23% renewable energy share in the national energy mix by 2025. However, by 2023, this goal remained significantly out of reach, with fossil fuels still accounting for approximately 81% of national electricity generation (Belva & Raspati, 2024). This gap between target and realization has led the government to consider revising the 2025 target downward to 17–19%. Achieving either the original or revised targets requires consistent and robust implementation of renewable energy policies across all levels of society and government (Prawiyogi & Anwar, 2023).

Indonesia's renewable energy development strategy includes not only utility-scale power generation projects but also decentralized solutions, such as rooftop solar photovoltaic (PV) systems installed on residential and public buildings (A'yun & Heryanti, 2024). To promote this, the government launched initiatives like the "One

Million Rooftop Solar" movement and introduced net metering regulations, encouraging households and businesses to adopt solar energy technologies. A vital component of this strategy is the government's commitment to lead by example, mandating state institutions to integrate renewable energy within their facilities. By showcasing the technical feasibility and economic benefits of solar energy adoption, public-sector projects are expected to inspire broader uptake among private sector actors and the general public (Fadjeri et al., 2024; Kurniawan et al., 2024).

In this context, the House of Representatives of the Republic of Indonesia (DPR RI) initiated a landmark rooftop solar project within its parliamentary complex. This initiative not only serves as a practical embodiment of the national renewable energy policy but also symbolizes institutional commitment to sustainable energy transition (Gombo et al., 2024; Soetadji & Khoirudin, 2024). An aerial view of the DPR RI "Energy Park" in Senayan, Jakarta reveals a striking solar panel installation arranged in a circular monument configuration, adorned with the national emblem, Garuda. This symbolic design represents Indonesia's commitment to energy sovereignty and sustainability. The solar photovoltaic (PV) panels are mounted on canopy structures surrounding the park's perimeter, seamlessly integrated into the landscape as part of a green building concept. The installation supplies a significant portion of the parliament's daytime electricity demand, serving as a tangible example of renewable energy adoption within a government institution (Bakar et al., 2024; Boesrony, 2023; Fadhilah et al., 2023).

B. LITERATURE REVIEW

1. Renewable Energy Policy Frameworks

Implementing renewable energy requires a supportive policy framework encompassing regulatory mandates, financial incentives, and institutional initiatives. Globally, common policy instruments include feed-in tariffs or tariff premiums, renewable portfolio standards, net metering schemes, tax incentives, and government-led demonstration projects. In Indonesia, the policy landscape has gradually evolved over the past decade to promote clean energy, though not without challenges. The National Energy Policy (KEN 2014) and its derivative, the National Energy Plan (RUEN), issued under Presidential Regulation No. 22 of 2017, established strategic goals to reduce reliance on fossil fuels and increase the share of renewables in the national energy mix (Hutabarat & Faizin, 2023.; SETO & PRATOMO, 2023; Susan, 2023).

One particularly progressive feature of RUEN 2017 is the mandate requiring government buildings to utilize solar photovoltaic (PV) systems on at least 30% of their rooftop area (Rismanto, 2024; Wibowo, 2024). This regulation positions the public sector as a catalyst for early adoption. By obligating ministries, agencies, and government offices to install solar panels, the policy seeks to generate demand for solar technology and normalize its use within society. This approach reflects a "leadership by example" strategy, whereby the government models its commitment to renewable energy through its own operational practices. Independent analysts

have supported this strategy; for example, a policy review recommended that “all government building should install [rooftop solar]” as a means to accelerate broader adoption. Installing solar PV systems in prominent public institutions serves not only to demonstrate technical feasibility but also to raise public awareness and reduce costs through economies of scale (Lasaksi et al., 2023; Purba, 2024; Saputra et al., 2023).

2. Solar PV in Government Buildings

Utilizing solar photovoltaic (PV) systems on public buildings is supported by both environmental and economic rationale. Public facilities such as offices, schools, and government institutions typically have expansive rooftop areas and daytime electricity consumption profiles that align closely with solar generation peaks. This makes them ideal candidates for rooftop solar installations, as most of the energy produced can be self-consumed during operational hours, maximizing efficiency and minimizing the need for battery storage. Furthermore, rooftops represent unused physical space with no competing land-use demands, allowing solar modules to generate clean energy without sacrificing productive land (Afif et al., 2023; Sitepu, 2024).

From a policy and fiscal perspective, installing solar panels on government buildings offers immediate benefits in the form of reduced electricity expenditures an appealing prospect for budget-conscious public finance managers. Over time, these cost savings can be substantial and redirected toward other essential public services. For instance, the rooftop solar project at the Indonesian House of Representatives (DPR RI) was projected to save approximately IDR 4 billion annually by offsetting part of its power needs from the state electricity utility (PLN) with solar energy. In addition to financial advantages, public-sector PV projects contribute directly to Indonesia’s renewable energy targets and climate commitments. As of 2022, Indonesia's total installed rooftop solar capacity was still modest, around 80 MWp, increasing to 141 MWp in 2023. Therefore, every large-scale solar installation especially on prominent government buildings represents a significant contribution to national progress in clean energy (Alamsyah, 2024; Riaz, 2024; Taufiqurrohman & Yusuf, 2022).

Moreover, such projects help stimulate the domestic solar industry by creating demand for local equipment, skilled labor, and maintenance services. However, sustainability transition literature highlights the persistent challenge posed by entrenched interests. In Indonesia, the coal-dominated power sector particularly PLN's monopoly and vested interests in coal has historically resisted distributed solar deployment. Fathoni et al. (2021) observed that rooftop PV systems pose a disruptive threat to the established energy regime, prompting institutional resistance through policy and regulatory pushback. Despite these obstacles, solar initiatives led by government institutions such as the DPR’s solar park signal high-level political endorsement of renewable energy. By demonstrating that powerful national bodies are adopting clean technologies, these projects can help overcome resistance and

accelerate broader transition toward sustainable energy (Andhika & Munadi, 2024; Festaria, 2023; Halawa, 2023).

3. Indonesia's Energy Transition Strategy

Indonesia's energy transition roadmap is shaped by a combination of long-term strategic plans and evolving short-term regulatory instruments. A central benchmark is set by the National Energy Plan (RUEN), which targets a 23% share of renewables in the national energy mix by 2025 and 31% by 2050. Meeting these targets requires a substantial expansion in renewable energy capacity, particularly from solar, wind, and geothermal sources. Among these, solar photovoltaic (PV) plays a critical role due to Indonesia's abundant solar potential, which the government has estimated at approximately 207.8 GW nationwide. However, by the end of 2021, the country had installed only around 200 MW of solar capacity highlighting a significant gap between potential and actual deployment (Firmansyah et al., 2024; Ibrahim et al., 2024).

To address this lag, the Indonesia Solar Summit 2022 called for accelerated deployment of solar PV, setting cumulative targets of 1 GW by 2023, 10 GW by 2025, and 30 GW by 2030 through multi-stakeholder collaboration. In support of these goals, the Ministry of Energy and Mineral Resources (MEMR) issued regulations to encourage rooftop solar adoption. MEMR Regulation No. 49/2018 introduced net metering, allowing PLN customers to export surplus electricity to the grid and receive credits initially valued at 65% of the export. This incentive was strengthened through MEMR Regulation No. 26/2021, which increased the credit value to 100% and simplified administrative processes, thereby making rooftop solar more attractive to households and institutions (Sagala et al., 2024; Sisdiyanto, 2025).

The DPR RI solar rooftop project was implemented under this favorable regulatory environment, enabling the institution to receive credits for any excess solar power exported to the grid, especially during weekends and holidays. However, Indonesia's policy framework continues to evolve. In early 2024, the government issued MEMR Regulation No. 2/2024, which replaced the previous net metering rule with a new quota-based system and removed the export credit mechanism. Although aimed at improving solar integration governance, this change has raised concerns among industry stakeholders, who fear it could discourage further rooftop solar investments due to diminished financial incentives (Purwoko, 2022; Wardhana et al., 2024).

This dynamic regulatory context underscores a key lesson in renewable energy policymaking: the theoretical benefits of supportive incentives can be undermined by abrupt or uncertain policy shifts. Nevertheless, Indonesia's broader energy strategy including its commitment to achieving net-zero emissions by 2060 remains heavily reliant on expanding renewable energy at all scales. Within this evolving policy landscape, the DPR RI solar rooftop project stands as both a product of past policy support and a valuable case study for understanding the implications of regulatory change on future implementation efforts.

C. METHOD

This study employs a qualitative case study approach to analyze the rooftop solar project at DPR RI as a practical example of renewable energy policy implementation in Indonesia. The research integrates several methods, including document analysis, literature review, data evaluation, and interpretative analysis. Key project details such as technical specifications, financial performance, and policy background were obtained from official DPR documents and national regulations, including RUEN and MEMR regulations. To provide broader context, academic publications and reports from institutions like Ember and IRENA were reviewed. Quantitative data on solar energy generation, cost savings, and emissions reduction were analyzed and cross-referenced with external sources to ensure accuracy. Finally, the project's alignment with policy objectives was interpreted using policy implementation theory, identifying both enabling factors and limitations. The study aims to generate practical insights rather than produce statistically generalizable findings.

D. RESULTS AND DISCUSSION

1. Case Background: DPR RI Solar Rooftop Project

The DPR RI solar rooftop project emerged as a strategic response to Indonesia's national push for renewable energy and the specific policy mandate requiring government buildings to utilize at least 30% of their rooftop area for solar photovoltaic (PV) systems, as outlined in the RUEN (National Energy Plan). Initiated in 2021, the project was spearheaded by the Secretariat General of the DPR RI (Setjen DPR RI), which identified the large parliamentary complex in Senayan, Jakarta including landmark buildings like the Nusantara Building and wide open spaces as an optimal location for a large-scale solar installation. Rather than limiting the project to rooftop installations, the DPR adopted an innovative approach by developing a dedicated "Taman Energi" (Energy Park) on the lawn in front of the main "Turtle Building" (so named for its iconic dome). This park features a circular monument with canopy-mounted solar panels and is integrated with green landscaping and a national emblem (Garuda), symbolizing the country's commitment to energy sovereignty.

A defining feature of the project is its financing model. Implemented through a public-private partnership (PPP), the solar system was developed under a build-own-operate-transfer (BOOT) scheme. A private solar energy company provided 100% of the initial capital to supply, install, and operate the infrastructure. In return, the DPR granted access to its rooftop and land assets and agreed to purchase the electricity generated at a rate 15% lower than the standard PLN tariff, effectively paying only 85% of the usual per-kWh cost. Operational and maintenance responsibilities remain with the private partner for the duration of the 25-year contract, after which the system will be transferred to the state as a DPR-owned asset. This model was crucial in overcoming financial barriers commonly faced in renewable energy projects specifically the high upfront capital cost without burdening the state budget. It also complied with regulatory requirements on state asset utilization,

particularly Ministry of Finance Regulation No. 115/2020, which governs how government assets can be used in public-private investment schemes.

From a technical and regulatory standpoint, the system was designed as an on-grid installation, connected to the local PLN distribution network. This setup enabled excess electricity generation to be exported to the grid, in accordance with MEMR Regulations No. 49/2018 and 26/2021, which at the time permitted net-metering with full credit for exported power. Given that DPR's electricity demand peaks on weekdays, while solar production continues on weekends and during recess periods, surplus energy generated during low-demand days could still be fully credited. The official DPR presentation highlighted this advantage, noting that solar energy produced on weekends is not wasted but credited against future bills, thereby maximizing economic returns. By taking advantage of favorable policy provisions, the DPR project not only complied with national mandates but also demonstrated an effective and financially viable model for renewable energy adoption in public institutions.

By May 2022, the DPR RI solar PV project had reached a total installed capacity of approximately 1.955 MWp (1955 kWp), making it one of the largest rooftop solar installations in Indonesia at the time. This single project nearly fulfilled the Jakarta provincial government's 2022 solar target of 2 MW. The panels were strategically distributed across various locations within the DPR complex, notably on the custom-built canopies in the Energy Park and potentially on the rooftops of several buildings. Installation progressed in phases beginning in late 2021, with incremental capacity additions: 150 kWp operational by January 2022, 409 kWp by February, 988 kWp by March, 1.42 MW by April, and the full 1.955 MWp achieved by May. This stepwise expansion resulted in a steady increase in monthly solar energy output.

Once fully operational, the solar system produced between 200–300 MWh of electricity monthly. In May 2022, for example, it generated approximately 222.2 MWh. Project estimates indicated an average monthly production of 302.5 MWh equivalent to roughly 3,630 MWh annually under Jakarta's solar irradiance conditions. This accounted for around 17–25% of the DPR complex's monthly electricity consumption, which previously stood at approximately 1,755 MWh. DPR officials confirmed that the system meets about 25% of their energy needs. As solar generation increased, grid electricity use decreased significantly from about 1.8 GWh in October 2021 to 1.41 GWh in May 2022. Correspondingly, PLN electricity bills fell from Rp 1.98 billion to Rp 1.56 billion during the same period. On an annual basis, the solar system is expected to reduce grid purchases by around 3,889 MWh. With DPR purchasing solar power at 85% of the PLN tariff, annual savings are estimated at Rp 4.04 billion. These savings are immediate and predictable, while maintenance and performance risks remain the responsibility of the private operator, ensuring optimal system performance.

The DPR project contributes significantly to Indonesia's climate goals by reducing greenhouse gas emissions and minimizing coal consumption. Substituting approximately 3.6 GWh of coal-fired grid electricity with solar energy reduces CO₂

emissions by around 183.8 tons per month, or about 2,200 tons annually. In terms of coal usage, this translates to approximately 154.8 tons of coal avoided per month, or 1,858 tons per year. The DPR also presented illustrative comparisons, such as equating the emissions savings to planting 252 mature trees. Beyond emissions, the Energy Park introduces green public space and raises awareness among lawmakers and visitors about renewable energy. Symbolic elements like the 17-panel rows representing August 17 (Independence Day) and a 45-meter span symbolizing the year 1945 tie the solar initiative to national pride and identity, reinforcing the narrative that sustainability is a patriotic value.

The project fully complies with RUEN's mandate that government buildings allocate at least 30% of rooftop area to solar PV, setting a precedent for other institutions. Public response highlighted DPR's leadership and called on other agencies to follow suit. The project demonstrates that large public facilities can adopt solar energy cost-effectively and without operational disruption. Furthermore, it validates the public-private partnership (PPP) model, especially for government entities with limited capital. The Ministry of Energy had previously installed a small 20 kWp system in 2015, but DPR's 1.955 MWp scale shows that upscaling is possible. Politically, the project is symbolically powerful. Legislators who influence national energy policy and budgets are signaling a clear endorsement of renewables. DPR Speaker Puan Maharani emphasized the initiative as a commitment to climate action and urged members to support the "Green House" movement. Such public statements reinforce the normalization of renewable energy within national governance. Nonetheless, energy politics in Indonesia remain complex, and some policymakers have been linked to coal interests. In this context, the DPR solar project represents a progressive shift, illustrating growing support for clean energy within political elites.

Despite its success, the project highlights several challenges. One issue involves the trade-off of the BOOT (Build-Own-Operate-Transfer) model. While it allowed zero capital investment from DPR, the savings are shared with the private partner, who earns a 15% margin on each kWh sold. If DPR had self-financed the system, it could have retained the full benefit after cost recovery. However, fiscal constraints and risk aversion often make direct investment unfeasible. Another concern is system longevity. Although maintenance is the private partner's responsibility, DPR will eventually inherit the system after 25 years, making long-term performance oversight critical. Additionally, the policy environment presents risks. The project was executed under MEMR Regulation 26/2021, which allowed full export credit via net metering. However, the newer Regulation 2/2024 eliminated net metering and introduced a quota system. Had these new rules applied earlier, the project might have faced reduced economic viability, particularly for weekend surplus energy. Fortunately, existing systems are typically grandfathered under old regulations. Nonetheless, such regulatory volatility can undermine investor confidence. For future replication of the DPR model, stable and transparent policy frameworks will be essential to maintain momentum in rooftop solar adoption while balancing grid management and utility concerns.

2. Performance and Outcomes

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3. Broader Implications

The DPR RI solar rooftop project offers several important lessons for renewable energy policy implementation in Indonesia. First and foremost, it demonstrates the crucial role of government leadership in translating policy mandates into action. By complying with the RUEN mandate to utilize at least 30% of rooftop space for solar PV, the DPR has set a precedent that other public institutions can follow. If replicated across Indonesia's thousands of government buildings many of which could accommodate hundreds of kilowatts in PV capacity the cumulative effect could contribute hundreds of megawatts to the national grid. This would not only support Indonesia's renewable energy targets but also stimulate the local solar industry by creating jobs in engineering, procurement, and construction. Furthermore, it would

reduce public electricity expenditure over time. The symbolic value of parliamentary leadership is also significant: the public visibility of the DPR going solar sends a strong signal to businesses and citizens that renewable energy is both feasible and officially endorsed.

The success of the DPR project also highlights the importance of aligning multiple policy instruments. The initiative benefited from a combination of regulatory mandates (RUEN's 30% rooftop requirement), incentive mechanisms (net metering under MEMR Regulation 26/2021), and a viable financing model (BOOT-based public-private partnership). This convergence of factors helped overcome the usual barriers to renewable energy adoption: the mandate created a sense of obligation, the net metering scheme made the project economically viable, and the PPP model resolved the challenge of high upfront investment. Without one of these elements such as the legal framework allowing private ownership of infrastructure on state property or the ability to export surplus electricity the project might not have been realized or scaled to the same extent. However, Indonesia's evolving regulatory environment, particularly changes to the net metering system in MEMR Regulation 2/2024, underscores the need for a stable and predictable policy framework to facilitate the replication of successful models like this.

Though modest in size relative to the national energy system, the DPR project contributes meaningfully to the broader energy transition strategy. It enhances Jakarta's renewable energy capacity and provides real-world experience in integrating rooftop solar into dense urban grids. The national utility, PLN, can use such projects to better understand grid dynamics, including managing bi-directional flows and solar peaks during daylight hours. These insights can help inform future investments in smart grids, battery storage, and demand-side management. Additionally, the DPR project directly contributes to Indonesia's climate goals by reducing emissions in the public sector a valuable metric in national determined contributions (NDCs). Its visibility also supports public education and acceptance of solar technology, encouraging a cultural shift toward clean energy. When influential institutions such as Parliament adopt renewables, the impact goes beyond kilowatt-hours it helps build political and societal momentum for broader change.

However, scaling rooftop solar to all government buildings presents practical challenges. Many public agencies lack the internal initiative or leadership support that was evident in the DPR project. Financing models need to be standardized and made accessible, particularly for smaller or regional offices that may struggle to attract private partners. Bureaucratic processes such as permitting, procurement, and PLN coordination can further complicate implementation. Roof conditions also vary some buildings may not be structurally suitable or may be partially shaded. To overcome these hurdles, a coordinated national program led by the Ministry of Energy, in partnership with the Ministry of Public Works and the Ministry of Finance, could provide technical support, streamline permitting, and aggregate smaller projects into bundled procurements. Budgetary incentives or recognition awards could further encourage adoption. While PPP models are effective for speed and risk-sharing, direct

government financing may be preferable for maximizing long-term savings where feasible. A hybrid approach combining PPP and state-funded models based on agency capacity and project scale could accelerate nationwide adoption.

In summary, the DPR RI solar rooftop project illustrates that Indonesia's renewable energy policies, when actively implemented, can deliver measurable benefits and serve as a replicable model. It bridges the gap between policy design and real-world execution, demonstrating how the public sector can lead by example in advancing national energy and climate targets. As Indonesia moves forward, the ability to replicate, adapt, and scale such initiatives will be vital in achieving its energy transition ambitions.

E. CONCLUSION

The implementation of a solar panel electricity system at the Indonesian House of Representatives (DPR RI) serves as a compelling case study of renewable energy policy in action. Through this initiative, Indonesia's broader energy transition goals such as increasing renewable energy uptake, reducing dependence on fossil fuels, and demonstrating public sector leadership were realized in a tangible and symbolic manner at a national landmark. The DPR solar rooftop project resulted from a combination of top-down mandates (requiring government buildings to adopt solar energy) and bottom-up innovation (DPR's initiative to create an Energy Park and secure private sector investment). The outcome is a 2 MWp solar PV system that supplies approximately 25% of the Parliament's electricity needs, reduces carbon emissions by over 2,000 tons annually, and saves billions of rupiah in public funds. In doing so, the project fulfills national policy directives such as the 30% rooftop solar utilization rule and proves the economic viability of renewable energy adoption for large-scale consumers under a supportive regulatory framework.

Several important lessons emerge from this case. First, it underscores the critical role of public institutions in leading by example. When lawmakers themselves adopt renewable energy solutions, they generate direct environmental and economic benefits while also sending a powerful message that can influence wider societal behavior. Second, the DPR project highlights the effectiveness of innovative financing mechanisms. By using a public-private partnership (PPP) model, the DPR overcame the common financial barriers that often hinder renewable energy projects, especially in the public sector. This approach allowed the project to proceed without relying on the state budget. Third, the success of the initiative points to the importance of policy coherence and stability. When incentives such as net metering credits and electricity tariff discounts are well-aligned with mandates, they can unlock significant progress. The DPR project was implemented during a favorable regulatory window and took full advantage of it; maintaining such enabling environments will be crucial for future replication.

Fourth, the project demonstrates that renewable energy can be integrated into institutional infrastructure without compromising operational functionality or aesthetics. In fact, the DPR's Energy Park enhanced the visual and symbolic profile of

the institution, reinforcing its image as a progressive and environmentally conscious legislative body. This shows that sustainability can be embedded into public architecture and identity.

To achieve its renewable energy targets and move toward its net-zero ambitions, Indonesia must scale up similar initiatives across government, commercial, and residential sectors. The public sector's leadership is particularly essential. If each ministry, province, and city government replicates DPR's approach, the collective impact could be substantial not only in installed capacity but also in normalizing solar technology and building public trust in renewables. The DPR project offers a strong template. Its success has already inspired calls for other institutions to follow suit. The government could build on this momentum by institutionalizing solar adoption in public buildings through standardized guidelines, budget-linked incentives, or performance indicators.

In conclusion, the DPR RI solar rooftop project exemplifies how high-level energy policy can be effectively translated into real-world implementation. The case demonstrates the multifaceted benefits economic, environmental, and symbolic of integrating clean energy infrastructure into government operations. It reinforces the principle that successful policy implementation requires not only clear mandates but also enabling frameworks and committed stakeholders. As Indonesia and the world face the urgent challenge of climate change, such examples provide hope and guidance. Indonesia's path to a sustainable energy future will be paved by projects like this, where ambition is matched by action. The DPR RI has shown that even traditional institutions can innovate and lead in the transition toward renewable energy, setting a powerful precedent for others to follow.

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