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Implementation of the Policy on Rooftop Solar Power Plants (PLTS) for Residential Customers of PT Perusahaan Listrik Negara (Persero) in the Province of DKI Jakarta

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Abstract

This research aims to analyze the implementation of the Rooftop Solar Power Plant (PLTS Atap) policy for residential customers of PT PLN (Persero) in the Province of DKI Jakarta, along with its supporting and inhibiting factors. The theory used in this research is Grindle's policy implementation theory. The research method employed a qualitative approach with a descriptive-analytical type. The results indicate that the implementation of the Rooftop Solar policy for residential customers of PT PLN (Persero) in DKI Jakarta is considered less successful. This is because the policy implementation has not fully represented the interests of the target group; the benefits generated remain limited; the expected changes have not been supported by clear operational strategies; the decision-making structure is fragmented; the capacity of implementing actors is still inadequate; resource support remains limited; power dynamics and actors' interests have led to restrictions that slow down implementation; institutional support has not been accompanied by adequate supporting instruments; and the level of responsiveness to customers' needs and complaints remains low. The supporting factors include public awareness of clean energy, the readiness of a competent EPC/vendor market, and PLN's institutional commitment to service digitalization. The inhibiting factors include policy systems and financing mechanisms that have not provided attractive economic incentives, limitations in the readiness and reliability of electricity infrastructure, procedures and service mechanisms that have not ensured certainty and ease, and inconsistencies in policy direction and alignment among actors.

INTRODUCTION

Law Number 30 of 2007 concerning Energy places the National Energy Policy as the foundation of energy management which includes meeting domestic energy needs, setting priorities for energy development, optimizing the use of national energy resources, and providing energy buffer reserves to ensure long-term energy security (Rissanti, 2026; Smith, 2019).

In order to operationalize the mandate, the government stipulated Government Regulation Number 79 of 2014 concerning the National Energy Policy (KEN), which was later refined through Government Regulation Number 40 of 2025. This policy update is carried out to strengthen the direction of transforming the energy mix towards a cleaner and more sustainable system, increasing the contribution of new and renewable energy (NRE) as the main pillar in national energy supply, and strengthening energy security and independence through reducing dependence on fossil energy sources that have dominated the national

electricity system (Karkour et al., 2020; Wang et al., 2020).

Solar Power Plants (PLTS) are a priority in the National Energy Policy not only because of their great technical potential, but also because of their economic, technical, and operational advantages that make them an effective instrument in accelerating the energy transition in Indonesia. Based on the 2024 Electricity Statistics from the Ministry of Energy and Mineral Resources, the installed capacity of solar power plants, including rooftop solar PV, continues to experience a significant increase from 2020 to 2024, from 151 MW in 2020 to 205 MW in 2021, increasing again to 283 MW in 2022, soaring to 600 MW in 2023, and reaching 909 MW in 2024. This growth shows the acceleration of solar energy implementation in Indonesia, although this capacity is still relatively small compared to the national potential so that the development opportunities are still very large (Fahmi et al., 2021; Fauzan, 2024; Meilani, 2024). Along with the increase in installed capacity, the involvement of solar energy industry players is also an important factor in supporting the development of solar PV in Indonesia. This can be seen from the composition of the membership of the Indonesian Solar Energy Association which is dominated by companies in the field of implementation and construction, such as developers as many as 38 companies, EPCs as many as 45 companies, and suppliers as many as 18 companies, while supporting roles such as consultants which only amount to 3 companies and engineering inspection institutions as many as 5 companies are still relatively limited. This condition shows that the Rooftop Solar industry ecosystem in Indonesia is still stronger in terms of project implementation than in terms of planning and supervision, so it is necessary to strengthen the role of supporting services to support the implementation of a more sustainable and quality Rooftop Solar policy (Aribowo et al., 2025; Bayu & Windarta, 2021).

The development of rooftop solar power plant regulations in Indonesia shows that there are policy changes that continue to be adjusted to market needs and national electricity system conditions (Steffen, 2020; Tietenberg & Lewis, 2016). Initially, the government issued Regulation of the Minister of Energy and Mineral Resources No. 49 of 2018 which became the basis for the use of rooftop solar power plants with a net-metering scheme, where customers can export electricity to PT PLN (Persero) and get an energy calculation of 65%. This regulation was then corrected through the Regulation of the Minister of Energy and Mineral Resources No. 13 and 16 of 2019 to simplify the installation procedure and provide administrative certainty for customers.

A stronger impetus emerged in the Minister of Energy and Mineral Resources Regulation No. 26 of 2021, which increases customer incentives by allowing 100% net-metering and providing ease of licensing. This policy has made interest in installing rooftop solar PV increase rapidly. However, this high enthusiasm poses new challenges for PT PLN (Persero) regarding system management and network reliability, so the government feels the need to make adjustments.

In response, the government issued Minister of Energy and Mineral Resources Regulation No. 2 of 2024 which became a major turning point. This regulation abolishes the electricity export-import mechanism and switches rooftop solar to a pure self-consumption system. In addition, a quota scheme set by IUPTLU holders such as PT PLN (Persero) is also implemented to control the amount of rooftop solar capacity that can be installed every year. This new policy aims to maintain the stability of the electricity system, but at the same time reduce flexibility and economic incentives for customers. With these changes, the policy

direction shifted from an expansionary push to tighter controls to maintain the reliability of the national power grid.

The Rooftop Solar Power Plant (PLTS) Policy in the Minister of Energy and Mineral Resources Regulation Number 2 of 2024 shows a number of important changes compared to the Minister of Energy and Mineral Resources Regulation Number 26 of 2021. One of the main changes is in the electricity export-import mechanism. In the previous regulation, Rooftop Solar Solar customers received compensation of 65% for electricity exported to the PT PLN (Persero) network, while in the latest regulation, the use of Rooftop Solar Power Plants is focused only on self-use efficiency so that customers no longer receive compensation for electricity exported to the network of IUPTLU holders. In addition, in terms of installation capacity, the old regulations limit the maximum capacity to 100% of the customer's connected power, while the new regulations no longer set capacity limits as long as the Rooftop Solar Solar quota is still available and registration is carried out within a predetermined period.

Other changes are seen in licensing and financing procedures. In the Minister of Energy and Mineral Resources Regulation Number 2 of 2024, the process of applying for Rooftop Solar PV becomes simpler because it is done digitally through the PLN Mobile application, which allows customers to submit applications, check quotas, and monitor the approval process without having to come directly to the service office. Submissions can only be made in two periods, namely January and July, and must be decided no later than 30 calendar days. In addition, customers are no longer charged capacity fees or advanced meter replacement fees because all rooftop solar service costs are integrated costs borne by PLN and reimbursed by the government through a subsidy and compensation mechanism due to the increase in the Cost of Production (BPP) (Uyun et al., 2022; Woo et al., 2023).

Along with these regulatory changes, the development of rooftop solar power plants in Indonesia shows a significant increasing trend. Data from the Ministry of Energy and Mineral Resources noted that the installed capacity of PT PLN (Persero) Rooftop Solar PV continues to increase from 2022 to 2024, both in terms of the number of customers and installed capacity. In 2022 the installed capacity reached 80,454,831 Wp for 6,522 customers, increasing in 2023 to 141,144,154 Wp for 8,491 customers, and jumping again in 2024 to 327,802,739 Wp for 9,928 customers. The most significant increase occurred in 2024, which was allegedly influenced by the determination of a relatively large quota for rooftop solar power plants at the beginning of the implementation of the new regulations. Household customers as the largest users of electricity are a very strategic sector in supporting the achievement of the national renewable energy mix target through community participation in the use of solar energy.

DKI Jakarta Province was chosen as the research locus because it is included in the five provinces with the highest number of customers in the household sector rooftop solar in Indonesia. Data shows that household customers dominate the installation of rooftop solar power plants in DKI Jakarta compared to other sectors, with the number continuing to increase from 1,559 customers in 2022 to 1,804 customers in 2023 and 2,091 customers in 2024. However, the growth rate in 2024 is only 15.7%, lower than other sectors despite the huge potential of the household market in this region. This condition shows that there are challenges in the implementation of the policy, such as the relatively high initial installation cost, the lack of public understanding of the technology and benefits of rooftop solar PV, and the decline in customer interest after the removal of electricity export incentives. Based on these conditions,

this study aims to analyze the implementation of the Rooftop Solar Power Plant policy for household customers of PT PLN (Persero) in DKI Jakarta Province along with its supporting and inhibiting factors. Theoretically, this research contributes to public policy implementation studies using Grindle's theory in Indonesia's energy transition. Practically, it benefits regulators (policy refinement), PLN (service improvement), EPCs/vendors (market understanding), household customers (informed decisions), and regional governments (policy adoption).

RESEARCH METHOD

This research employed a qualitative research approach with a descriptive-analytical design. This approach was selected to gain an in-depth understanding of the implementation of the Rooftop Solar Power Plant (PLTS Atap) policy for residential customers of PT PLN (Persero) in DKI Jakarta Province, including the factors that support and hinder its implementation.

The analytical framework is based on Grindle's (1980) policy implementation theory, which evaluates implementation through two dimensions: the content of policy (interests affected, types of benefits, extent of change envisioned, site of decision making, implementors, and resources committed) and the context of implementation (power, interest, and strategy of actors involved; institution and regime characteristics; and compliance and responsiveness).

Data were collected through three main techniques: (1) in-depth interviews with purposively selected key informants, including representatives from the Directorate General of New, Renewable Energy and Energy Conservation (EBTKE), the Directorate General of Electricity at the Ministry of ESDM, PT PLN (Persero)'s Retail Sales and Customer Service Division, EPC/vendors registered under the Indonesian Solar Energy Association (AESI), and residential customers who had installed rooftop solar panels in DKI Jakarta; (2) document analysis of relevant regulations, implementation reports, and secondary data from ESDM and PLN; and (3) direct observation of the service and registration processes.

Data validity was ensured through source triangulation and method triangulation. Data analysis followed the interactive model proposed by Miles and Huberman (2014), encompassing data reduction, data display, and conclusion drawing/verification.

RESULTS AND DISCUSSION

Implementation of the Rooftop Solar Power Plant Installation Policy for PT PLN (Persero) Household Customers in DKI Jakarta Province

A. Policy Content

1. Interests That Influence

The interests affected of Grindle's policy implementation theory in the context of this study are related to various interests that affect a policy implementation. This indicator argues that a policy in its implementation must involve many interests, and the extent to which these interests influence its implementation.

Affected interests relate to the various interests of those affected or influenced by the implementation of the policy, i.e. those who are the target of the policy. The reason is that the implementation of a policy will inevitably be related to many interests. The extent of these interests is related to the implementation of the policy of installing rooftop solar power plants for household sector customers connected to the PT PLN (Persero) network in the DKI Jakarta

area.

Based on the opinions of several people, it can be known that the interests influenced by the implementation of the Rooftop Solar Installation policy for PLN customers in the household sector in DKI Jakarta Province based on the provisions of the Minister of Energy and Mineral Resources Regulation Number 2 of 2024 as the latest policy can be known from four perspectives of views put forward by the regulator, PT PLN (Persero) as the implementer, the EPC/Vendor as the installer of Rooftop Solar PV and the PLN customers in the household sector, as follows.

a. The perspective of the view conveyed by the Directorate General of New, Renewable Energy and Energy Conservation (EBTKE) and the Directorate General of Electricity of the Ministry of Energy and Mineral Resources as regulators is to provide clarity on regulations related to IUPTLU holders, namely PLN by regulating the quota mechanism for the installation of rooftop solar PV, encouraging residential or household to penetrate rooftop solar power plants according to the capabilities of PLN's power grid, especially in urban areas such as DKI Jakarta Province, potentially pose technical challenges such as voltage rise and load imbalance.
b. From the perspective of the views conveyed by the Retail Sales and Customer Service Division, PT PLN (Persero) as the holder of IUPTLU has an influence on the security of PLN's electricity network with an on-grid system in the installation of rooftop solar power plants for household customers. Provisions related to periodization, quota determination and elimination of electricity exports are the middle point for the government as a regulator and PLN as the implementer of the policy of installing rooftop solar power plants with an on-grid system for household customers in DKI Jakarta Province.
c. Perspective from the views conveyed by EPCs/Vendors from the latest policy on the installation of rooftop solar power plants for PLN customers in the household sector affects the business aspect because the interest of PLN customers in the household sector in DKI Jakarta Province has decreased due to the waiting time for the installation process to take a long time, there is no certainty that household customers will get quotas and there is no enforcement of electricity exports.
d. The perspective of the views conveyed by PLN customers in the household sector in DKI Jakarta Province who install rooftop solar power plants at home assessed that the provisions of quota restrictions caused customers to enter to get a waiting list, no longer enforced electricity exports, and a long licensing process.

From the first three perspectives put forward by the Ministry of Energy and Mineral Resources as the regulator, PT PLN (Persero) the IUPTLU holder as the implementer, the EPC/Vendor as the installer of the Rooftop Solar Power Plant in the implementation of the policy is in line with Jones' opinion as an effort made by the authorities to achieve the goals that have been set.

These three perspectives reflect the existence of interests that influence a policy. According to Grindle, the success or failure of a policy depends largely on the interests that exist in the policy. In the policy of installing Rooftop Solar Power Plants for customers of PT PLN (Persero) in the household sector in DKI Jakarta Province, there are interests that represent the interests of certain communities, namely people who know and get information about Solar Power Plants installed on household roofs, people who already understand the efficiency in

electricity consumption patterns to reduce carbon emissions, and people who already know about the provisions of quotas, registration periodization, and electricity exports even though people who live in the DKI Jakarta area as customers of PT PLN (Persero) but not all people in DKI Jakarta Province know and understand related to the installation of rooftop solar power plants for customers of PT PLN (Persero) in the household sector.

In line with the theory of the implementation of the Grindle policy, the interests that affect a policy can achieve the successful implementation of the policy for the installation of rooftop solar power plants in the household sector if they receive support or high interest from the people who are customers of PT PLN (Persero) in the household sector to install rooftop solar PV, and the policy represents the interests of the people who are customers of PT PLN (Persero) related to the determination of quotas, the implementation of the periodization of registration, and the elimination of electricity exports in the installation of rooftop solar power plants in the DKI Jakarta area.

Manohara and Suprajogo's research show that the implementation of energy transition policies in Indonesia is influenced by various economic, political, and institutional interests between sectors. The findings confirm that the content of the policy reflects the configuration of the interests involved in it. In the context of the implementation of the Rooftop Solar Solar policy for PT PLN's household consumers in DKI Jakarta, the difference in interests between the government, PT PLN, business actors, and household consumers is an important factor that affects the success of the policy implementation.

Ramadani's research, et.al on the implementation of the One Map of Energy and Mineral Resources policy shows that the success of policy implementation is influenced by the interests of the community as policy beneficiaries, especially in terms of access to information and regulatory certainty. The findings emphasize the importance of understanding the impact of policy content on target groups. In the context of the implementation of the Rooftop Solar Solar policy for PT PLN's household consumers in DKI Jakarta, analysis of economic interests, access to information, and perception of community benefits is crucial in explaining the dynamics of successful policy implementation.

2. Types of Benefits Generated

The type of benefit of the Grindle policy implementation theory in the context of this study looks at the content of the policy that seeks to show or explain that in a policy there must be several types of benefits that have a positive impact on the beneficiaries generated by the implementation of policies related to the implementation of the Rooftop Solar Solar installation policy for household sector customers connected to the PLN network (Rooftop Solar Power Plant on grid) in DKI Jakarta area.

Based on the opinions of several informants, it can be known that the types of benefits that have a positive impact on the beneficiaries of the Rooftop Solar PV installation policy for PLN customers in the household sector in DKI Jakarta Province are that the cost savings of regular electricity bills from household electricity consumption during the day can save electricity bill costs by 20% per month, reduce carbon emissions, reduce the impact of climate change and increase property values.

This type of benefit is in line with Grindle's policy implementation theory, which states that the type of benefit that can achieve the success of a policy is to provide many benefits to the target group, namely customers of PT PLN (Persero) in the household sector who install

Rooftop Solar Power Plants as their target group and receive wide support from customers of PT PLN (Persero) in the household sector who install Rooftop Solar Power Plants as the target group, so the government needs to develop a strategy in increasing the benefits directly felt by the target group, namely saving electricity bill costs up to above 20% per month with the installation of rooftop solar power plants for PLN customers in the household sector. The existence of these economic benefits can encourage PLN customers in the household sector to install Rooftop Solar Power Plants so that they can contribute to changes in efficient electricity consumption patterns as an effort to reduce the impact of climate change to increase the value of residential properties installed by Rooftop Solar PV.

Manohara and Suprajogo's research show that energy transition policies produce benefits in the form of developing renewable energy technology, increasing investment, and strengthening collaboration between the government, the private sector, and the community. The findings confirm that the magnitude of policy benefits affects the success of implementation. In the context of the Rooftop Solar Solar policy for PT PLN household consumers in DKI Jakarta, the clarity and measurability of the economic benefits received by consumers is an important factor in determining the effectiveness of policy implementation.

Aini et al.'s research on the implementation of the TKDN policy in the energy sector shows that the policy produces strategic benefits for the economy, technological development, and social aspects. These findings emphasize that the distribution of policy benefits affects the level of support as well as the success of implementation. In the context of the Rooftop Solar Power Plant policy for PT PLN's household consumers in DKI Jakarta, economic, technological, and social benefits are important factors in explaining the dynamics of policy implementation.

3. Desired Degree of Change

The extent of change envisioned from Grindle's policy implementation theory in the context of this study sees that each policy has a target that it wants and wants to achieve. The content of policy that is to be explained in this indicator is the extent to which the desired changes from a policy must have clarity to achieve the policy goal.

According to Grindle, the greater the level of change that can be felt directly and quickly by the target group, the more effective the implementation of the policy, the level of change that must have a direct impact is related to the implementation of the Rooftop Solar Installation policy for household sector customers connected to the PLN network (Rooftop Solar Power Plant on grid) in the DKI Jakarta area.

Based on the opinions of several informants, it can be known that the desired degree of change from the implementation of the Rooftop Solar PV installation policy for PLN customers in the household sector in DKI Jakarta Province is a change in energy consumption patterns towards more efficient use of electricity, increased public participation in reducing carbon emissions in the energy transition process, and the determination of quotas in writing can improve the reliability and safety of the Rooftop PV network connected to PLN power grid. To achieve the desired level of change, it is necessary to have transparency from the registration mechanism for the installation quota of rooftop solar power plants for PLN customers in the household sector in DKI Jakarta Province, increase the quantity of registration periods, and re-enact electricity export provisions to increase the interest of PLN customers in the home sector to install rooftop solar PV.

The desired degree of change in the policy of installing rooftop solar power plants for customers of PT PLN (Persero) in the household sector in DKI Jakarta Province reflects a major change desired from the policy. In line with Grindle's policy implementation theory, a policy that wants major changes is increasingly difficult to implement. The big changes that are desired from the policy of installing Rooftop Solar Power Plants in changing electricity consumption patterns for PLN customers in the household sector, wanting transparency from the quota registration mechanism, increasing the quantity of registration periods, and the desire of customers of PT PLN (Persero) in the household sector who have installed Rooftop Solar Power Plants to benefit from electricity export provisions that are no longer enforced by the regulator reflect the difficulties in achieving The policy goal of installing Rooftop Solar Power Plants is the energy transition and efforts to reduce carbon gas emissions.

Manohara and Suprajogo's research show that energy transition policies demand significant structural, institutional, and behavioral changes, so they have a high degree of change and great complexity of implementation. In the implementation of the Rooftop Solar Solar policy for PT PLN (Persero) household customers in DKI Jakarta, the degree of change shows that the Rooftop Solar Solar policy is not only a technical policy, but part of the transformation of the energy system that requires significant changes in behavior, governance, and incentive structures, so that the complexity of its implementation can be higher and multidimensional.

4. Location of Decision Making

The site of decision making from Grindle's policy implementation theory in the context of this study sees that decision-making in a policy plays an important role in the implementation of a policy, so it is necessary to explain the extent of the accuracy of the location of decision-making from the implementation of a policy.

According to Grindle, what is meant by the location of decision-making is where and who has the right and authority to make decisions in implementing policies. Diversity and geographic location determine the success of a policy/program. The more homogeneous and geographically the decision-making process is closer to the location of policy implementation, the higher the probability of success. On the other hand, the more diverse or farther the decision-making is, the weaker the probability of the success of a policy in achieving its goals. The location of decision-making in this study is related to the implementation of the policy of installing rooftop solar power plants for household sector customers connected to the PT PLN (Persero) network in the DKI Jakarta area.

Based on the opinions of several informants, it can be known the location of decision-making in the implementation of the Rooftop Solar Power Plant installation policy for PLN customers in the household sector in DKI Jakarta Province, technical and normative decision-making is carried out through cross-unit within the scope of the Directorate of Renewable Energy of the Directorate General of ETBKE. The Directorate of Electricity Program Development, Directorate General of Electricity has the authority to set a quota for the installation of rooftop solar PV. PT PLN (Persero) and its related divisions coordinate with the Directorate General of ETBKE to prepare and propose policy changes and implement policies for the installation of rooftop solar power plants for PLN customers in the household sector.

The location of decision-making on the policy of installing Rooftop Solar Power Plants for PLN customers in the household sector in DKI Jakarta Province is on the regulator's side,

namely the Ministry of Energy and Mineral Resources to formulate, compile and establish policies and guidelines for the Rooftop Solar Solar policy. Decision-making at the technical stage of policy implementation is on the side of the IUPTLU holder, namely PT PLN (Persero) in carrying out quota distribution, registration periodization mechanism by involving EPCs/Vendors for the installation of Rooftop Solar Power Plants on the grid in the household sector.

The location of the decision-making of the policy that is in line with Grindle's policy implementation theory is very much determining the success or failure of policy implementation. In terms of policy determination and technical implementation of the established policies are not in one decision-making location because it is only coordination between the Ministry of Energy and Mineral Resources and PT PLN (Persero), especially in terms of quota distribution, the registration periodization mechanism involving EPC/Vendor for the installation of rooftop solar power plants on the household sector is more likely to be less successful.

Ramdani et al.'s study shows that in the implementation of the One Map ESDM policy, centralized decision-making at the ministerial level affects the flexibility and effectiveness of implementation at the operational level. The findings confirm that the location of strategic decisions will determine the dynamics of policy implementation. In the implementation of the Rooftop Solar Power Plant policy for PT PLN (Persero) household customers in DKI Jakarta, decisions regarding quotas, registration mechanisms, and electricity export schemes are determined at the central level, while implementation is carried out at business entities and households. This structure shows a separation between policy formulation and implementation, which has the potential to affect the effectiveness of implementation if not supported by adequate coordination and communication.

5. Policy Implementer

Policy implementers of Grindle's policy implementation theory in the context of this research see that a policy or program that is implemented must be supported by a competent policy implementer so that the success of a policy can be achieved. Policy implementers have the competence to properly collect data from policies implemented by implementers related to the implementation of the policy of installing rooftop solar power plants on household sector customers connected to the PT PLN (Persero) network in the DKI Jakarta area.

Based on the opinions of several informants, it can be known that the implementers of the Rooftop Solar Solar installation policy for PLN customers in the household sector in DKI Jakarta Province are PT PLN (Persero) as the technical implementer and EPC/Vendor as the implementer of the installation of Rooftop PV. Even though PLN as an entity that has a massive distribution network, PLN has network system limitations in receiving rooftop solar PV, the availability of advanced meters and the readiness of distribution substations that need to be improved. The implementing officer from PLN has the capacity and ability to adjust the policy of installing rooftop solar power plants for household sector customers in DKI Jakarta Province. PT PLN (Persero) as the technical implementer needs to increase socialization regarding technology information from the development of the on-grid system that can be known by household customers who have installed rooftop solar PV.

Policy implementers who are in line with Grindle's policy implementation theory can determine the success or failure of policy implementation depending on the ability and

commitment of the policy implementer. The stronger the ability and commitment of the implementer, the more successful the policy will be.

Judging from the implementation of the Rooftop Solar Solar installation policy for PLN customers in the household sector, PT PLN (Persero) as an IUPTLU holder and as a technical implementer has the ability and commitment to policy changes set by the Ministry of Energy and Mineral Resources as a regulator. The ability and commitment of the policy implementers have not been supported by the ability to prepare a network system to receive rooftop solar PV, the availability of advanced meters and the readiness of distribution substations, so the policy has become less successful. In addition, the lack of optimal socialization and delivery of information on installation procedures and the development of on-grid rooftop solar PV technology also affects the level of understanding and community participation.

Research by Nanda and Sagena (2025) shows that the success of the implementation of NRE policies in the IKN is highly dependent on the readiness of implementers, especially infrastructure support, human resource capacity, coordination, and technological and investment readiness. Although it has been progressively designed, its implementation still faces system and resource limitations. In the implementation of rooftop solar power plants in DKI Jakarta, although PT PLN (Persero) and EPC/Vendors already have a clear role, the constraints on PLN in preparing networks, supporting devices, and lack of optimal socialization show that the effectiveness of the policy has not been fully supported by the technical readiness and operational capacity of the implementers.

6. Resources Involved

The resources committed from Grindle's policy implementation theory in the context of this study look at the extent to which a policy or program is supported by adequate resources. The implementation of the policy must be supported by supporting resources so that the implementation runs well related to the implementation of the policy of installing rooftop solar power plants for household sector customers connected to the PT PLN (Persero) network in the DKI Jakarta area.

Based on the opinions of some of the informants mentioned above, it can be known that the resources involved in the implementation of the Rooftop Solar Installation policy for PLN customers in the household sector in DKI Jakarta Province are human resources from implementing officers as evaluators from the Ministry of Energy and Mineral Resources, technical personnel from PLN and EPC/Vendors, technological resources using the PLN Mobile and SIMANTAP applications. The implementing officers who are the evaluator team still need special training to improve their ability to evaluate technically. Technical personnel from PLN and EPC/Vendors have the same understanding in mitigating registration applications submitted by PLN customers in the household sector for the installation of rooftop solar PV.

The resources used in a policy are in line with Grindle's implementation theory is judged from the availability of resources to support policy implementation that greatly affect the success of the policy. If it is not supported by the necessary resources, it will make it difficult to successfully implement a policy.

Judging from the supporting resources used in the implementation of the Rooftop Solar Solar installation policy for customers of PT PLN (Persero) in the household sector in DKI Jakarta Province, there are resources used, namely the implementing officer as an evaluator

team and the use of digitalization system applications. The implementing officer as an evaluator team from the regulator has not been able to support the success of the policy because special training is still needed in evaluating the implementation of the Rooftop Solar Installation policy for PLN customers in the household sector. If it is not supported by the ability to conduct evaluations by the implementing officer as an evaluator team, it will make it difficult for the successful implementation of a policy that has an impact on the policy to be less successful.

Ramdani et al.'s research shows that in the implementation of the One Map ESDM policy, the adequacy and quality of resources, especially the capacity and technical competence of the apparatus, greatly determine the effectiveness of policy implementation. Success depends not only on the clarity of regulations, but also on the readiness of implementers in carrying out technical and evaluation functions. In the implementation of the Rooftop Solar Power Plant policy for PT PLN (Persero) household customers in DKI Jakarta, the limited ability of the regulatory evaluator team which still requires special training shows that the resource dimension involved in the Grindle theory is not optimal. Without capacity building, monitoring and evaluation of policies have the potential to be less effective so that policy objectives are not achieved optimally.

Likewise, Nanda and Sagena's research shows that the implementation of new and renewable energy policies in the IKN does not only depend on regulatory commitments and infrastructure development, but is also highly determined by the readiness of resources, especially the capacity of human resources and adequate technical support. The research emphasizes that the limitations of human resources, technology, and technical competence are one of the main challenges in realizing an effective energy transition.

B. Policy Context

1. Powers, Interests and Strategies of the Actors Involved

Power, interests, and strategy of actors involved from Grindle's policy implementation theory in the context of this study sees that a policy needs to consider the power or power, interests and strategies used by the actors involved to facilitate the implementation of a policy implementation. If this is not carefully taken into account, then the results of the policies or programs implemented are not in accordance with the desired expectations related to the implementation of the policy of installing rooftop solar power plants for household sector customers connected to the PT PLN (Persero) network in the DKI Jakarta area.

Based on the opinions of some of the informants mentioned above, it can be known the power, interests and strategies of actors involved in the implementation of the Rooftop Solar Solar installation policy for PLN customers in the household sector in DKI Jakarta Province, there are interests related to planning, supervision starting from installation to the Rooftop Solar On-grid building that has been installed with the availability of flexible power plants to maintain the reliability of the electricity system especially in areas with a high level of electricity consumption load density in DKI Jakarta Province, controlling the penetration rate of rooftop solar power plants to match the capacity of the distribution network. The strategy prepared by PT PLN (Persero) is by preparing a digital system in the mechanism of providing information on the availability of quotas that can be submitted for registration by PLN customers in the household sector. The Indonesian Solar Energy Association (AESI) has

conducted a public campaign by means of socialization through social media, in collaboration with universities and communities in conveying information related to rooftop solar PV.

Power, interests, and strategies in the implementation of a policy in line with the theory of policy implementation Grindle are indicators that determine the success of a policy from actors involved in the implementation of the policy have power, interests, and strategies in implementing a policy.

In the implementation of the policy of installing Rooftop Solar Power Plants for PLN customers in the household sector in DKI Jakarta Province, there is an interest from the Ministry of Energy and Mineral Resources which has the authority to plan and supervise the installation of Rooftop Solar Power Plants on the grid, controlling the penetration rate of Rooftop Solar Power Plants to match the capacity of the distribution network connected to PLN. The strategies implemented by PT PLN (Persero) as the technical implementer prepare a system for the rotation of registration services, and the distribution of rooftop solar installation quotas for household customers. AESI conducts public campaigns, socialization through social media, in collaboration with universities and communities to convey information on rooftop solar PV. The existence of the authority, interests and strategies of the Ministry of Energy and Mineral Resources and PT PLN (Persero) as actors involved in the implementation of the policy in its implementation is still found to be a concern for PLN if household customers turn off the Rooftop Solar Power Plant that has been installed and connected to the PLN network or on the grid will have an impact on PLN's electricity system. The findings of concerns about the power, interests, and strategies of the actors involved can be considered that the implementation of the policy of installing rooftop solar power plants for PLN customers in the household sector in DKI Jakarta Province has been less successful.

Nanda and Sagena's research show that the implementation of new and renewable energy policies in the IKN involves various actors with different authorities, interests, and strategies, such as the central government, the IKN authority, PLN, and other stakeholders. The study emphasizes that the dynamics of power and interests between actors greatly influence the direction and strategy of policy implementation, especially when there is a difference in priorities between energy transition targets and considerations of electricity system stability. In the context of the Rooftop Solar Power Plant policy for household customers of PT PLN (Persero) in DKI Jakarta, the authority of the Ministry of Energy and Mineral Resources as a regulator and PLN's role as a technical implementer show that there is a division of power that affects the implementation strategy. PLN's concern about the potential for electricity system disruptions if household customers turn off grid-connected rooftop solar reflects the institutional interest to maintain network reliability and electricity supply stability. This condition shows that the implementation of the Rooftop Solar Solar policy is not only technical, but also an arena for the interaction of interests between actors, where the strategy of each party will greatly determine the effectiveness and sustainability of the policy.

2. Characteristics of Institutions and Rulers

The characteristics of institutions and regimes that are in power (institution and regime characteristics) of Grindle's policy implementation theory in the context of this study look at the environment in which a policy is implemented which affects its success so that it can be explained the characteristics of an institution that also influences policies related to the implementation of the policy of installing rooftop solar power plants on household sector

customers connected to the PT PLN network (Persero) in the DKI Jakarta area.

Based on the opinions of some of the informants mentioned above, it can be known the characteristics of the institutions and regimes that are in power in the implementation of the policy of installing rooftop solar power plants for PLN customers in the household sector in DKI Jakarta Province, namely the Directorate of Renewable Energy is tasked with formulating policies, compiling technical guidelines, and providing guidance for implementing officers and coordinators from across directorates within the scope of the Ministry of Energy and Mineral Resources. The Directorate of Electricity Program Development is tasked with ensuring certainty in the implementation of regulations and governance of its development, maintaining a balance of public interests and minimizing technical and operational risks such as intermittency and power quality disturbances from the installation of rooftop solar power plants for customers of PT PLN (Persero) in the household sector in DKI Jakarta Province. PT PLN (Persero) as the implementing officer who holds the IUPTLU stated that there was no compensation for electricity exports from customers of PT PLN (Persero) in the household sector who installed rooftop solar PV.

According to Grindle, the success of policy implementation is determined by the support of institutions and the regime in power. This support is successful depending on the characteristics of the ruling regime. In the implementation of the policy of installing Rooftop Solar Power Plants for customers of PT PLN (Persero) in the household sector in DKI Jakarta Province, there is support from the Ministry of Energy and Mineral Resources as a regulator to ensure certainty in the implementation of regulations and governance of its development, maintain a balance of public interests and minimize technical and operational risks such as intermittency and power quality disturbances from the installation of Rooftop Solar Energy.

The support from the regulator must be able to provide policy support instruments for PT PLN (Persero) as a technical implementer in the elimination of electricity export compensation from customers of PT PLN (Persero) in the household sector who have installed rooftop solar power plants as a target group on the elimination of electricity exports. The provisions for the elimination of electricity exports have an impact on the economic benefits that can be received directly by customers of PT PLN (Persero) in the household sector to install rooftop solar PV. If the support provided by the regulator does not represent the interests of the target group, the implementation of the policy will be less successful.

Nanda and Sagena's research show that the characteristics of institutions and rulers greatly determine the direction and consistency of energy policy implementation, especially when these policies are part of the national strategic agenda such as the energy transition and the achievement of the SDGs. The research confirms that political commitment, policy orientation, and the way institutions respond to public interest will affect the success rate of implementation in the field. In the context of the Rooftop Solar Solar policy for household customers of PT PLN (Persero), the provision for the elimination of electricity exports reflects the character of the policy that emphasizes aspects of system stability and institutional interests rather than economic incentives for the target group. As a result, the economic benefits that were previously the main attraction for household customers have been reduced. If the regulator's support does not fully represent the interests of the target group, the level of participation and policy acceptance tends to decrease, so that the implementation of the authentic Rooftop Solar PV policy is less successful.

3. Compliance and Responsiveness of Implementers

The level of compliance and responsiveness of the implementers (compliance and responsiveness) of the Grindle policy implementation theory in the context of this study looks at the extent of the level of compliance and responsiveness of the implementers in the implementation process in responding to a policy related to the implementation of the policy of installing rooftop solar power plants on household sector customers connected to the PT PLN (Persero) network in the DKI Jakarta area.

Based on the opinions of several informants, it can be known that the compliance and responsiveness of the implementers of the implementation of the Rooftop Solar Solar installation policy for PLN customers in the household sector in DKI Jakarta Province can be seen from the coordination carried out by PT PLN (Persero) with EPC/Vendor to follow up on complaints of household rooftop solar customers, PT PLN (Persero) has good responsiveness to the implementation of registration periodization, Quota distribution mechanism set in the installation of solar PV Rooftop households, PT PLN (Persero) can respond quickly in terms of system reliability related to quota availability.

The level of compliance and responsiveness of the implementation of the Rooftop Solar PV installation policy for customers of PT PLN (Persero) in the household sector in DKI Jakarta Province can be affected by the often changing policies where the policy of installing Rooftop PV for customers of PT PLN (Persero) in the household sector does not formulate its policies comprehensively for the interests of customers and the interests of PLN because PLN is responsible for electricity supply while demand depends on customers.

According to Grindle, policies will be successful if there is a compatibility of the objectives and form of the program. This is also related to the responsibility of the implementers for the implementation of the policy. The responsibility of the implementers in the implementation of the Rooftop Solar Solar installation policy for PLN customers in the household sector in DKI Jakarta Province is shown by coordinating to follow up on complaints from PLN customers in the home sector who will register, and install Rooftop PV. The change in policy that regulates the periodization of registration, determination and quota distribution mechanism affects PLN's responsibility on supply and has an impact on demand that depends on customers.

Thus, the level of compliance and responsiveness of the implementers in implementing the policy is considered less successful in following up on complaints from PLN customers in the household sector when applying for registration where there is no certainty of getting quotas, registration periodization, or complaints from PLN customers in the household sector who have installed rooftop solar PV for the economic benefits of eliminating electricity exports.

Nanda & Sagena's study shows that the implementation of new and renewable energy policies in the IKN is highly dependent on the consistency of implementers in implementing regulations as well as their ability to respond to technical and social challenges that arise during the energy transition process. The research emphasizes that in addition to compliance with the regulatory framework, responsiveness to stakeholder needs is an important factor so that policies not only run administratively, but also gain public legitimacy. In the context of the Rooftop Solar Power Plant policy for household customers of PT PLN (Persero), the uncertainty of quotas, the unclear periodization of registration, and the lack of optimal response

to complaints about the elimination of electricity exports show that even though the policy has been established and implemented, the responsiveness of implementers to customer needs has not been maximized. This condition indicates that without increased transparency, proactive communication, and clear follow-up mechanisms, the implementation of the rooftop solar policy has the potential to be considered less successful by the target group

C. Supporting and Inhibiting Factors

1. Supporting Factors

Based on several informants' opinions, supporting factors that determine the success of the implementation of the Rooftop Solar Solar installation policy for PLN customers in the household sector in DKI Jakarta Province can be identified, namely:

a. Social support and environmental awareness, namely increasing public awareness of clean energy, high interest in installing rooftop solar PV, and motivation to save electricity.
b. Market readiness and business ecosystem, in the form of the availability of competent EPC/Vendors in Jakarta, the ability to provide information, warranty, and maintenance services, thereby strengthening customer trust.
c. PLN's commitment and institutional readiness is reflected in support for energy transition policies, the development of digital-based service systems, and the existence of a wide and relatively mature distribution network in the DKI Jakarta area.

2. Inhibiting Factors

Based on the opinions of some of the informants mentioned above, it can be identified that the factors that hinder the successful implementation of the Rooftop Solar PV installation policy for PLN customers in the household sector in DKI Jakarta Province can be identified, namely:

a. Economic obstacles stemming from policy systems and financing mechanisms that have not yet supported and have implications for the low attractiveness of household investment, namely the high initial cost of installation and the unavailability of adequate incentives and net metering schemes, so that the economic benefits of rooftop solar have not been able to provide significant savings for household customers.
b. Technical and infrastructure obstacles stemming from limited readiness and reliability of the electricity system, in the form of limited distribution and transmission network capacity, substation readiness, availability of advanced meters, and lack of optimal real-time data integration, which has an impact on quota restrictions and increasing concerns about the stability and quality of the electricity system.
c. Administrative and governance barriers that reflect the suboptimal design of service procedures and mechanisms, which are characterized by limited registration periodization, quota uncertainty, length of SLA mitigation process, and document obligations (SLO) that cannot always be fulfilled by customers, thereby reducing certainty, convenience, and trust in the service process.
d. Institutional and regulatory obstacles that show inconsistency in policy direction and alignment between sectors, namely policy changes that are relatively frequent and not fully aligned between the interests of the energy transition and the reliability aspect of the system, thus causing uncertainty for customers and EPCs/vendors

CONCLUSION

The implementation of the policy of installing rooftop solar power plants for household customers of PT PLN (Persero) in DKI Jakarta is considered less successful because there are still various obstacles in the design aspects of the policy and the context of its implementation. On the policy side, the quota mechanism, the limitation of the registration period, and the elimination of the electricity export scheme have reduced economic benefits and public interest has decreased, coupled with a fragmented decision-making structure, limited implementation capacity, and suboptimal resource support. On the implementation side, the existence of technical caution related to the stability of the electricity system, the lack of incentives after the elimination of electricity exports, and services that are not yet responsive and have not provided quota certainty have also reduced customer participation and confidence. However, the implementation of this policy is supported by increasing public awareness of clean energy, the readiness of the EPC/vendor market, and PLN's commitment to digitizing services, while the obstacles include weak economic incentives, limited infrastructure, service procedures that are not yet easy, and inconsistent policies between sectors. Overall, rooftop solar policies tend to be more successful for industrial customers than households, so a more appropriate strategy is needed through the involvement of various stakeholders such as banks for initial financing and local governments to strengthen policy socialization.

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