



## Subsidy Reforms and Their Implications for Green Investment in Indonesia's Renewable Energy Market

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### Abstract

*This study explores the implications of subsidy reforms on green investments in Indonesia's renewable energy market, with a focus on understanding how changes in subsidy structures can support the transition from fossil fuels to renewable energy. A mixed-methods approach was used, combining quantitative data analysis on investment trends and subsidy allocation, along with qualitative interviews with key stakeholders. The findings reveal that while fossil fuel subsidies have been gradually reduced, the impact on renewable energy investments has been modest, particularly in emerging sectors like solar and wind. Geothermal and hydropower sectors received the majority of the subsidies, despite the higher potential for solar and wind. The study also finds that political resistance and the lack of clear policy stability hinder the effective implementation of subsidy reforms. Social support programs have been introduced but have not fully mitigated the regressive impacts of higher energy prices. The results suggest that more aggressive and targeted financial incentives are needed to boost green investments, alongside comprehensive long-term policy reforms. The study contributes to the understanding of subsidy reforms in the context of energy transition and highlights areas for further research, including the role of carbon pricing mechanisms and the effectiveness of social programs in promoting energy justice.*

## INTRODUCTION

Indonesia is undergoing significant transformations in its energy sector, where sustainability and renewable energy development are becoming focal points of national policy. The Indonesian government, acknowledging the environmental challenges posed by fossil fuels, has made substantial strides in promoting renewable energy through various policy interventions. These efforts, which include both fiscal measures and subsidies, are critical to achieving the nation's ambitious goals of reducing greenhouse gas emissions and shifting towards cleaner energy sources. However, while subsidies have historically played a central role in driving energy consumption, there is increasing debate over their sustainability and long-term impact on the renewable energy sector (Strielkowski et al., 2021; Cui et al., 2022; Hassan et al., 2024). This paper explores the implications of subsidy reforms

on the Indonesian renewable energy market, particularly in the context of green investments that are essential to fostering the transition to sustainable energy. Subsidy reforms present both challenges and opportunities for stakeholders involved in green energy development, and understanding their effects is crucial for the effective design of energy policy moving forward (Falcone, 2023; Gokul et al., 2024; Soni et al., 2024).

The renewable energy sector in Indonesia is poised for significant growth, especially as the country seeks to meet international commitments under the Paris Agreement and to address its growing energy needs. Over the past decade, Indonesia has invested heavily in renewable energy projects, such as geothermal, hydropower, solar, and wind power. Government subsidies have traditionally supported these projects, aiming to reduce the initial capital cost and make renewable energy more competitive with fossil fuels (Yan et al., 2023; Benavides-Franco et al., 2023; Rempel & Gupta 2022). However, these subsidies have also led to inefficiencies, creating market distortions and disincentivizing investment in more competitive green technologies. In recent years, the government has begun to reevaluate these subsidies, with an eye toward reforming the system to encourage more sustainable and market-driven investments in renewable energy. This shift raises important questions about the role of subsidies in green investment and the broader implications for Indonesia's transition to a low-carbon economy (Abyan, 2025; Khoirunurrofik et al., 2025; Sambodo et al., 2022).

One of the primary issues with the current subsidy structure is its misallocation and inefficiency (Zhang et al., 2021). While subsidies have helped reduce the costs of energy for consumers, they have also hindered market competition and contributed to over-reliance on fossil fuels. The continued use of subsidies for fossil energy has created a barrier to entry for renewable energy projects, which typically require large upfront capital investments. As the government moves toward reform, it must consider how to gradually phase out fossil fuel subsidies and redirect financial support to renewable energy initiatives. This transition, however, is not without its challenges. The political economy of energy subsidies is complex, with vested interests in the fossil fuel sector resisting changes that could undermine their profitability. The removal or reduction of fossil fuel subsidies could also lead to higher energy prices, which may negatively affect low-income populations unless accompanied by targeted social support mechanisms (Belgioioso & Newman, 2025; Okereke et al., 2024; Bemgba & Adadu, 2025). Therefore, understanding the impacts of subsidy reforms on both the renewable energy market and the broader economy is essential for designing effective policies that balance sustainability with socio-economic equity.

The solution to these challenges lies in a comprehensive and well-coordinated subsidy reform strategy that shifts the focus from fossil fuel dependence to a supportive environment for green investments. Literature suggests that the gradual reduction of fossil fuel subsidies, combined with targeted incentives for renewable energy technologies, could help achieve this transition. For instance, studies by Grubb et al. (2020) and Newell and Paterson (2018) argue that policy mechanisms such as feed-in tariffs, tax credits, and investment subsidies for renewable energy can mitigate the risks posed by subsidy reform, attracting private sector investment and ensuring the competitiveness of renewable energy projects. These policies, if designed correctly, could incentivize private investors to step in and fill the gap left by the phasing out of subsidies. Additionally, transparency in subsidy reforms and clear signals from the government about future energy pricing can help reduce market uncertainty and encourage long-term investments in green energy technologies.

However, the transition toward renewable energy subsidies must also account for the broader socio-economic context of Indonesia. The literature emphasizes the need for a balanced approach, where reforms not only promote green investment but also safeguard vulnerable communities from potential negative impacts, such as energy price hikes. For example, policies that incorporate mechanisms for energy efficiency improvements in households, alongside direct cash transfers to low-income groups, can mitigate the regressive effects of energy price increases. The effectiveness of these measures, however, is highly context-dependent, requiring careful design based on the country's unique political, economic, and social environment. The introduction of carbon pricing mechanisms, such as a carbon tax or emissions trading schemes, may also play a role in aligning economic incentives with environmental goals, but such measures require careful consideration of their potential economic impact, especially on industries dependent on fossil fuels.

In line with this, the study aims to contribute to the existing literature by analyzing the effectiveness of subsidy reforms in Indonesia and their impact on green investment in the renewable energy market. Specifically, this paper will explore the dynamic relationship between subsidy reforms and the development of renewable energy, examining how subsidy adjustments can create opportunities for green investments, foster market competition, and ultimately contribute to the country's sustainable energy future. Previous studies on subsidy reforms in other countries, such as those by Heffron et al. (2019) and Nuzzo et al. (2017), provide valuable insights into the effectiveness of subsidy reforms in facilitating energy transitions. However, few studies have focused specifically on Indonesia's context, where political economy dynamics and social welfare considerations complicate the implementation of subsidy reforms.

This study will fill this gap by providing an in-depth analysis of the implications of subsidy reforms for the Indonesian renewable energy sector, considering both the short- and long-term effects on green investments. The research will also explore potential pathways for aligning subsidy reform with broader policy goals, such as reducing carbon emissions and promoting energy equity. By examining these issues, the study will contribute to the academic literature on energy policy and provide valuable recommendations for policymakers seeking to transition Indonesia's energy sector towards sustainability. Moreover, the findings could offer lessons for other developing countries facing similar challenges in balancing energy transition goals with social and economic priorities.

## METHODS

This study aims to examine the implications of subsidy reforms on green investments in Indonesia's renewable energy market. The methodology employed in this research adopts a mixed-methods approach, combining both qualitative and quantitative data collection techniques to explore the various dimensions of subsidy reform and its effect on the renewable energy sector. The use of both methods is intended to provide a comprehensive analysis, incorporating the perspectives of stakeholders, policymakers, and industry experts, as well as empirical data on market performance, investment trends, and subsidy dynamics. The following sections outline the key methodological steps followed in this study, which include the research design, data collection methods, data analysis techniques, and the rationale behind the choices made.

### Research Design

The research design of this study is structured to comprehensively assess the impact of subsidy reforms on green investment in Indonesia's renewable energy market. Given the multifaceted nature of subsidy reforms, which involve both policy changes and market behavior, a mixed-methods design is employed to ensure that both the

macroeconomic and microeconomic aspects of subsidy reform are addressed. This approach enables the study to integrate the detailed, context-specific insights provided by qualitative data with the broader trends observed in quantitative data.

In line with this, the study adopts an explanatory sequential design, a form of mixed-methods research in which quantitative data is collected first to identify patterns and trends, followed by qualitative data collection to further explain and interpret the findings. This approach allows for a more nuanced understanding of the complex relationships between subsidy reforms and green investments, particularly the ways in which the policies are received by stakeholders and implemented in practice.

### **Data Collection**

Quantitative data for this study was collected from several secondary sources, including government reports, industry publications, and academic studies that focus on the energy sector and subsidy reforms in Indonesia. The main focus of the quantitative data collection was on identifying trends in the renewable energy market, such as the volume of investments in renewable energy technologies, changes in energy production capacities, and shifts in energy prices. Specific datasets on the allocation of energy subsidies, the breakdown of subsidies between fossil fuels and renewables, and the financial performance of renewable energy projects were gathered.

Additionally, publicly available financial data from key players in Indonesia's renewable energy sector were examined, such as investment flows into solar, wind, and geothermal energy projects. The data on subsidy reforms in Indonesia was analyzed, including the timing, scale, and policy objectives behind these reforms, to determine their influence on green investments. This was complemented by data from international organizations, such as the International Energy Agency (IEA) and the World Bank, which provided insights into global energy subsidy trends and best practices for subsidy reform in the context of renewable energy.

The statistical analysis of this data primarily relied on descriptive statistics, which helped identify overall trends, as well as regression analysis, which was used to explore potential relationships between subsidy reforms and the level of investment in green energy. The regression models considered various variables, including the level of subsidy reductions, the introduction of new incentives for renewable energy, and macroeconomic indicators such as GDP growth and inflation, which could potentially impact the renewable energy market.

### **Data Collection**

Qualitative data collection involved semi-structured interviews with key stakeholders in Indonesia's energy sector, including government officials, policymakers, renewable energy industry experts, and representatives from international organizations involved in energy development and climate change. A purposive sampling method was used to select participants who had relevant knowledge and experience related to subsidy reforms, energy policy, and renewable energy investments in Indonesia.

The semi-structured interviews were designed to capture the perspectives and opinions of stakeholders on the following key areas: 1) The rationale behind the subsidy reforms and their expected impact on the renewable energy market; 2) The challenges and opportunities identified by industry players in response to subsidy reforms; 3) The perceived effectiveness of policy measures in supporting the growth of renewable energy investments; 4) The role of the private sector and financial institutions in driving the green investment agenda in the context of subsidy reforms; 5) The social and political dynamics that may affect the implementation of subsidy reforms and the transition to renewable energy.



In total, 30 interviews were conducted, with each interview lasting approximately 60 to 90 minutes. The interviews were transcribed verbatim and analyzed using thematic analysis, a common qualitative research method that involves identifying and interpreting recurring patterns or themes within the data. Thematic analysis allowed for the identification of key factors influencing the effectiveness of subsidy reforms, as well as the identification of potential barriers to green investments in the renewable energy sector.

### **Data Analysis**

The quantitative data collected was analyzed using statistical software, including SPSS and R. Descriptive statistics, such as mean values, standard deviations, and trends over time, were used to provide an overview of the data on subsidy allocation and renewable energy investments. In addition to descriptive statistics, regression analysis was employed to test the relationships between the variables identified earlier. The primary focus of the regression models was to determine whether reductions in fossil fuel subsidies or the introduction of new incentives for renewable energy investments were significantly associated with increases in green investments.

The regression models also controlled for confounding variables such as economic growth, inflation rates, and energy demand fluctuations, to isolate the specific impact of subsidy reforms on renewable energy investments. The models were tested for statistical significance using standard techniques such as t-tests and F-tests, and the results were evaluated in terms of their practical significance and relevance to policy recommendations.

The qualitative data from the semi-structured interviews was analyzed using thematic analysis, a method that is particularly useful for identifying patterns and themes in qualitative data. The analysis began with an initial coding process, where transcribed interview data was systematically reviewed and key concepts were identified. These concepts were then grouped into themes, which were further refined to create an overarching narrative about the perceptions and experiences of stakeholders regarding subsidy reforms and their impact on green investments in Indonesia.

The themes that emerged from the interviews were cross-referenced with the quantitative findings to provide a more comprehensive understanding of the relationship between subsidy reforms and green investments. The qualitative analysis also helped explain the factors that could not be fully captured through quantitative data alone, such as the political and social dynamics influencing policy implementation and stakeholder behavior.

## **RESULTS AND DISCUSSION**

This section presents the findings of the study, which investigates the implications of subsidy reforms on green investments in Indonesia's renewable energy market. The results are derived from a combination of quantitative data analysis and qualitative insights obtained through interviews with key stakeholders. The following subsections discuss the key results, including the impact of subsidy reforms on renewable energy investments, market behavior, and policy implications.

### **Trends in Renewable Energy Investment**

The quantitative analysis of data from government reports and industry publications reveals significant trends in renewable energy investments in Indonesia over the past decade. A marked increase in investments was observed following the government's introduction of various renewable energy incentives, such as feed-in tariffs, tax credits, and investment subsidies. However, these investments were largely

concentrated in a few energy sources, notably geothermal and hydropower, with solar and wind energy receiving less attention despite their higher potential. The data show a steady rise in geothermal investments, particularly in the provinces of East Nusa Tenggara and North Sulawesi, where the government has provided targeted support through grants and subsidies.

Table 1. Total Renewable Energy Investments in Indonesia (2010-2020)

| Year | Geothermal | Hydropower | Solar | Wind | Total Investments (USD) |
|------|------------|------------|-------|------|-------------------------|
| 2010 | 45%        | 35%        | 10%   | 5%   | 2.4 Billion             |
| 2011 | 48%        | 30%        | 12%   | 6%   | 2.7 Billion             |
| 2015 | 50%        | 32%        | 10%   | 6%   | 3.0 Billion             |
| 2020 | 52%        | 32%        | 10%   | 6%   | 4.3 Billion             |

From 2010 to 2020, the total investments in renewable energy projects in Indonesia increased by approximately 40%. The highest growth rates were seen in geothermal energy, which accounted for 52% of total renewable energy investments, followed by hydropower at 32%. Solar and wind energy projects, on the other hand, made up only 16% of total investments, despite their vast untapped potential. This distribution indicates that while renewable energy investments are growing, the distribution across energy types is uneven, and certain sectors have received more substantial support than others.

The analysis also highlights the impact of subsidy reforms on these trends. Following recent announcements of subsidy reductions for fossil fuels, a noticeable shift occurred in the allocation of investments. Renewable energy projects, especially those in solar and wind energy, began to show a slight increase in investor interest after 2018. However, this increase was relatively modest and lagged behind the growth observed in geothermal and hydropower sectors. This suggests that while subsidy reforms may be providing some incentives for green investments, the overall effect on the broader renewable energy market remains limited without more aggressive policy adjustments and financial incentives for emerging renewable technologies.

### Changes in Subsidy Allocation and Their Effect on Green Investments

Table 2. Allocation of Energy Subsidies in Indonesia (2015-2020)

| Year | Fossil Fuel Subsidy (%) | Renewable Energy Subsidy (%) | Total Subsidy (IDR Trillion) |
|------|-------------------------|------------------------------|------------------------------|
| 2015 | 63%                     | 14%                          | 210 Trillion                 |
| 2016 | 60%                     | 15%                          | 220 Trillion                 |
| 2018 | 58%                     | 18%                          | 230 Trillion                 |
| 2020 | 54%                     | 21%                          | 240 Trillion                 |

The study also examined the changes in subsidy allocation between fossil fuels and renewable energy in Indonesia. Between 2010 and 2020, the Indonesian government allocated an average of 40% of its energy subsidy budget to fossil fuels, with the remaining 60% divided between renewable energy projects and other energy sectors. However, in recent years, the government has undertaken gradual efforts to reduce fossil fuel subsidies, which accounted for 54% of total subsidies in 2020, down from 63% in 2015. This shift in subsidy allocation was primarily driven by the need to reduce fiscal burdens and align with international climate commitments.

Despite these efforts, the redistribution of subsidies has not yet resulted in a significant increase in green investments. While fossil fuel subsidies were reduced, the funds allocated to renewable energy projects were often insufficient to stimulate large-scale investments. Furthermore, renewable energy subsidies were often channeled into larger, more established technologies like geothermal and

hydropower, rather than emerging technologies like solar and wind. As a result, these changes in subsidy allocation have had a limited impact on accelerating the growth of the renewable energy market, especially in sectors where initial capital costs remain high.

The quantitative analysis of the impact of subsidy reforms on investment behavior indicates that the gradual reduction in fossil fuel subsidies has led to a modest increase in the investment attractiveness of renewable energy projects. However, the lack of long-term policy certainty and insufficient financial incentives for investors remain major barriers to further investment in renewable energy. Regression analysis of investment data, controlling for factors such as GDP growth and energy demand, showed that while reductions in fossil fuel subsidies were positively correlated with increased investment in green energy, the effect was not statistically significant in most cases. This suggests that subsidy reforms alone are insufficient to drive large-scale shifts toward renewable energy without additional policy measures, such as the introduction of more targeted financial incentives and long-term investment guarantees.

### **Stakeholder Perspectives on Subsidy Reforms and Green Investment**

The qualitative data obtained through semi-structured interviews with key stakeholders in the renewable energy sector provide important insights into the challenges and opportunities associated with subsidy reforms. Interviews with government officials revealed that the primary rationale behind the subsidy reforms was to reduce the fiscal burden of fossil fuel subsidies, which have long been a drain on public finances. These officials emphasized that the goal of the reforms was not only to reduce subsidies for fossil fuels but also to promote cleaner energy sources, although the latter objective has not been fully realized in practice.

Industry experts and renewable energy developers expressed concerns about the limited scope of the subsidy reforms, arguing that the current level of support for renewable energy remains inadequate. One major issue highlighted by interviewees was the lack of consistency and predictability in energy policy. Many stakeholders noted that while the government had made initial strides in reducing fossil fuel subsidies, the absence of a clear roadmap for renewable energy development and investment left investors uncertain about the long-term viability of their projects. This uncertainty was particularly pronounced in the solar and wind energy sectors, where investors were hesitant to commit large sums of capital without clear guarantees regarding feed-in tariffs or other financial incentives.

Furthermore, interviewees noted that while there had been some positive signals from the government, such as the introduction of green bonds and funding for renewable energy research and development, these measures were often overshadowed by the continued subsidization of fossil fuels. Several stakeholders emphasized that the full potential of subsidy reforms could only be realized if the government took a more aggressive stance in reducing fossil fuel subsidies and simultaneously introduced comprehensive policies to support green investments. These policies, they argued, should include long-term financing mechanisms, tax incentives, and more transparent bidding processes for renewable energy projects.

### **Stakeholder Perspectives on Subsidy Reforms**

The results of the qualitative analysis, based on interviews with 30 key stakeholders in Indonesia's renewable energy sector, provided valuable insights into the political, economic, and social challenges of implementing subsidy reforms. Interviewees included government officials, policymakers, renewable energy developers, and industry experts.

One key theme that emerged from the interviews was the perception that the subsidy reforms were insufficient to stimulate large-scale investments in green energy. Many stakeholders emphasized the need for more comprehensive financial support, particularly for emerging renewable technologies such as solar and wind. Several interviewees highlighted that the subsidy reforms focused primarily on reducing fossil fuel subsidies but did not provide adequate incentives for renewable energy developers, particularly those in the solar and wind sectors.

As one government official mentioned,

*“While reducing fossil fuel subsidies is important, we need to ensure that renewable energy projects, especially in solar and wind, receive the same level of financial incentives as geothermal or hydropower.”*

Similarly, industry experts noted that the lack of clarity regarding long-term energy policies created an uncertain investment environment. One developer stated,

*“We need long-term guarantees and a stable policy environment to attract significant investment in solar and wind projects.”*

The interviews also revealed concerns about the social impacts of subsidy reforms. Several stakeholders pointed out that higher energy prices resulting from subsidy cuts could disproportionately affect low-income households unless targeted social support programs were implemented. One expert noted,

*“The government needs to ensure that the social implications of subsidy reforms are addressed, especially for the most vulnerable populations.”*

### **Political and Social Dynamics Influencing Subsidy Reform**

A significant finding from the qualitative data was the political resistance to subsidy reductions from vested interests in the fossil fuel sector. As noted by one policymaker,

*“There is significant pressure from the fossil fuel lobby to maintain subsidies. This is one of the biggest challenges in moving forward with subsidy reforms.”*

Moreover, social dynamics also play a crucial role in shaping the implementation of subsidy reforms. Several interviewees highlighted the challenges of balancing economic growth with the need for social equity. For example, the introduction of targeted social programs, such as cash transfers, was seen as a necessary measure to mitigate the regressive effects of higher energy prices. However, the effectiveness of these programs was questioned by several stakeholders, particularly given the difficulties in reaching all affected groups.

An energy policy expert explained,

*“While cash transfers are helpful, they are not a long-term solution. The government needs to focus on providing sustainable energy solutions that will reduce dependency on subsidies in the long run.”*

This sentiment was echoed by several stakeholders, who argued that energy policy reforms should focus on long-term sustainability, rather than short-term fixes.

### **Implications for Policy and Future Research**

The findings from both the quantitative and qualitative data suggest that while the Indonesian government's subsidy reforms have led to some positive changes, they have not yet resulted in a significant shift toward green investments, particularly in solar and wind energy. The gradual reduction in fossil fuel subsidies and the marginal increase in renewable energy subsidies are steps in the right direction, but more aggressive policies are required to stimulate substantial investments in emerging renewable energy sectors.



Table 3 summarizes the key factors influencing the success of subsidy reforms and their implications for green investment. The table identifies the key drivers, challenges, and policy recommendations based on the data collected.

Table 3. Key Drivers and Challenges of Subsidy Reforms in Indonesia

| Key Driver/Challenge                         | Impact on Green Investment                           | Policy Recommendation   |
|--|--|---|
| Reduction in Fossil Fuel Subsidies           | Moderately increases renewable energy attractiveness | Further gradual reduction, with targeted subsidies for solar and wind         |
| Insufficient Financial Incentives            | Limits large-scale investment in emerging sectors    | Increase financial incentives for solar and wind projects                     |
| Political Resistance from Fossil Fuel Sector | Delays subsidy reforms, creates uncertainty          | Strengthen political will and engage fossil fuel sectors in transition        |
| Social Equity Concerns                       | Negative impact on low-income households             | Implement comprehensive social support mechanisms, such as targeted subsidies |

The results suggest that future research should focus on evaluating the long-term effectiveness of subsidy reforms, particularly in the solar and wind energy sectors. Further studies could explore the role of carbon pricing mechanisms, such as carbon taxes and cap-and-trade systems, in promoting green investments. Additionally, research on the political economy of subsidy reforms in developing countries like Indonesia could provide valuable insights into the social and political factors that influence energy transition policies.

## Discussion

The aim of this study was to explore the implications of subsidy reforms on green investments in Indonesia's renewable energy market, with a particular focus on how changes in subsidy structures could facilitate the transition from fossil fuel dependence to renewable energy adoption. The findings indicate that while subsidy reforms have contributed to some positive shifts in the renewable energy sector, these reforms have been insufficient in driving significant investment in emerging renewable technologies like solar and wind. This section discusses the key findings in the context of existing literature and provides a deeper understanding of the broader implications of subsidy reform for Indonesia's energy transition.

### The Impact of Subsidy Reforms on Renewable Energy Investments

One of the most significant findings of this study is that while the Indonesian government has made strides in reducing fossil fuel subsidies, the shift has been gradual, and the effects on renewable energy investments have been relatively modest. The quantitative analysis revealed that the renewable energy sector, particularly geothermal and hydropower, received a substantial share of energy subsidies, while emerging sectors like solar and wind energy saw much less investment. These findings are consistent with the broader literature on energy subsidy reforms, which suggest that subsidy reductions, if not paired with targeted incentives for renewable energy, may fail to stimulate the kind of transformative change needed in the energy sector (Heffron et al., 2019; Nuzzo et al., 2017).

The results corroborate the arguments made by Grubb et al. (2020) and Newell and Paterson (2018), who highlight that the mere removal of fossil fuel subsidies does not automatically result in a boom in renewable energy investments. As these studies argue, the underlying issue is the need for a coherent and comprehensive policy framework that not only reduces subsidies for fossil fuels but also directs financial

support towards renewable energy technologies. The limited increase in the allocation of subsidies to renewable energy, from 14% in 2015 to 21% in 2020 (Table 2), further emphasizes the importance of targeted financial incentives in stimulating renewable energy investments. This modest shift in subsidy allocation, while encouraging, highlights that the government's fiscal constraints have likely prevented a more aggressive policy stance towards renewable energy investments.

In contrast to the gradual shift observed in Indonesia, studies in other developing economies have shown that aggressive subsidy reforms, when combined with strong support mechanisms for renewable energy, have led to significant investments in emerging technologies. For example, in India, a clear policy commitment to renewable energy, including both subsidy cuts for fossil fuels and incentives for solar energy, led to exponential growth in solar power investments (Kumar et al., 2020). This comparison suggests that Indonesia's gradual approach to subsidy reforms may not be sufficient to meet its renewable energy goals, especially in sectors where capital-intensive technologies, such as solar and wind, dominate.

### **The Role of Political and Social Dynamics**

A critical factor influencing the success of subsidy reforms is the political and social dynamics surrounding energy policy. The qualitative findings underscore the significant role that vested interests, particularly from the fossil fuel sector, have in delaying or obstructing subsidy reforms. As discussed by interviewees and as outlined by several political economy scholars (Arezki et al., 2020), the fossil fuel lobby in Indonesia has historically been a powerful force in shaping energy policy. This resistance, coupled with the need to balance fiscal constraints and social welfare concerns, presents a significant challenge to the effective implementation of subsidy reforms.

This political resistance is not unique to Indonesia. In other countries, such as Brazil and Malaysia, fossil fuel industries have also played a key role in delaying subsidy cuts, especially when such cuts are perceived to threaten their market dominance (Bastos et al., 2019). In Indonesia, the government's hesitance to fully phase out fossil fuel subsidies is influenced not only by political pressures but also by concerns over the potential social impacts, particularly on low-income households. The interviews revealed that many stakeholders were concerned that the removal of fossil fuel subsidies could lead to higher energy prices, disproportionately affecting vulnerable populations. These findings align with those of Unander and Tröster (2020), who found that in energy subsidy reforms in low-income countries, social equity considerations are often a central issue, requiring policies that ensure fairness and mitigate adverse effects on the most disadvantaged groups.

While some social support mechanisms, such as targeted cash transfers, were introduced by the Indonesian government to mitigate the impacts of higher energy prices, their effectiveness remains uncertain. Interviewees expressed skepticism about the ability of these programs to fully address the social inequalities caused by rising energy costs. These concerns reflect broader debates in the literature on the limitations of social transfer programs in ensuring energy justice during subsidy reforms (Ahlborg & Hammar, 2020). Moreover, the challenge of implementing these programs effectively, especially in rural or remote areas, is exacerbated by issues of administrative capacity and corruption, which have been shown to limit the reach and impact of such initiatives in Indonesia (Jannsen & Paavola, 2021).

### **Financial Incentives and Policy Uncertainty**

Another important theme from the study is the role of financial incentives in fostering green investments. Despite the gradual increase in renewable energy subsidies, the overall financial incentives for emerging technologies like solar and wind were seen

as insufficient by many stakeholders. The lack of long-term policy stability and clarity regarding financial support for renewable energy projects was a recurring concern among interviewees. This is particularly important for capital-intensive technologies such as solar, where long-term certainty regarding subsidies and tariffs is crucial for attracting both domestic and foreign investors (Climaco et al., 2020).

The findings of this study are consistent with the work of Jacobson et al. (2020), who argue that clear, long-term policy commitments are necessary to encourage private sector investment in renewable energy. The results also highlight the importance of aligning financial incentives with the actual cost structures of emerging technologies. For instance, solar and wind energy projects often require high initial capital expenditures, and without targeted incentives, such projects remain financially unattractive compared to established technologies like geothermal or hydropower. This is especially true in Indonesia, where high upfront costs and long payback periods remain significant barriers to investment in renewable energy (Feldman et al., 2021).

A key conclusion from the interviews is that the government's subsidy reforms should be accompanied by clear, long-term financial support for renewable energy projects, especially in the solar and wind sectors. Policies such as guaranteed power purchase agreements (PPAs), green bonds, and renewable energy auctions are examples of mechanisms that have successfully incentivized investments in renewable energy in other countries (Lochner et al., 2021). However, the lack of such mechanisms in Indonesia suggests that the government must do more to create an enabling environment for renewable energy development, particularly for emerging sectors like solar and wind.

### **The Path Forward for Indonesia's Energy Transition**

Given the findings of this study, it is clear that Indonesia's renewable energy transition requires a more aggressive and coordinated approach to subsidy reforms. While the reduction in fossil fuel subsidies is a necessary step, it is insufficient on its own to drive large-scale shifts towards renewable energy. The government must increase its financial support for emerging renewable technologies, such as solar and wind, by introducing targeted incentives and long-term policy frameworks that provide investors with the stability and certainty they need to commit to large-scale projects. Additionally, stronger political will and stakeholder engagement are essential to overcoming the resistance from vested interests in the fossil fuel sector and ensuring that the benefits of subsidy reforms are equitably distributed.

Furthermore, the social impacts of subsidy reforms cannot be ignored. While targeted cash transfers and social support programs are important, they must be complemented by efforts to create affordable, sustainable energy solutions that reduce dependency on fossil fuels in the long term. Energy justice should be a central consideration in subsidy reforms, ensuring that the transition to renewable energy does not disproportionately affect vulnerable populations. The role of international cooperation, particularly in the form of financing mechanisms and technology transfer, will also be crucial in supporting Indonesia's energy transition.

### **CONCLUSION**

This study investigates the impact of subsidy reforms on green investments in Indonesia's renewable energy sector. The findings reveal that while the Indonesian government has made strides in reducing fossil fuel subsidies, the reforms have not yet led to significant shifts toward renewable energy investments, particularly in emerging sectors like solar and wind. Geothermal and hydropower projects have seen the most substantial investments, benefiting from both existing subsidies and policy incentives. However, these subsidies have not been equally distributed among

renewable technologies, limiting the growth of solar and wind energy despite their greater potential.

The political resistance from fossil fuel sectors and the lack of clear, long-term policy stability have been major barriers to the success of these reforms. Furthermore, while the government has introduced social support mechanisms to mitigate the impact of subsidy cuts on vulnerable populations, their effectiveness remains limited, suggesting the need for more comprehensive and sustainable solutions. This study contributes to the body of knowledge by providing a detailed analysis of the challenges and opportunities associated with subsidy reforms in a developing economy like Indonesia. It highlights the importance of targeted financial incentives and long-term policy frameworks for accelerating green investments. Future research should explore the role of carbon pricing mechanisms and evaluate the effectiveness of social support programs in ensuring energy justice during the energy transition.

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