Enhancing the Private Sector’s Roles in Climate-Energy Policies Towards the Indonesian NDC Target
About this report

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Project in brief
This project is a third-year study of Strengthening national climate policy implementation (SNAPFI): Comparative Empirical Learning & Creating Linkages to Climate Finance, investigated by the Climate Change Center, Bandung Institute of Technology collaborating with DIW Berlin. This project delves into the energy policies of Indonesia and assesses the extent of the private sector’s roles in helping the Government of Indonesia achieve NDC by 2030 and NZE by 2060.
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Glossary

AESI  Asosiasi Energi Surya Indonesia-Indonesian Solar Energy Association
AHP  Analytical Hierarchy Processes
APBI-ICMA  Asosiasi Pertambangan Batubara Indonesia-Indonesian Coal Mining Association
BAU  Business as Usual
BESS  Battery Energy Storage System
BPDLH  Environmental Fund Management Agency (Badan Pengelola Dana Lingkungan Hidup)
BPPT  Badan Pengkajian dan Penerapan Teknologi (Agency for the Assessment and Application of Technology)
BRIN  Badan Riset Nasional Indonesia- National Research and Innovation Agency
CCUS  Carbon capture, utilisation, and storage
CCS  Carbon Capture and Storage
CFPP  Coal Fired Power Plant
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<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>CMfMIA</td>
<td>Coordinating Ministry for Maritime and Investment Affairs (Kementerian Koordinator Bidang Maritim dan Investasi/Kemenkomarves)</td>
</tr>
<tr>
<td>DEN</td>
<td>Dewan Energi Nasional- National Energy Council</td>
</tr>
<tr>
<td>DMO</td>
<td>Domestic Market Obligation</td>
</tr>
<tr>
<td>DPR</td>
<td>House of Representatives (Dewan Perwakilan Rakyat)</td>
</tr>
<tr>
<td>FiT</td>
<td>Feed in Tariff</td>
</tr>
<tr>
<td>FOLU</td>
<td>Food and Land Use</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GHG</td>
<td>Greenhouse Gases</td>
</tr>
<tr>
<td>GoI</td>
<td>Government of Indonesia</td>
</tr>
<tr>
<td>GWh</td>
<td>Gigawatt hours</td>
</tr>
<tr>
<td>ICF</td>
<td>International Climate Finance</td>
</tr>
<tr>
<td>IESR</td>
<td>Institute for Essential Services Reform</td>
</tr>
<tr>
<td>IPPs</td>
<td>Independent Power Producers</td>
</tr>
<tr>
<td>KEN</td>
<td>Kebijakan Energi Nasional (National Energy Policy)</td>
</tr>
<tr>
<td>LCOE</td>
<td>Levelized Cost of Electricity</td>
</tr>
<tr>
<td>LTS-LCCR</td>
<td>Long-Term Strategy for Low Carbon and Climate Resilience</td>
</tr>
<tr>
<td>MoEF</td>
<td>Ministry of Environment and Forestry (Kementerian Lingkungan Hidup dan Kehutanan/KLHK)</td>
</tr>
<tr>
<td>MoEMR</td>
<td>Ministry of Energy and Mineral Resources (Kementerian Energi dan Sumber Daya Mineral/KESDM)</td>
</tr>
<tr>
<td>MoF</td>
<td>Ministry of Finance (Kementerian Keuangan/Kemenkeu)</td>
</tr>
<tr>
<td>MoI</td>
<td>Ministry of Industry (Kementerian Perindustrian/Kemenperin)</td>
</tr>
<tr>
<td>MoNDP</td>
<td>Ministry of National Development Planning (Kementerian Perencanaan Pembangunan Nasional/BAPPENAS)</td>
</tr>
<tr>
<td>MoSOE</td>
<td>Ministry of State-Owned Enterprises (Kementerian Badan Usaha Milik Negara/Kementerian BUMN)</td>
</tr>
<tr>
<td>MtCO2e</td>
<td>Million tonne carbon dioxide equivalent</td>
</tr>
<tr>
<td>MW</td>
<td>Megawatt</td>
</tr>
<tr>
<td>NEK</td>
<td>Nilai Ekonomi Karbon-Carbon Economic Value</td>
</tr>
<tr>
<td>NDC</td>
<td>Nationally Determined Contribution</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
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<tr>
<td>NRE</td>
<td>New Renewable Energy</td>
</tr>
<tr>
<td>NZE</td>
<td>Net Zero Emission</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>PEPs</td>
<td>Politically Exposed Persons</td>
</tr>
<tr>
<td>PF</td>
<td>Power Factor</td>
</tr>
<tr>
<td>PLN</td>
<td>Perusahaan Listrik Negara (National Electricity Company)</td>
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<tr>
<td>PPA</td>
<td>Power Purchase Agreement</td>
</tr>
<tr>
<td>RE</td>
<td>Renewable Energy</td>
</tr>
<tr>
<td>RIPIN</td>
<td>National Industry Master Plan (Rencana Induk Perindustrian Nasional)</td>
</tr>
<tr>
<td>RPJMN</td>
<td>Rencana Pembangunan Jangka Menengah Nasional (Medium-Term Development Plan)</td>
</tr>
<tr>
<td>RUEN</td>
<td>Rencana Umum Energi Nasional (National Energy General Plan)</td>
</tr>
<tr>
<td>RUED</td>
<td>Rencana Umum Energi Daerah (Regional Energy General Plan)</td>
</tr>
<tr>
<td>RUPTL</td>
<td>Rencana Usaha Penyediaan Tenaga Listrik (Electricity Supply Business Plan)</td>
</tr>
<tr>
<td>TKDN</td>
<td>Locally Manufactured Content Level (Tingkat Komponen Dalam Negeri)</td>
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Chapter one

Introduction
1. Introduction

The Government of Indonesia (GoI) submitted an updated Nationally Determined Contribution (NDC) in July 2021 and compiled the Long-Term Strategy on Low Carbon and Climate Resilience (LTS-LCCR) as a commitment to achieve Net Zero Emissions by 2060 or sooner. However, the updated NDC did not increase its climate mitigation targets, only reflecting the progression beyond the existing NDC and a new set of activities in the adaptation strategy. Through its NDC, Indonesia voluntarily pledged to reduce greenhouse gases (GHG) emissions by 29% on its own efforts and up to 41% with international support compared to the business-as-usual (BAU) scenario by 2030. According to the Climate Transparency Report 2021 (IESR, 2021a) Indonesia’s emissions (excluding emissions from land use) have increased by 157% between 1990-2018 to 947 MtCO₂e. By category, the increase was largely due to energy-related emissions. In Indonesia, the energy sector is the second largest emitting sector to GHG emissions after the FOLU sector by contributing to 34% of total emissions in 2019. If no decarbonization efforts are carried out in Indonesia, the emission from the energy sector is projected to turn into the largest emitter by 2030 while the FOLU sector will decrease gradually (IESR, 2021b; MoEF, 2020).

In the national level energy policy (KEN and RUEN), the GoI sets a target for NRE mix in 2025 at least 23% and 31% in 2050. Based on data from the Ministry of Energy and Mineral Resources-MoEMR, the achievement of the national energy mix has reached 13.55% as of April 2021. This number has increased by 2.04% in four months compared to data at the end of last year, which was only 11.51%. Nevertheless, renewable energy development remains sluggish in 2021, with renewables only contributing 13.53% of power generation (IESR, 2021b). The installed capacity of renewable energy only increased by 386 MW in Q3 2021 with the dominance of 291 MW hydropower, 55 MW geothermal, 19 MW bioenergy, and 21 MW solar PV. This achievement is still far below what is needed to achieve the 23% target. In addition, coal still dominated power generation by contributing 66% of total power generation in 2021, while renewables only contributed around 13%.

To reduce emissions and accelerate the achievement of the national energy mix target of 23% in 2025 and 31% in 2050, efforts and support from various parties are needed to formulate a clean energy transition policy through the development of NRE sources. According to Suroso et al. (2020) there are few issues in the NRE development in Indonesia, such as the lower-level policies and regulations not synergising enough with higher-level policies and sometimes overlapping with each other, financing for NRE projects in Indonesia is still limited, and the roadmap NDC for energy still do not take sides on the NRE investors. In addition, the master plan for NRE development is regulated in Presidential Regulation 22/2017 concerning The National Energy General Plan (RUEN), which has not been effective enough to increase the rate of NRE development, especially in power plants, due to limited financial instruments and the absence of a clear tariff scheme arrangement. These problems have the potential to limit private investment in the NRE sector. Suroso et al. (2021) also found that the challenge of NRE development in Indonesia is that the NRE sector has high risk and low returns because of the regulation of NRE pricing, which is not too profitable for the IPP developer. The NRE policy in Indonesia is not yet supportive of creating an attractive market for investors and is still not in favour of investors (Erdiwansyah et al., 2022). Therefore, the NRE development in Indonesia needs the government’s intervention through policies that facilitate actors, including the private sector, in developing NRE.
Maulidia et al. (2019) stated that Indonesia needs to strengthen its NRE commitment to address constraints impeding private sector investment.

The involvement of the private sector in the NRE development is needed, especially in developing countries where public finance is insufficient to meet the needs of climate finance and the lack of local government capacity in NRE development. Suroso et al. (2020) found that the financing for NRE in Indonesia is still limited even though NRE is intended to be the first contributor to GHG emission reduction. Indonesia has enormous potential in the development of NRE. Still, on the other hand, Indonesia also faces various challenges in energy governance, such as an unstable economy, complicated regulations and policies, investors are less interested in developing NRE, and the informality of practices in the energy sector which causes coal still dominates in the energy mix (Boediman et al., 2021 & Suroso et al., 2021).

In the third year of the study, the public policy in the energy sector will be identified to understand the connections of climate-related policies with the role of private sectors in - climate change mitigation from a renewable energy sector perspective. The research question in this study is “To what extent can the climate-energy policy be adjusted to enhance the role of the private sector in facilitating the achievement of the Indonesian NDC targets?”. As understood from the research question, this study aims to analyse the public policy in the energy sector that facilitates the achievement of the NDC targets and transitioning into NZE by 2060 or sooner to identify what are the possible roles for private sectors to help GoI in achieving the targets. This study used a qualitative approach by analysing public policy using evaluation criteria. While there were 15 informants interviewed, consisting of government officials, experts, and the private sector, we also reinterpreted and contextualised interviews from our previous studies (see Suroso et al., 2020; Suroso et al., 2021).

The scope of this research is the role of the private sector in the energy sector, especially the new and renewable energy sector. As a comparison, the role of the private sector in the oil and gas and coal industry is also discussed in this paper.

This document is structured as follows: we introduce the background of the study. We add the literature review on the roles of private companies in the energy sector and climate change policymaking. Next, we explore the energy profile of Indonesia, particularly in the context of the year 2022. We then elaborate on the mandatory and voluntary instrument options assessments that are possible to be adopted in Indonesian energy policy making and how it should be contextualised on SNAPFI project's theory of change. Finally, we conclude this report by summarising the findings, suggesting practical recommendations to the government, and emphasising our contribution to academic literature.
Chapter two

Situating Private Sector in The Energy Landscape
2. Situating Private Sector in The Energy Landscape

The involvement of the private sector in policymaking has various roles such as advocate, financier, and policy entrepreneur. Related to advocating in the energy sector, the presence of new actors and organisations in the development of New Renewable Energy provides knowledge and material resources which further increase learning potential and economic competitiveness as well as increase the capacity to advocate for institutional change and market development (Jacobsson and Bergek, 2004). The private sector plays an important role in shaping public policy. The private sector influences public policy using three main avenues such as knowledge sharing, campaign contributions; and lobbying efforts (Strickland, 2018). In addition, private consultants and energy NGOs also provide technical/operational support sources, for example, through the development of policy impact estimators to estimate electricity and GHG savings in building and land use policies.

To reduce greenhouse gases by setting GHG reduction targets on an administrative scale, limited local scale capabilities can make the changes needed to meet targets a significant challenge. The active participation of private actors in climate and energy negotiation is essential to increase climate and energy governance efficiency (Andrade and Oliveira, 2015). One of the failures in the process of getting the emissions down is a state-centric system that does not allow the effective inclusion of multiple actors including the private sector (Andrade and Taravella, 2009). Therefore, Berkhout and Westerhoff's (2013) stated that adopting a system perspective through a network in climate policy development can support local governments in achieving GHG emission reduction targets.

Governments have a wide range of national plans and policies that require funding to implement, therefore the governments cannot address the impacts of climate change on their own. In this case, the private sector has a role as a financier. Berkhout and Westerhoff's (2013) also mention the role of private organisations in networking with the government, namely as providers of funds for local governments because government funding sources are often only available for a limited time and less than needed. Related to climate finance, for example the private sector can be a conduit for innovative financing and act as a service provider (Pacific Islands Forum, 2021). A recent analysis of the global landscape of climate finance by the Climate Policy Initiative (2021) found that the private finance source continues to provide the majority of NRE finance. Private sector finance accounts for the majority of renewable energy finance which reached USD 223 billion annually in 2019/2020, or around 69 % of total renewable energy finance. In mitigation finance flows, private investors accounted for over half (54 %) of all mitigation finance (see Figure 1).
In the Indonesian context, according to Hendriwardani et al. (2022) fossil fuels still attracted the largest share of investment in 2020 at USD 16.5 billion (around 65% of the total investment in the energy sector). While investment in renewable energy made by Independent Power Producers (IPPs), PT PLN, and other developers was only USD 1.4 billion, representing 7.8% of the total investment in the energy sector. Renewable energy investment in Indonesia is significantly lower than fossil fuel investment and insufficient to meet the 23% renewable energy target (ibid.).

Public funding is also important to support the achievement of NZE and NDC targets. Sitorus et al. (2018) stated that public finance instruments play a role in supporting clean energy development, and some are more effective in catalysing private investment. Sitorus et al. (2018) found that funding between 2012 and 2016 indicates that capital injections to state-owned enterprises and guarantees significantly impact leveraging private investment. Between 2012 and 2016, the GoI provided financial support for the clean energy development of IDR 12.4 trillion (average of IDR 2.5 trillion) per year. This financial support contributed to developing renewable energy power plants across Indonesia at least 2.140 MW or equivalent to an average of 430 MW per year.

Hendriwardani et al. (2022) also stated that public finance is the key to encouraging private investment in renewable energy. Public finance can play a de-risking role, signaling that the GoI prioritises support for the renewable energy sector. Public funding in the form of direct budget transfers, fiscal incentives, capital injections, equity investments, and public debt issuance can potentially attract private investment in new renewable energy by reducing private financial risk and mobilising private finance. One mechanism to accelerate private investment in renewable energy projects is the Green Sukuk or Green Islamic Bond to fund climate change mitigation and adaptation (Hendriwardani et al.,...
SNAPFI (2020) found that Green Sukuk is impactful in renewable energy development because it involves energy facilities construction, including solar power plants, micro-hydro and mini hydropower plants, solar-diesel hybrid power plants, biogas facilities and photovoltaic street lighting. Green projects that the Green Sukuk can finance are based on the Indonesian Climate Budget Tagging (CBT) to identify expenditures of projects delivering environmental benefits in accordance with Indonesia's climate change targets. Green Sukuk have supported the government to map green financing needs better and assist the project planning and evaluation process.

The private sector can also play a role as policy entrepreneurs. Cohen (2016) stated that policy entrepreneurs are individuals from the private, public or third sectors who take advantage of opportunities to influence policy outcomes to increase their interests. Cohen and Naor (2013) found that policy entrepreneurs have proven significant in various policy areas such as energy policy. Privates, especially those from large companies are more prone to develop a corporate political strategy (CPA) which is intended to influence government policies or processes to create a favorable environment for their business activities (Huang et al., 2017).

In addition, Andrade and Oliveira (2015) found that increasing and more direct participation of the private sector in the global climate and energy governance especially in decision-making can be problematic because of their lack of legitimacy and/or their participation have any political legitimacy. Private sectors are mainly driven by profit, therefore an expanded influence of private sectors in global climate and energy governance might trigger a shift from international environmental regulations to economic goals (Clapp and Dauvergne, 2005). Private sectors can be powerful actors in the international and national energy policy landscape, generally they lobby heavily against any form of regulation to shape international agreements and national legislation for their own interest (Andrarde and Oliveira, 2015). The challenge regarding the involvement of the private sector in climate and energy governance is finding ways to avoid their interests negatively influencing regime outcomes while also including the valuable information and resources at their disposal to support the effectiveness of the climate regime (ibidem).

### 2.1 The Roles of Private Sector in The Coal Sector

In the context of climate change, private actors have the capacity to directly shape outcomes at the national or international level (Falkner, 2008). Downie (2017) stated that business actors are critical to addressing some global environmental problems. In the energy sector, Yudha et al. (2018) also stated that the presence of private investors and business actors in the fossil energy development network plays a role in supporting business processes better. With rising coal prices and supply shortages due to disruptions, the private sector is the viable alternative to emerge from an impending crisis (APBI-ICMA, 2022a). The existence of a large number from the private sector would not only enhance supply but also trigger competition.

However, profit-oriented business actors, including in the coal sector, tend to oppose policies or regulation if the policy has a negative impact on the company business process. The private sector, especially those operating within “polluting” industries, is under pressure when it comes to improving environmental performance (Snell, 2018). On the one hand, they make strategic decisions about their
environmental footprint, but on the other hand they also consider various issues in their supply chain and business assets (Kolk, 2016; Boutilier, 2017). According to Downie (2017) the coal industry has a long history of opposing climate regulations. In the context of the coal industry in the US, leading coal industries often oppose policies related to limiting emissions from coal because it adversely affects their competitive position in the energy market (ibidem). This is driven by the fact that some of the leading coal companies rely on coal production for almost 100 percent of their revenues.

In the Indonesian context, control of natural resources in the mining sector, especially coal, is still dominated by the private sector. Due to the dynamic nature of demand and supply of fossil fuel, Indonesian policies have a significant effect on the fossil fuel industry development (Yudha et al. 2018). Leading coal companies in Indonesia are also often in conflict with carbon emission reduction plans. This is shown by the issue related to the extension of coal mining contracts by one of the leading coal companies in Indonesia (Wakik, 2022). This has resulted in the company having overused its carbon budget to reach the Paris Agreement. In addition, policies related to coal export restrictions and high taxes on coal also received rejection from coal companies because these had an impact on company revenues.

In order to ensure the security of sustainable domestic coal supply, the GoI stipulates a Domestic Market Obligation (DMO) in which coal companies are required to sell 25 % of the planned total annual coal production to meet domestic demand. According to the Minister of Energy and Mineral Resources in Tempo (2022) in the development of the energy transition which is still dominated by coal, the GoI has set a DMO to support the provision of affordable electricity. In the New Renewable Energy Bill, the DMO Policy which was originally 25 % will become 30 % of the total production. However, it is feared that this policy is not in line with the renewable energy transition effort because the increase in the portion of DMO is considered a step to support the addition of domestic coal use in the midst of efforts to achieve net zero emission targets (APBI-ICMA, 2022b; Riyandanu, 2022). The increase in DMO is also an inconsistency of the government in its commitment to make an energy transition. Based on PLN (2021), there are 10 (ten) companies with the largest coal DMO realisations as of October 2021 (see Figure 2). The PLN (2021) reported that the realisation of coal sales to DMO reached 93.16 million tons until October 2021. During that period, Bukit Asam became the largest domestic supplier of coal by selling 11.44 million tons of coal. This number even exceeds the target set for the BUMN, which is 6.05 million.
While much of the world is shifting from coal to clean energy, the Government of Indonesia (GoI) is taking steps to further strengthen the country's coal production and consumption (Coca, 2021). Politicians who own shares in coal companies are proponents of coal in Indonesia's government by demonstrating the role of coal in Indonesia's economy and energy independence (ibidem). The politician aims to encourage local and national bureaucracies to support mining so that financial interest in coal mining activities can be maintained (Atteridge et al. 2018). The involvement of individuals who hold powerful political positions and concurrent positions in the company has facilitated the phenomenon of coal and political corruption (Greenpeace-Jatam-ICW-Auriga, 2018). Suroso et al., (2021) found the phenomenon of informality in Indonesian climate and energy governance which causes issues in the energy sector such as conflict of interest among actors and inconsistent regulation and policies in the energy sector and sometimes overlap with each other. Informality in Indonesian climate and energy governance are indicated through the practice of lobbying and negotiating in the policy-making and the policy-making process is often coloured by political and economic interests (ibid.). Current energy policies in Indonesia tend to slow the energy transition by increasing the utilisation of fossil fuels rather than NRE until 2030. With the current situation, where the global trend is toward decarbonization, the private sector in Indonesia needs to transform towards renewable energy and should be involved in renewables development (Jong, 2021).
2.2 The Roles of the Private Sector in the Renewable Energy Development

Increasing global investment in climate change mitigation interventions beyond national ambitions is urgently needed. Irena (2019) states that in order to tackle the climate challenge would require cumulative investments of USD110 trillion in the energy sector through 2050. Due to limited capacity in developing countries, climate finance is urgently needed to close the financing gap. Investing in renewable energy and funding from the private sector. Developing countries will disproportionately carry the burden of climate change, on the other hand, GHG emissions will also increase along with industrial activities in developing countries, therefore, investment in low-carbon and nature-based solutions will be vital in coming years in these countries (IFC, 2016). Suroso et al., (2022) also mention that to optimise existing funding for climate change, Indonesia as a developing country should develop various financing instruments such as optimising the role of private or non-public actors.

The private sector will play a crucial role in pushing and driving the energy transition, private capital investments in sustainable infrastructure are vital to addressing the climate change impact (Meltzer, 2018; Martin, 2020). Renewable energy projects always require a huge amount of funding, national budgets or public sector investments are often insufficient to fund these projects. Therefore, private investment plays an important role in the development of renewable energy in Indonesia with all its financial and technological capabilities (Boediman et al. 2021). In order to support the transition toward renewable energy to go smoothly, the private sector needs to be involved in the development of renewable energy (Jong, 2021). Related to power generation, the private sector contributed to expanding power generation capacity in developing countries (Cugh and Singla, 2020).

Nevertheless, the involvement of the private sector in the development of renewable energy still faces numerous challenges. According to Pacific Island Forum (2021), there are some common barriers to engage the private sector in climate finance: Lack of appropriate incentives and an enabling environment to increase private sector investments; Limited understanding of the role of the private sector in accessing climate change resources; Limited understanding by the private sector on available funding sources for climate change projects; Lack of information on national initiatives and interaction by government with the private sector such as planning and implementation; Burdensome requirements and standards applied by funding agencies; and Limited capacity and ability to prepare bankable projects to mitigate the impacts of climate change.

In the context of the Indonesian energy sector, Yudha et al., (2021) stated that the most significant barriers to the transition depends on planning and implementation aspects. In general, NRE development policies in Indonesia are technically and economically unattractive to investors (The Director General of New, Renewable Energy, and Energy Conservation-Tempo, 2022). Moreover, the development of renewable energy in Indonesia faces numerous challenges that make it difficult to involve the private sector in renewable energy and energy in general, the major challenges in particular have been identified as the following:

• The inability of the government to comprehensively understand the factors needed to encourage private sector investment in the renewable energy sector and energy in general. The government’s neglect of private sectors within policy-making, where policies are often difficult and
unprofitable for renewable energy investment is also the reason why Indonesia’s energy sector is underinvested by the private sector (Maulidia, 2019; Asian Development Bank, 2019).

- The policies and regulations concerning renewable energy are fragmented and changing, which has had a discouraging impact on investment (Hendriwardani et al., 2022).
- The prevailing pricing and tariff structure is not cost-reflective and varies considerably from region to region. Current policy for IPPs and renewable energy developers does not reflect the real costs of renewable energy and is not profitable (Simanjuntak, 2021; Hendriwardani et al., 2022).
- High risk in developing renewable energy in Indonesia due to the complexity and difficulty of obtaining domestic debt for renewable energy projects. The investment risk, inconsistent policies and unprofitable pricing structure has deterred investors because renewable energy projects in Indonesia are not financially viable and are not bankable (Dutt et al., 2019; Lestari, 2021; MoEMR, 2021b; Bechauf, 2021).
- The lack of transparency and accuracy of data on financial flows, sources and allocation of public funding for renewable energy projects in Indonesia has harmed renewable energy development and hurts investment and investor confidence (Lestari, 2021; MoEMR, 2021b; OECD, 2021).
- Complicated collateral requirements make it difficult to increase the production of NRE projects (Simanjuntak, 2021).
- The cooperation mechanism of Build, Own, Operate, Transfer (BOOT) is less attractive to investors (Simanjuntak, 2021)
- Results of licensing procedures pose a high risk of loss for Independent Power Producers (IPP) (Simanjuntak, 2021).

The government has established a Feed-in Tariffs (FIT) scheme for the development of power plants through the Minister of Energy and Mineral Resources Regulation Number 4 of 2012 concerning the Purchase Price of Electricity by PT PLN (the Company) from Power Plants Using Small and Medium-scale Renewable Energy. But then the policy was changed in 2019 when the government implemented a maximum price regulation to reduce the Basic Cost of Production (BPP) of electricity and to meet electricity needs in locations where there are no other primary sources. Moreover, there is also an additional provision for price approval in which the government provides space for PT PLN and Independent Power Producer (IPP) to negotiate in determining the Power Purchase Agreement (PPA). These uncertain changes are an obstacle to increasing NRE power plant investment. Therefore, it is hoped that the government can improve existing policies in the renewable energy sector, among others by providing convenience to investors in the renewable energy sector, including effective and efficient management of renewable energy supply chains (Yudha and Tjahjono, 2019).

Given the limited capacity of the government, the involvement of the private sector engaged in the NRE is important as a stimulant in order to increase renewable energy to reduce the use of fossil fuel and achieve NZE and NDC targets. Moreover, the existence of renewable energy associations also plays an important role in accelerating energy mix targets by providing support for the implementation of established policies and regulations and providing input for the formulation of policies and regulation in the energy sector. In Indonesia, there are several associations of NRE companies (see Table 1).
For emerging and developing economies, renewable energy investment from the private sector will be indispensable. However, there are many obstacles to the deployment of private investment in renewable energy projects. World Economic Forum (2021) identified five broad areas that can be addresses these obstacles, including:

1. Transparent and regulated policies to give investors confidence in the ability to recover investment in power generation. For example, a bankable and standardized power purchase agreement (PPA).
2. Incentives for clean energy include the development of an integrated multi-year energy strategy to phase out fossil power generation, decommissioning schedule for coal-fired power plants, and implement a carbon tax.
3. Development of business-friendly policies such as no VAT (Value-added tax) on clear power sales, improved permitting processes, and allowing foreign direct investment (FDI).
4. Development of innovative financing mechanisms to mitigate risk, creating more investment opportunities, and offering additional return potential.

In the Indonesian context, the GoI has also developed several strategies to increase the attractiveness of investment in renewable energy. Several strategies include: Tariff policies to attract NRE investment in a Presidential Regulation, creating a market for renewable energy through Renewable Energy Based Industry Development (REBID) and Renewable Energy Based on Economic Development (REBED), encourage an increase in NRE power generation capacity in accordance with the RUPTL, and developing large-scale solar power plant and wind power plant to create an attractive market for investors and develop local industries (MoEMR, 2020). Related to financing, the GoI has also developed innovative financing through the issuance of Green Bonds and Green Sukuk as financial instruments to attract investors in financing renewable energy projects (Suroso et al., 2022).

<table>
<thead>
<tr>
<th>No</th>
<th>Association</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Asosiasi Produsen Biofuels Indonesia (Indonesian Biofuel Producers Association)</td>
</tr>
<tr>
<td>2.</td>
<td>Asosiasi Produsen Bioethanol Indonesia (Indonesian Bioethanol Producers Association)</td>
</tr>
<tr>
<td>3.</td>
<td>Asosiasi Panas Bumi Indonesia (Indonesian Geothermal Association)</td>
</tr>
<tr>
<td>4.</td>
<td>Asosiasi Pengusaha Minihidro Indonesia (Indonesian Mini Hydro Entrepreneur Association)</td>
</tr>
<tr>
<td>5.</td>
<td>Asosiasi Pengusaha Pembangkit Listrik Tenaga Air (Hydro Power Plant Entrepreneur Association)</td>
</tr>
<tr>
<td>6.</td>
<td>Asosiasi Hidro Indonesia (Indonesian Hydro Association)</td>
</tr>
<tr>
<td>7.</td>
<td>Asosiasi Energi Surya Indonesia (Indonesian Solar Energy Association)</td>
</tr>
<tr>
<td>8.</td>
<td>Asosiasi Pabrikan Modul Surya Indonesia (Indonesian Solar Module Manufacturers Association)</td>
</tr>
<tr>
<td>9.</td>
<td>Asosiasi Energi Laut Indonesia (Indonesian Ocean Energy Association)</td>
</tr>
<tr>
<td>10.</td>
<td>Indonesian Renewable Energy Society (METI-IRES)</td>
</tr>
</tbody>
</table>
2.3 Key takeaways

— The presence of private sectors in the development of renewable energy plays an important role in providing knowledge and material resources, technical/operational support, and financing which further increase capacity to advocate for institutional change and increase climate and energy governance efficiency.

— The direct participation of the private sector in climate and energy governance can be problematic due to a lack of legitimacy or a profit orientation. The private sector generally lobbied heavily against any regulation to shape international agreements and national legislation for their own benefit.

— The private investors and business actors in the fossil energy development network play a role in supporting business processes better. The existence of the private sector would not only enhance energy supply but also infuse competition. However business actors in the coal sector tend to oppose policies or regulation if the policy has a negative impact on the company business process.

— The role of private sectors in the energy transition are vital to addressing the climate change impact with all its financial and technological capabilities. However, Indonesia's energy sector is underinvested by the private sector due to uncertain and unprofitable policies in renewable energy investment.

— To increase the attractiveness of renewable energy investment, the GoI has developed several strategies such as: Tariff policies, creating a renewable energy market, increasing NRE power generation capacity, developing large-scale solar and wind power plants, and issuing Green Bonds and Green Sukuk.
Chapter three

Methods
3. Methods

This section elaborates the methods utilised in this study, both in collecting and collating data and the following analytical framework.

3.1 Data collection

This study employs a qualitative approach to answer the research question. The data were collected through in-depth interviews and literature review. Several respondents coming from various institutions in Indonesia related to the energy sector were interviewed in the period of 2021 until March 2022 (see Table 2). Also, the interview notes from several respondents of our previous studies (Suroso et al., 2020; 2021) will also be re-analysed and contextualised within this study.

Table 2 List of respondents

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Position/Profession</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Former Advisor</td>
<td>Coordinating Ministry of Maritime Affairs and Investment</td>
</tr>
<tr>
<td>B</td>
<td>Vice President</td>
<td>Geothermal power plant company</td>
</tr>
<tr>
<td>C</td>
<td>CEO</td>
<td>Coal company</td>
</tr>
<tr>
<td>D</td>
<td>Staff</td>
<td>Coal company</td>
</tr>
<tr>
<td>E</td>
<td>General Secretary</td>
<td>AESI</td>
</tr>
<tr>
<td>F</td>
<td>Member</td>
<td>DEN</td>
</tr>
<tr>
<td>G</td>
<td>Political scientist</td>
<td>BRIN</td>
</tr>
<tr>
<td>H</td>
<td>C-level person</td>
<td>Medco Energy</td>
</tr>
<tr>
<td>Y1 - A</td>
<td>Director of Energy, Mineral, and Mining Resources</td>
<td>Ministry of National Development Planning</td>
</tr>
<tr>
<td>Y1 - C</td>
<td>Associate – Debt Capital Markets at HSBC Global Banking and Markets</td>
<td>HSBC</td>
</tr>
<tr>
<td>Y2 - A</td>
<td>Public policy expert</td>
<td></td>
</tr>
<tr>
<td>Y2 - B</td>
<td>Former Deputy</td>
<td>Presidential Chief of Staff Office</td>
</tr>
<tr>
<td>Y2 - D</td>
<td>Senior New Venture Development</td>
<td>Star Energy Development</td>
</tr>
</tbody>
</table>
The interview transcripts were then analysed using content analysis. The excerpts were systematically coded and interpreted. The official statistics, reports, regulations, and national and local news were also collected to be analysed qualitatively, and added into the content analysis result.

### 3.2 Analysis

In this study we employed public policy evaluation analysis with the main focus on the efforts towards achieving NDC by 2030 and transitioning into NZE by 2060. The main framework initially was done by employing the concept of Regulatory Impact Assessment which tried to propose several scenarios first, before the implementation feasibility was assessed (Radaelli, 2004; OECD, 1997). As this approach is an ex-ante evaluation, the main assumption in this study is that the government will maintain a cost-efficient policy making process to balance competing interests, while at the same time maintaining the process’ quality by contextualising an array of emerging policies, disciplines, and frameworks (Shah, 2018). Using the previous study’s analytical framework (ibid.), we devised several Mandatory Instruments and Voluntary Instruments that are possible for the GoI to select and act upon to succeed the targets aforementioned. The evaluation criteria was developed not only by adapting ex-ante evaluation method\(^1\), but also by adapting energy policy’s evaluation criteria in the previous study (Shah, 2018).

The Mandatory instruments and Voluntary Instruments to be implemented were then assessed by considering its possible effects and externalities (see Table 3). The findings from our previous studies (Suroso et al., 2020; Suroso et al., 2021) were also interpreted and contextualised. We provided statistical facts, regulations, and discourses related to assessing all the criteria. Besides those, using content analysis, we knitted the findings from interviews to complement the overall energy policy evaluation analysis. The evaluation criteria will be elaborated in Section 5.

\(^1\) As the criteria for ex-ante evaluation analysis by JICA (2015) consists of relevance, effectiveness/impact, efficiency, and sustainability, a trenchant set of criteria will be developed to elaborate the public policy evaluation in the Indonesian energy sector.
Table 3 Mandatory and voluntary instruments in this study

<table>
<thead>
<tr>
<th>Mandatory/Voluntary Instruments</th>
<th>Explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRE Act</td>
<td>Still in draft version</td>
</tr>
<tr>
<td>Incentivising IPPs in renewables sector (through feed-in-tariff policy)</td>
<td></td>
</tr>
<tr>
<td>Enabling the carbon market in Indonesia</td>
<td></td>
</tr>
<tr>
<td>Galvanising the role of DEN in the energy policy making</td>
<td></td>
</tr>
<tr>
<td>Localisation on RE technologies (battery and TKDN)</td>
<td>Incentive for RE suppliers</td>
</tr>
<tr>
<td>Developing carbon capture and storage technologies</td>
<td>Incentive for RE suppliers</td>
</tr>
<tr>
<td>Minimising Politically-Exposed Persons in coal sector</td>
<td>Disincentive for coal energy suppliers</td>
</tr>
<tr>
<td>Higher tax on coal supplier</td>
<td>Disincentive for coal energy suppliers</td>
</tr>
<tr>
<td>Limitations on coal export</td>
<td>Disincentive for coal energy suppliers</td>
</tr>
<tr>
<td>Subsidised electricity price from PLN</td>
<td></td>
</tr>
<tr>
<td>Simplified procedure for installing home solar PV</td>
<td></td>
</tr>
</tbody>
</table>
Chapter four

Indonesia energy outlook 2022
4. Indonesia energy outlook 2022

4.1 Indonesian Energy Policies

In 2021, Indonesia updated its Nationally Determined Contribution (NDC) submitted to the UNFCCC. Indonesia voluntarily pledged to reduce greenhouse gases (GHG) emissions by 29% on its own efforts, and up to 41% with international support, compared to the business-as-usual (BAU) scenarios of 834 MtCO$_2$e and 1,185 MtCO$_2$e, respectively, by 2030. However, the updated NDC did not increase its climate mitigation targets, only reflecting the progression beyond the existing NDC and a new set of activities in the adaptation strategy. The updated NDC reflects progress beyond the existing NDC, particularly through:

- Enhancing ambition on adaptation;
- Enhancing clarity on mitigation by adopting the Paris Agreement rule book (Katowice Package);
- Aligning the national context relating to the existing condition;
- Enacting milestones along with national development for 2020-2024;
- Providing indicative pathways towards Vision Indonesia 2045 and the Long-Term Strategy on Low Carbon and Climate Resilient Development 2050 (LTS-LCCR 2050);
- Translating the Paris Agreement Rule Book (Katowice Package) into Indonesia's context.

In addition, Indonesia also submitted a Long-Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR) 2050, which aims to contribute to achieving global goals and national development objectives by considering the balance between emission reduction, economic growth, justice, and climate resilience development. Several things listed in the LTS-LCCR 2050 are the achievement of Indonesia’s first NDC targeted in 2030, and then Indonesia will achieve net-zero emission (NZE) by 2060 or sooner. However, according to IESR (2021b) the LTS-LCCR's low carbon scenario still incorporates a high portion of fossil fuels (share of CFPP is still 38% in the primary energy mix) and the use of CCUS despite estimates showing that such technological options will become more costly (78% of is equipped with CCS that may cause higher LCOE).

On the way to the G20 presidential forum, the GoI introduced a scenario to achieve the NZE target by 2060 or sooner, as outlined in the National Energy Grand Strategy (GSEN), which includes a plan to transition from fossil energy to renewable energy (MoEMR, 2022b). In the GSEN, the target for renewable energy mix is 100% by 2060, with a capacity of 587 Gigawatt (GW), including solar power plants 361 GW, hydropower plants 83 GW, wind farms 39 GW, nuclear power plants 35 GW, bioenergy power plants 37 GW, geothermal power plants 18 GW, and ocean currents power generation systems 13.4 GW. After 2030, additional power plants will only come from renewable energy; then starting in 2035 it will be dominated by Variable Renewable Energy (VRE) in the form of solar power plants, and in the following year, it will become wind farms and ocean current power plants. Geothermal power plants will also be maximised up to 75 per cent of its potential. However, according to the Minister of Energy and Mineral Resources in Tempo (2022) Indonesia has great geothermal potential but is still constrained by its expensive development, therefore the GoI is preparing regulations to support geothermal development. On the other hand, there will be no additional coal-fired power plants except those that have reached financial close and are under construction.
Indonesia also signed four strategic cooperations towards NZE 2060 or sooner between PT PLN and related stakeholders (MoEMR, 2022c). The four cooperations are:

1. Memorandum of Understanding (MoU) on the Construction of a Public Electric Vehicle Charging Station with the Association of State-Owned Banks or Himbara, consisting of PT. Bank Mandiri, PT. Bank Rakyat Indonesia (BRI), PT. Bank Negara Indonesia (BNI), and PT. Bank Tabungan Negara (BTN).
2. Power Purchase Agreement (PPA) for two projects, namely the development of solar power plants in Bali with Medco Power and the development of the Kukusan-2 5.4 MW Mini Hydro Power Plant in Lampung with Arkora New Energy.
3. Renewable Energy Certificate from PT PLN to 6 companies for more than 500 MWh per year from PLN's NRE generators.

The Indonesian government's commitment to climate change was also demonstrated by the launch of the Country Platform for the Energy Transition Mechanism (ETM) together with the Asian Development Bank (ADB) and PT Sarana Multi Infrastruktur (PT SMI)(Ministry of Finance 2022). The country platform for ETM is a framework that provides the financing needed to accelerate the national energy transition by mobilising funds from public and private sources in a sustainable manner. ETM consists of two schemes. First, Indonesia's Carbon Reduction Facility (CRF) scheme is used for the early retirement of coal-fired power plants (PLTU). Second, the Clean Energy Facility (CEF) scheme to develop or invest in the construction of green energy facilities.

Besides the international commitment through NDC and NZE in the climate sector, the Indonesian energy sector also has a different policy trajectory, namely The national energy policy (Kebijakan Energi Nasional-KEN 2014, RUEN 2017, RUKN 2019-2038, RUPTL 2021-2030, and Presidential Regulation 98/2021 on the Implementation of Carbon Economic Value. KEN 2014 aims to optimise the energy mix and stipulates that renewable energy should be at least 23 % of the energy mix by 2025. However, projections in 2025, coal will remain Indonesia's most significant energy source with a proportion of 30 % in the energy mix. KEN is then detailed in the National Energy General Plan (RUEN) 2017. The main Indonesian energy policies (KEN and RUEN) state the renewable energy share target is 23 % in 2025 and 31 % in 2030. According to IESR's study (2021b), with the current slow renewables growth, the share of renewable energy will only reach 15 % in 2025 and 23 % in 2030. Electricity Supply Business Plan (RUKN) 2019-2038 contains the national electricity policy, the direction of developing electricity supply, the current condition of electricity supply, and the projected electricity demand for the next 20 years. Furthermore, in the newly released RUPTL 2021-2030, there is an increase in the addition of new renewable energy capacity. However, coal will still dominate the overall generation mix for the next ten years. In the renewable energy context, the GoI, through the Ministry of Energy and Mineral Resources, also updated and improved the MoEMR Regulation number 26/2021 on rooftop solar PV.
4.2 Energy Dominance of Fossil Fuels

The energy resources in Indonesia can be divided into energy development and consumption. Based on Figure 3, the trend of primary energy supply decreased in 2020 and then increased in 2021 to 1,546,557,232 Boe. However, the energy supply in 2021 is still dominated by coal at 36.15 % and crude oil & product 32.09 %. Meanwhile, biomass and biofuel contributed 8.15 % for renewable energy, followed by hydropower 2.97 %, geothermal 1.91 %, wind 0.069 %, and solar PV 0.051 %. This shows that renewable energy is still underutilised. The following is a description of the primary energy supply from 2008-2021 in Figure 3 and an overview of the primary energy supply in 2021 in Figure 4.

**Figure 3** Primary Energy Supply 2008–2021(BOE)

Source: MoEMR, 2022a
Based on data from the Ministry of Energy and Mineral Resources, the achievement of NRE in the national energy mix has reached 13.53% as of April 2021 (IESR, 2021b). This number has increased by 2.04% in four months compared to data at the end of last year, which was only 11.51 per cent. The installed capacity of renewable energy only increased by 386 MW in Q3 2021 with the dominance of 130 MW hydropower, 71.26 MW micro hydropower, 55 MW geothermal, 19.5 MW bioenergy, and 17.88 MW solar PV (MoEMR, 2021). This achievement is still far below what is needed to achieve the 23% target (IESR, 2021b). In addition, coal still dominated the power generation by contributing 66% of total power generation in 2021.

In 2022 Indonesia announced its commitment to reaching net-zero by 2060 or sooner and phasing out CFPP (Coal Fired Power Plant) by 2040 (with international support). However, the implementation of COP26 also raises new issues in the energy sector. For example, in the closing stages of the UN COP26 summit, India and China succeeded in weakening the effort to end coal power and fossil fuel subsidies by bringing countries to agree to „phase down“ rather than „phase out“ coal. This issue certainly has a significant impact on the future of the energy sector, especially in a country with abundant coal resources such as Indonesia.

Indonesia is still reluctant to move away from coal. According to MoEMR (2022a), Indonesia’s coal production reached 606.22 million tons in 2021. This realisation increased by 7.2% compared to 2020, which was 565.69 million. The realisation of production in 2021 is 96.99% of the target of 625 million tons. Related to coal exports, the trend of coal exports has decreased in the last two years, especially during the pandemic. Coal exports declined by 26.97% to 331.94 million tons in 2020. Furthermore, coal exports fell by 8.15% to 304.9 million tons in 2021 (MoEMR, 2022a).
**Figure 5** Indonesia Annual Coal Production 2014-2021

![Graph showing Indonesia annual coal production from 2014 to 2021.](image)

Source: MoEMR, 2022a

**Figure 6** Indonesia Annual Coal Export 2015-2021

![Bar chart showing Indonesia annual coal export from 2015 to 2021.](image)

Source: MoEMR, 2022a
### 4.3 Indonesian Renewable Energy Development

According to IESR (2021b), the long-awaited Indonesian renewable energy law such as Presidential Regulation on Feed in Tariff, regulation on energy conservation, and Presidential Regulation on Carbon Economic Value suffer more delays this year. The delays extend uncertainty to investors in renewable energy development. This year, renewable energy development in Indonesia remains sluggish and far below what is needed to achieve the 23% energy mix target in 2025. Installed renewable energy capacity only increased by 386 MW by Q3 2021 with the dominance of 291 MW hydropower, 55 MW geothermal, 19 MW bioenergy, and 21 MW solar PV (IESR, 2021b; MoEMR, 2021).

**Figure 7** Renewable Installed Capacity (on-grid) in 2021 (MW)

In addition, coal still dominated power generation by contributing 66% of total power generation in 2021, while renewables only contributed around 13%. According to PLN (2021), Indonesia's energy mix will continue to be dominated by coal until 2030 (59.4%) if it follows the low-carbon scenario. National coal power generation is projected to continue to grow from 194,558 GWh (2021) to 264,260 GWh (2030). Fuel power generation will be the only energy source to be reduced from 10,222 GWh (2021) to 1,798 GWh (2030).
In order to achieve carbon neutrality in 2060, PLN proposes two scenarios: the first scenario focuses on the use of renewable energy plus storage and nuclear power to replace the Coal-fired Power Plant (CFPP) (IESR, 2021b). And the second scenario is to combine the use of renewable energy, nuclear power, and coal plus CCUS. In Tempo (2022) through an interview with the Director General of New, Renewable Energy, and Energy Conservation, it was also stated that nuclear power is planned to be built in 2040–2050 to achieve the NZE projection in 2060. Nuclear development in 2040 in the Nuclear Energy Law is intended as a base load to compensate for the intermittent solar and wind power plants. However, the inclusion of nuclear power is still seen as a distraction to the development of renewable energy in Indonesia, even though it has low emissions, one of which is because technology is considered as “immature” technology (IESR, 2021b).
4.4 Key takeaways

- In order to achieve the NDC target and towards net zero emissions, key policies and regulations in the energy sector such as NDC, LTS-LCCR, KEN and RUEN, RUPTL 2021-2030 and regulation No. 26/2021 on rooftop solar PV were updated and improved. However, these policies still incorporate a high portion of fossil fuels, especially coal. With the current slow renewables growth, it is predicted that the share of renewable energy will only reach 15% in 2025 and 23% in 2030.

- Renewable energy in Indonesia is still underutilised. Coal still dominated the power generation by contributing 66% of total power generation in 2021, while renewables only contributed around 13%.

- Renewable energy development in Indonesia remains sluggish and far below what is needed to achieve the 23% energy mix target in 2025. However, if it follows the low-carbon scenario, Indonesia’s energy mix will continue to be dominated by coal in 2030 (59.4%). In addition, policy uncertainty over renewable energy laws hinders investor engagement in NRE development.
Chapter five
Results
5. Results

In this section, the energy policy evaluation analysis will be elaborated, followed by the baseline condition enabling the private sector’s involvement in the Indonesian energy landscape. The role of the private sector in the Indonesian energy landscape will be elaborated next, followed by the extent to which the private sector can contribute to climate change mitigation.

5.1 Energy Policy Evaluation Analysis Result

This section will explore the evaluation criteria first, followed by a brief explanation of the mandatory and voluntary instruments that are being evaluated. Finally, the evaluation result will be presented.

5.1.1 Evaluation criteria

In this study, several main criteria have been developed from a previous study (Shah, 2018) and chosen to represent the dimensions of which a certain public regulation can contribute to. These main criteria are then broken down into sub criteria. The overall evaluation criteria can be seen in Table 4. We also devise simple parameters to assess the performance of every policy instrument that will be summarised in the scorecard (see Table 8).
<table>
<thead>
<tr>
<th>Ex-ante evaluation criteria</th>
<th>Main evaluation criteria</th>
<th>Sub criteria</th>
<th>Explanation</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness/Impact</td>
<td>Increase of renewables share in the energy mix and environmental effects</td>
<td>Direct effect on the increase of renewables share in the energy mix</td>
<td>+ sign: Direct effects - sign: Indirect or no effect(s)</td>
<td></td>
</tr>
<tr>
<td>Effectiveness/Impact</td>
<td>Additional effects on the increase of renewables share in the energy mix</td>
<td>Positive environmental effects such as greenhouse gas emission reduction</td>
<td>+ sign: Direct additional effects - sign: Indirect or no additional effect(s)</td>
<td></td>
</tr>
<tr>
<td>Effectiveness/Impact; Relevance</td>
<td>Political and social acceptability</td>
<td>Competitiveness</td>
<td>Measures the policy instrument’s capacity to positively or negatively influence the how the country’s economy reacts to national or international changes</td>
<td>+ sign: The policy instrument motivates the nation’s economy to react to national or international changes; - sign: The policy instrument motivates the nation’s economy to negatively react to national or international changes</td>
</tr>
<tr>
<td>Effectiveness/Impact; Relevance</td>
<td>Social equity</td>
<td></td>
<td>Measures the fairness in renewables development of the policy instrument between the stakeholders regarding costs and benefits.</td>
<td>+ sign: The policy instrument promotes fairness in renewables development between stakeholders regarding costs and benefits; - sign: The policy instrument does not/slightly promote fairness in renewables development between stakeholders regarding costs and benefits.</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Flexibility</td>
<td></td>
<td>The ability of the instrument options to be manipulated to consider cost and timeframe changes given potential changes such as overachievement of the targets, technology innovative activities and others.</td>
<td>+ sign: The policy instrument is easily manipulated; - sign: The policy instrument is difficult to manipulate.</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>Transparency and accountability</td>
<td></td>
<td>Shows whether the implementation and application of the policy instrument is transparent for all stakeholders. In addition, it indicates whether the accountability is clear or not.</td>
<td>+ sign: The policy instrument promotes transparency and accountability; - sign: The policy instrument does not promote transparency and accountability.</td>
</tr>
<tr>
<td>Efficiency; Relevance</td>
<td>Feasibility of implementation</td>
<td>Implementation network capacity</td>
<td>Indicates the extent to which responsible actors (ministries, authorities, etc.) are able to design, support and manage the implementation of the policy instrument. Factors such as trained personnel, technological, infrastructure, credibility and transparency determine capacity.</td>
<td>+ sign: The policy instrument requires a narrow extent of actors’ capacity; - sign: The policy instrument requires a wide extent of actors’ capacity.</td>
</tr>
</tbody>
</table>
In this study, there are three main criteria used to assess the mandatory and voluntary instruments in regards to the energy policies and their connection to climate change mitigation: increase of renewables share in energy mix and environmental effects; political and social acceptability; and feasibility of implementation.

**5.1.2 Mandatory and voluntary instruments**

As this study assesses the impact of energy policy options in Indonesia, we propose several mandatory and voluntary instruments that can contribute to achieve NDC by 2030 and also NZE by 2060. Mandatory instruments are mostly concerned with the regulation dimension of the energy sector, while voluntary instruments are developed regarding supply-demand dynamics within both coal and RE sectors. Mandatory instruments tend to be obligatory due to the regulation being either an operationalisation of an international pledge or the convergence of a policy trajectory. Voluntary instruments include policies that might not be strategically situated in the main energy policies but needed to support the implementation of mandatory instruments. The mandatory and voluntary instruments are as follows:

**1. Mandatory instruments**

**a. NRE Act**

NRE Act will be a bill proposed to specify the 2007 Energy Act with the targets set in NDC regarding GHGs emission. Besides improving the efforts to minimise GHGs emissions, the NRE Act will also emphasise the targets set in KEN 2015, which are the 23% share of renewable energy in the energy mix by 2025 and improving the electrification rate, particularly in the frontier areas.

The NRE Act is currently still in a draft version. Several public hearings have been held since 2020, but it has not been effectively enacted yet. During a public hearing in 2020, our team was invited by the House of Representatives of Indonesia (DPR) to provide opinions on the bill draft. Our team found that there are no parts mentioning the climate change situation or policies in the draft version, although its
brief explanation is found in the academic paper of the pertaining act. This situation suggests that the NRE Act looked like a stand-alone regulation only focusing on the energy sector without considering its potential impact on the climate change sector.

b. Incentivising IPPs in the renewables sector (through feed-in-tariff policy)

As the renewables market in Indonesia is still nascent, several regulations have been enacted to incentivise the IPPs in the renewable energy sector particularly through the feed-in-tariff policy. The feed-in tariff policy has also been specified by renewable energy sources, such as geothermal, mini and micro hydro, biomass, municipal solid waste, and solar PV (see Figure 9). From this policy trajectory, the latest Ministerial Regulation of EMR 7/2018 and Ministerial Regulation of EMR 9/2018 repeal the previous regulation, meaning that there has been no effective feed-in tariff policy until now. However, Table 5 displays several baselines set as a precedent for future feed-in tariffs specified by renewable energy sources.

**Figure 9** The feed-in-tariff policy trajectory

Source: Authors’ analysis (2022)
Table 5 Feed-in-tariff in Indonesia

<table>
<thead>
<tr>
<th>Energy sources</th>
<th>Feed-in-tariff2</th>
<th>Condition</th>
<th>Relevant regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geothermal</td>
<td>US$ 11.8 - 25.4/kWh (around Rp 173,734.83 - Rp 373,971.58/kWh)</td>
<td>Depends on location, whether the power plant is connected to a high- or medium voltage network, and based on year (where for different areas, price increase rate is also different).</td>
<td>Ministerial Regulation of EMR 17/2014</td>
</tr>
<tr>
<td>Mini and micro hydro</td>
<td>Rp 656 - 1,506/kWh (USD 0.045 – 0.1/kWh)</td>
<td>&lt;10 MW, dependent on location and whether connected to low or medium voltage network</td>
<td>Ministerial Regulation of EMR 4/2012</td>
</tr>
<tr>
<td>Biomass</td>
<td>Rp 975 - 1,722.5/kWh (USD 0.066 – 0.12/kWh)</td>
<td>&lt;10 MW, dependent on location and whether connected to low or medium voltage network</td>
<td>Ministerial Regulation of EMR 4/2012</td>
</tr>
<tr>
<td>Municipal solid waste (non-biogas)</td>
<td>Rp 1,050 - 1,398/kWh (USD 0.071 – 0.095/kWh)</td>
<td>&lt;10 MW, dependent on location and whether connected to low or medium voltage network</td>
<td>Ministerial Regulation of EMR 4/2012</td>
</tr>
<tr>
<td>Municipal solid waste (landfill gas)</td>
<td>Rp 850 - 1,198/kWh (USD 0.058 – 0.081/kWh)</td>
<td>Purchase agreements through tenders. Price ceiling dependent on use of 40% local materials</td>
<td>MoEMR Regulation No. 17 of 2013</td>
</tr>
<tr>
<td>Solar PV</td>
<td>Price ceiling US$ 0.25 - 0.30/kWh (Rp 3,680.82 – 4,416.99/kWh)</td>
<td>Purchase agreements through tenders. Price ceiling dependent on use of 40% local materials</td>
<td>MoEMR Regulation No. 17 of 2013</td>
</tr>
</tbody>
</table>

Source: Halstead et al. (n.d.), Authors’ analysis (2022)

Feed-in-tariff will also be regulated by the NRE Act, which is still in draft. However, experts said that the feed-in-tariff stated in the draft is going to be too expensive in the future, as the global trend of renewables price is decreasing and thus will not be contextual once the Act is finally effective (Faizal, 2021).

c. Enabling the carbon market in Indonesia

The carbon market in Indonesia has been seen as an alternative in achieving the NDC. The enactment of Presidential Regulation 98/2021 about the Carbon Economic Value invites not only governments of Indonesia on any hierarchy level to contribute to the measurement of carbon emission, but also the private sector to take the opportunity and synchronise their business activities and minimise the carbon emission. Other goals also include to support a more efficient investment in greener industry and R&D for greener technology (Ministry of Finance, 2021). This presidential regulation comprises four mechanisms: carbon emission trade, also including carbon emission offset; result based payment; carbon tax; and the combination of the other three. However, the carbon tax will be effective around July 2022, where it was supposed to be in April 2022 mostly due to the synchronisation with other tax regulations (Hamdani, 2022). According to the Minister of Energy and Mineral Resources in Tempo (2022) stated that the implementation of the carbon tax is still waiting for the right time. The carbon tax has previously been implemented but with the current crisis conditions, the implementation of the carbon tax will begin in 2023. The focus of the carbon tax is on the Coal-fired Power Plant (CFPP), although it will burden PLN, it is hoped that PLN must be proactive in reducing emissions, one of which is by using gas as a transition bridge from heavy carbon, medium, low and zero carbon.

2 The reference price is used is USD 1 – Rp 14,723.29
2. Voluntary instruments

a. Galvanising the role of DEN in the energy policy making

Despite the centrality of the Ministry of Environment and Forestry (MoEF), the Ministry of National Development Planning (MoNDP), and the Ministry of Energy and Mineral Resources (MoEMR), National Energy Council (DEN) is also central in overseeing the coordination between pertinent ministries in implementing the NDC (Suroso et al. 2020; Suroso et al. 2021). However, it is indicated that the process of promulgating certain regulations and policies are still coloured by informality in governance (Suroso et al., 2021). After the Reform era, the boundary between politicians and businessmen is getting blurry, which is reflected, for example, by the number of Politically Exposed Persons (PEPs) coming from the fossil fuel sector and holding positions in executive or legislative institutions.

The structure of DEN is also intricate. While the independent institution advises the President on the energy sector, the internal composition of it is dominated by the pertinent Ministers, such as the Minister of EMR. Oftentimes the MoEMR is perceived to bypass the DEN's authority and enact the regulations that have not been discussed with the members of DEN in the meetings. This condition refers to the fact that the Acting Head of the DEN is the Minister of EMR, who also has the capacity to enact Ministerial Decree or Ministerial Regulation. Moreover, internal conflicts within the DEN are also triggered by political business competition, where political parties have business interests behind the formulation of energy policies inside DEN. Another example of conflicts of interest is within PLN, in which the Directorate General of Electricity in MoEMR is also the commissioner of PLN. It is also found that there are small informal groups consisting of politicians who are also businessmen in the coal sector, advocating their interest in Indonesian energy policy-making. Such absence of a clear hierarchy of authority among the various institutions involved in the climate change policy-making process, including in energy, has made various institutions develop and lead particular programmes on climate change fitted to the interest of each institution.

Such urgency is also driven by the process of updating the National Energy Policy (KEN) to accelerate the achievement of the national energy mix, which is arguably still coloured by political bargaining processes, where many political parties having business interests are also involved in the policy-making process. The role of DEN remains paramount in leading the KEN updating process while at the same time minimising the influence of PEPs from the fossil fuel sector. The independence of DEN needs to be amplified and thus distinguished from the interest of political parties and businesses.

b. RE and bridging fuel supplier incentives

To motivate the private sector to contribute to achieving NDC by 2030, renewable energy and bridging fuel suppliers need to be incentivised. We propose localisation on RE technologies and the development of CCUS technologies as options for the incentive.

— Localisation on RE technologies

The renewable energy industry does not only cover the power generation sector, but also the manufacturing sector. In Indonesia, the Ministry of Industry has made the National Industry Master Plan (Rencana Induk Perindustrian Nasional/RIPIN) that lasts from 2015 to 2035. This master plan
aims to enhance the economic performance of Indonesia, while at the same time extending the access to job opportunities for local workforces. In this document, indeed renewable energy industries are among national priorities, particularly in the stage of 2020-2035. The industries aforementioned will be focused on electricity generators, battery, solar cell, and nuclear power plants.

One of the instruments seemingly used to ensure the localisation of the RE industry is Manufactured Local Content Level (Tingkat Komponen Dalam Negeri/TKDN). As mandated by the Industry Act 2014 and Governmental Regulation 29/2018, it was highly suggested that every national industry should: do the production domestically–where it should lead to the efficient industrialisation; improve the access to job opportunities for local workforces; maximise foreign exchange saving; and decrease the government's expenditure dependency on foreign products. For the renewable energy sector for electricity generation, TKDN in this sector is expected to be around 40% (see Table 6).

<table>
<thead>
<tr>
<th>TKDN for RE power plant</th>
<th>Baseline in 2019</th>
<th>Target in 2024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar PV</td>
<td>40 %</td>
<td>40 %</td>
</tr>
<tr>
<td>Bioenergy</td>
<td>40 %</td>
<td>40 %</td>
</tr>
<tr>
<td>Geothermal</td>
<td>30 %</td>
<td>35 %</td>
</tr>
</tbody>
</table>

Source: Medium Term National Development Plan (RPJMN) 2020-2024

The next one is the localisation of RE technologies. RE technologies can be distinguished based on the innovation needed, which furthermore can be categorised by its design capabilities and manufacturing capacities needed for innovation (see Figure 10). This classification considers the knowledge acquisition, technology transfer, and learning processes involved, as well as the role of home markets in the formation of a domestic industry that differ strongly between the technologies (Schmidt and Huenteler, 2016). Several supporting industries include fabrication and manufacturing, but other RE industries are also heavy on design innovation.
The localisation of RE technologies is important as starting in 2025, the GoI will develop a super grid to improve energy access and thus minimise the gap in electricity demand between frontier areas and on-grid areas. To support this, other technologies will also be developed, such as smart grid, smart metre, and energy storage technologies including pumped storage and Battery Energy Storage System (BESS).

- Developing CCUS technologies

Carbon capture, utilisation, and storage (CCUS) technologies are developed as a complementary to RE development, as a logical reason for the GoI—pressured by both global communities and national PEPs from the coal sector—to solve energy trilemma. CCUS technologies also cover clean coal through ultra supercritical coal power plants and biomass co-firing. Currently, CCUS technology has become a national discourse in minimising the GHGs emission from the electricity generation, as old coal power plants operation will be either stopped or enhanced by this technology. Concerning the nation’s abundance of coal, several argue that CCUS technology can act as a supporter of bridging fuel, particularly in managing energy trilemma, while the other demand that using this technology perpetuates the hurdles hindering climate change mitigation efforts. According to the Minister of Energy and Mineral Resources in Tempo (2022) the development of CCUS technology is one strategy to respond to PT PLN’s excess electricity capacity by increasing demand.

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c. Coal supplier disincentives

— Minimising Politically-Exposed Persons in coal sector

This policy instrument is chosen due to the fact that the Indonesian energy landscape cannot be fully cleared from the political and business interests. It is found that 40 out of 90 PLTU companies have directors and commissioners as Politically-Exposed Persons (PEPs), a person with public authority and/or person has registered political party affiliations (Yazid et al., 2021). There are also directors of state-owned enterprises who also become commissioners in private companies at the same time. This situation triggers "backstage" practices, which include lobbying and political transactions leading to seemingly "formal" corruption due to a lack of transparency and accountability mechanism, and thus these power holders can easily sway policies leaning to their interests (Makki, 2021). From the government's perspective, such an absence of a clear hierarchy of authority has enabled the governmental institutions to develop and lead particular programmes on climate change fitted to interest of each their own (Resosudarmo et al., 2013).

— Higher tax on coal supplier

The higher tax on coal suppliers has been regulated on Governmental Regulation 15/2022 to change the coal mining contract to be a coal mining licence. In this instrument, the non-tax national income tariff from the coal sector is progressively calculated based on coal reference price. This regulation should ensure higher non-tax national income, particularly when the coal sector has a 6.6% growth rate in 2021, exceeding overall GDP growth rate.

— Limitations on coal export

During January 2022, there was a coal export ban in Indonesia. This ban is effective since the domestic market obligation that accounts for 5.1 million tonne has not been fulfilled by coal companies until December 2021, as they only provide 35 thousand tonne. This national electricity emergency seems to be not seriously responded to by the coal companies, as they were still exporting coal to other countries. However, the coal export ban has been lifted in February 2022 for several conditions: if the companies have fulfilled 100% of their DMO in 2021; if they want to pay the compensation fee for the shortfall in fulfilling the DMO in 2021; or if they did not have DMO in 2021.

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7 Interview with Respondent Y2 - A, 2021.
d. Direct consumer incentives for renewables utilisation

— Subsidised electricity price from PLN

Energy Act 2007 and Electricity Act 2009 has mandated the government to subsidise the citizens who have low affordability. However, there have been several changes in subsidy mechanisms, particularly in electricity. In 2010 and 2013, there was an increase in electricity cost, where all 38 customer classifications received subsidies from the government\(^{12}\). While currently the electricity cost is around Rp 1,400-1,500/kWh (USD 0.096 - 0.10/kWh), the government will try to specify the right subsidy recipients, particularly the households connected to 450 and 900 VA apparent power grid, so they can only pay for Rp 400 - 600/kWh (USD 0.027 - 0.041/kWh).

— Simplified procedure for installing home solar PV

As stipulated in Ministerial Regulation of EMR 49/2018, not all PLN customers can install the solar PV panels, as it is limited only to households, governmental offices, and civil society organisations. The power capacity for solar rooftop panels is limited to 90% from connected apparent power from PLN. The power capacity is set through a hybrid total power inverter. The customer can then apply to a local office of PLN for the EX-IM electricity metre designed specifically for on-grid solar panels. They also have to apply for the change of prepaid electricity to postpaid one.

5.1.3 Evaluation result

In this section, the mandatory and voluntary instruments are elaborated based on the evaluation sub-criteria to compare between instruments.

a. Direct effect on the renewable energy share increase in the energy mix

In this sub criterion, all mandatory instruments were assessed to be able to directly increase the renewable energy share in the Indonesian energy mix by 2030. Firstly, the NRE Act has the fundamental potential in doing so, since the Act will provide legal certainty for NRE development and utilisation, strengthening NRE governance and institutions, creating a nurturing investment climate for NRE investors and optimising NRE resources in supporting industrial and economic development\(^{13}\). Next, the feed-in tariff will provide a competitive advantage of RE over fossil fuel in the energy sector, arguably due to the fact that the policy is the effective incentive for IPPs (Simanjuntak, 2021; Lu et al 2020). Another study also signifies that feed-in tariff policy positively influences and correlates with the renewable energy utilisation growth (Kersey et al., 2021). Next, the enabling of carbon market in Indonesia will arguably increase the cost of fossil energy i.e. coal which is currently the cheapest source of energy for power generation, thus the price of NRE will be competitive and thus increase the development of NRE\(^{14}\). The carbon market is therefore important in leading the energy sector by

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incentivising those who develop clean energy and disincentivising those who develop energy from fossil fuels, particularly in the condition where Indonesia is facing energy trilemma\textsuperscript{15}.

For the voluntary instruments, however, our assessment is mixed. Several voluntary instruments could possibly improve the RE share in the energy mix, such as developing CCUS technologies while at the same time implementing higher coal tax. While NRE is motivated by mandatory instruments aforementioned, both incentive and disincentive in the coal market could slow down the utilisation of fossil fuels, particularly coal, and reduce the GHGs emission. CCUS technologies can be developed as a complementary to RE development, as a logical reason for the GoI to solve energy trilemma. Following this incentive, higher coal tax is an effective way to reflect coals negative impacts, allowing the government to compensate for some of the costs of pollution and increasing coal prices, which would encourage consumers and investors to shift to cleaner alternatives. From consumers' perspective, incentivising the solar PV installation by reducing the time during applying for special electricity-metre to PLN could also capture a large share of the potential new customers.

However, such a practical approach might be hindered by the political economy dimension of strategic energy policy making in Indonesia. Our assessment of other voluntary instruments shows that untangling the complexity inherent in national energy policy making is still revolving on the presence of PEPs from the coal sector. Furthermore, another voluntary instrument i.e. limitation of coal export is not effective in slowing down the coal export towards other countries, referring to the fact that the coal export prohibition was made in place by MoEMR during January 2022 only to avoid national coal power plant crisis (Guitarra, 2022). It is highly indicated that PEPs pressure the government since the discussion is limited, including CMfMIA, MoEMR, PLN, representatives from coal companies, and other related parties (Muhammad, 2022).

These findings lead to our next assessments where our proposed voluntary instruments would possibly give the indirect effects to improve the RE share in the energy mix. While invigorating the DEN's capacity in energy policy making seems crucial, it will not necessarily result in the direct effect of the NRE share increase of the energy mix. This option is considered not contributing to solving the nation's energy trilemma. The policy window nearby, that is the discourse of KEN updating, is perceived to not set a more ambitious target for RE share\textsuperscript{16}. On the other hand, the NDC target itself is considered too ambitious to achieve, particularly by the private sector\textsuperscript{17,18}.

The localisation of RE technologies and improving its TKDN as proposed voluntary instruments also will not directly give a substantial role in enhancing the RE share in the energy mix. In Indonesia, the localisation of RE technologies are considered limited, particularly due to the low level of design innovation needed for the development of solar PV and micro hydro, for example (see Schmidt and Huenteler, 2016). Although the solar PV industries are growing in Indonesia, the upstream and downstream industries are considerably still not well connected, particularly compared to China (Sari and Dewi, 2021). However, Minister of Maritime and Investment Affairs explained a recent investment commitment from China and the United Arab Emirates summing up to Rp 1.848 trillion (USD 132 million) has been made to support the new development of an industrial park in Kalimantan island, which

\textsuperscript{15} In this study, rather than using only Gunningham's (2013) definition, we assert that energy security should be improved to be energy sovereignty, referring to Indonesia's unique position of having abundance of energy source potentials, both RE and fossil fuels.
\textsuperscript{16} Interview with Respondent F, 2022.
\textsuperscript{17} Interview with Respondent Y1 - B, 2020.
\textsuperscript{18} Interview with Respondent H, 2022.
will be focused on the nickel battery and the solar PV industries (Mudassir, 2021). Considering the RE industries value chain (see Figure 11), the investment starts on the manufacturing stage and follows the next stages.

Figure 11 RE Industries Value Chain

![RE Industries Value Chain Diagram](source: Adapted from Llera et al., 2013)

b. Additional effects on the increase of renewables share in the energy mix

Besides increasing the RE share in the energy mix, we assessed that several mandatory and voluntary instruments will have additional impacts. First, both the NRE Act and feed-in tariff policy arguably will result in more positive impacts towards the environment, despite the possibility that nuclear power plant development in Indonesia, as mentioned in NRE Act, is arguably endangering biodiversity, particularly amid the current trend of weakening environmental protection instruments (Anindarini et al, 2021). The agenda of deep decarbonisation, particularly in accordance with the NZE 2060 pathway, is supported by not only these mandatory instruments, but also by enabling the carbon market in Indonesia and utilising the CCUS technologies. The Presidential Regulation 98/2021 on the Carbon Economic Value is expected to mobilise more green financing and investment that have an impact on reducing GHG emissions19. On the consumers’ side, raising the price of coal for end users would reduce both carbon emissions and toxic air pollution by encouraging energy efficiency and switching investment to renewable energy sources20.

Other impacts that could be generated by feed-in tariff policy as our proposed mandatory instrument include the creation of new job opportunities, improving public health, and thus building a modern economy that allows Indonesia to compete in the global market, especially carbon neutral products. (IESR et al., 2021). However, we argued that the use of CCUS technologies indeed will decrease carbon emission, but it still gives a negative impact on the environment.

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c. Competitiveness

As the clean energy transition is being favoured globally, several mandatory and voluntary instruments were assessed to be able to positively improve the competitiveness of Indonesia's economy, particularly improving the economy's agility towards national or international changes. The regulatory foundation set by the NRE Act, feed-in tariff policy, and carbon market regulations will be adequate to start the clean energy transition. The NRE Act can positively accelerate the investment process by entering a good level of competitiveness against fossil energy, which consequently encourages a green economy. Also, the existence of carbon market regulations opens up opportunities for Indonesia to receive various funding alternatives in climate change management. In particular, the implementation of carbon pricing, especially at coal power plants, will provide investors with a strong market for Indonesia's commitment to the energy transition. It will also have a positive impact on NRE investment, thereby attracting more investors in renewable energy (IESR, 2022).

From the political economy dimension, the policy instrument to equip DEN with more authority, or rather, securing the institution independence from the PEPs from the coal sector can positively influence Indonesia's economic agility, since it provides DEN opportunities to transition to cleaner energy which is in line with the global agendas, particularly NDC target by 2030. As DEN also regulates renewables, particularly through updating the targets in KEN and RUEN, it is possible for them to keep referring to international commitments such as the Paris Agreement and NDC. This has to do with the discourse of KEN and RUEN update. Other targets such as NZE and coal phase down can also be incorporated into KEN and RUEN.

The DEN's authority is also needed to overlook the emerging issue both in enhancing RE share in the energy mix and phasing down coal. On the one hand, feed-in tariff policy has the potential to increase electricity tariffs and burden the state budget. In practice, the provision of incentives on the selling price of electricity generated from NRE plants can increase the basic cost for electricity generation in the local system which has an impact on increasing electricity subsidies and or increasing electricity tariffs. PLN is obliged to buy electricity production from private power companies which has the potential to burden PLN and the state budget because the stated budget is used to cover losses if PLN buys electricity more expensively from the private sector so that it can trigger electricity tariffs.
to rise (Wahid, 2015). On the other hand, coal phasing down through several voluntary instruments may be intricate. Higher taxes on coal will have an impact on increasing state budget allocation for PLN (increase in electricity rates, because the majority of primary energy for PLN power plants still uses coal, up to 62% (Kementerian Energi dan Sumber Daya Mineral, 2022). This situation is also exemplified by the limitation on coal exports in the beginning of January 2022 aimed to avoid inflation risk and energy crisis, and its sudden repeal not long after—highly likely due to pressure from PEPs from the coal sector. Both of which show the perspective of GoI in using coal due to complicated energy trilemma or using it as the tool for economic growth from coal export. Next, developing CCUS technologies for coal as bridging fuel is also still considered a pessimistic scenario, even in developed countries, due to its high cost for being a nascent technology. This low economic viability is still an emerging challenge since the perceived huge benefits from the CCUS technology to Indonesia's economy: job creation, minimising the operational cost for electricity generation, maintaining the existing infrastructure, and the unfolding innovation system for the bridging fuel industries.

From the standpoint of the innovation cycle of RE industries, Indonesia is geopolitically situated in two major areas. On the one hand, Indonesia is also influenced by the regional coal market, particularly the recent coal war between China and Australia. This geographical proximity possibly plays an important role in the echo chamber, that led to the lifting of the coal export prohibition that was in place in January 2022. The ensuing discussion in national policy making might consequently be centred on the possibility of developing CCUS technology to set coal as bridging fuel.

On the other hand, the emerging RE industries in Indonesia are also going hand in hand with other ASEAN countries, although Singapore is currently leading the electricity futures market in the region (Philippines Department of Energy, 2020). Solar PV is entering the adoption phase in Indonesia, since the market is currently growing in SEA regions (see Suroso et al., 2021). In particular, discourse around the development of nuclear power plants in ASEAN is done with the context of Singapore (Nian et al., 2014), although Indonesia, Malaysia, Thailand, Philippines, and Vietnam have embarked on nuclear research programmes (Nian, 2017). In Indonesia, the nuclear power plant is indeed planned in RIPIN 2015–2035, but faces rejections from experts, academics, and civil society, mostly due to high risks of natural disasters and limited technological capacity. Therefore, the effect of geographical proximity in nuclear energy development is confirmed (see Schmidt and Huenteler, 2016).

From this situation, the localisation of RE technologies and adjusting TKDN for RE industries is also demanded. Politically, the value chain of renewable industries can be distinguished by RE manufacturing sector and R&D sector (Schmidt and Huenteler, 2016). The development of RE industries will be still limited to solar PV (high manufacturing activities – low design innovation) and electric vehicles (high manufacturing activities – high design innovation), as it is directed by RIPIN 2015–2035 and also the abundance of nickel reserves in Indonesia. However, the investment in the

24 https://medium.com/@stanfordsolutionsproject/why-not-carbon-capture-b8bddd03977c
29 “Echo chamber” is used by Respondent Y2 - B in our previous study (Suroso et al., 2021) to represent a situation where the President is exposed to the specifically framed context of information, particularly to benefit one’s interest.
The electric vehicle industry was just made for the total of Rp142 trillion (around USD 9.745 billion) and claimed to create 20 thousand jobs, spanning from Halmahera in Maluku province to Batang in Central Java and Cikarang in West Java\(^\text{30}\)\(^\text{31}\).

The competitiveness of RE industries in Indonesia, therefore, lies on the opportunity to improve the value chain of renewable energy industries. From the electricity consumers' perspective, the social acceptability of solar PV is quite high. PLN has provided a mechanism for customers to change their electricity metre into EX-IM one—specifically designed for solar PV users. The application procedure takes approximately one month to register solar PV before they change their electricity metre\(^\text{32}\). From the RE industries, however, the competitiveness can be seen through the number of workforce utilised in building and expanding the RE industries (see Llera et al. 2013; Schmidt and Huenteler, 2016). As the solar PV industries require more capacity on fabrication and manufacturing, the workforce needed can be in a higher amount than that of electric vehicles industries or rather, nuclear power plants. The workforce of the latter, however, need to have more sophisticated hard skills to make the industries competitive at national and even international scale. In Indonesia, there is no link between RIPIN 2015-2035 under MoI to the Technology Development Plan under BPPT\(^\text{33}\) (see Figure 12), hence it is arguably difficult to operationalise the high technology RE industry in Indonesia. From Figure 12, the national ministry that has pertinent function and authorities to handle the development of RE industries are either MoI and/or MoSOE.

**Figure 12** RE Industries Value Chain and Pertinent Stakeholders in Indonesia

![Diagram showing the value chain of RE industries and pertinent stakeholders in Indonesia.](source: Llera et al., 2013; Authors’ Analysis, 2022)

d. Social equity

Regarding the social equity sub-criterion which measures the fairness in renewables development of the policy instrument between the stakeholders regarding costs and benefit (Shah, 2018), we found that our proposed policy instruments—both mandatory and voluntary—tend to be not socially equitable. Only the implementation of the carbon market that distributes the social cost of carbon equitably, since it sets the carbon price and charges it to the carbon emitters (Fullerton et al., 2005; Lucas, 2017). For the NRE Act, there exist imbalanced roles between central and regional governments in the NRE utilisation and management. In the NRE Act draft that we analysed, there is no clear reflection regarding the main job and functions between the central government and local governments in the management, utilisation, and provision of NRE. Synergy is needed between the central government and local governments in NRE management. In addition, the inputs and needs of the marginalised community have not been reflected and raised in the draft of the NRE Act34,35.

For feed-in tariff policy, the scheme would require additional costs that would either be borne by PLN or by the government through a subsidy from the state budget36. For solar PV, there are several mitigation measures reflected in the additional cost to prevent infrastructure violation in integrating solar PV with on-grid electricity (see Table 7). Some argue that these mitigation measures can be borne by PLN or rather, the electricity consumers (Horowitz et al., 2013), particularly due to the lessening electricity quality once the on-grid solar PV is widely utilised. Rather than achieving economies of scale, the additional cost of mitigation measures are not equitably distributed if the state budget allocates subsidy for this cost. Several examples have provided the scheme where it should be the sole responsibility to the ones who install the on-grid solar PV37,38.

37 https://news.energysage.com/net-metering-3-0/
### Table 7: Common mitigation approaches employed to integrate solar PV to on-grid electricity

<table>
<thead>
<tr>
<th>Violation</th>
<th>Mitigation measures</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overvoltage</td>
<td>• Advanced inverters&lt;br&gt; • Modification of voltage regulator equipment or increased use of voltage regulators (LTC, SVC, capacitor banks)&lt;br&gt; • Modifications to voltage regulator controls equipment&lt;br&gt; • Energy storage</td>
<td>Advanced inverters are most commonly used for power factor (PF) control. Energy storage is employed much less frequently</td>
</tr>
<tr>
<td>Undervoltage</td>
<td>• Addition of capacitors&lt;br&gt; • Modification of capacitor controls</td>
<td></td>
</tr>
<tr>
<td>Voltage stabilisation</td>
<td>• PF control via inverter&lt;br&gt; • Modification of capacitor bank control settings&lt;br&gt; • Reconductoring</td>
<td>Reconductoring is not a preferred solution due to expense, employed only if necessary</td>
</tr>
<tr>
<td>Overload</td>
<td>• Transformer replacement&lt;br&gt; • Reconductoring&lt;br&gt; • Energy Storage</td>
<td>Energy storage may provide a cost-effective alternative to major transformer or line replacements, even at current prices</td>
</tr>
<tr>
<td>Protection</td>
<td>• Installation of additional reclosers, relays, or fuses or change the location of these devices on the circuit&lt;br&gt; • Update substation protection schemes&lt;br&gt; • Use of advanced relay controls/functions</td>
<td></td>
</tr>
<tr>
<td>Harmonics</td>
<td>Harmonic filters</td>
<td></td>
</tr>
<tr>
<td>Device movement</td>
<td>Change low-frequency trip settings of the PV inverter to reduce frequent tripping during frequency drops</td>
<td></td>
</tr>
<tr>
<td>Anti-islanding</td>
<td>• Built-in inverter functionality&lt;br&gt; • Direct Transfer trip&lt;br&gt; • Coordinating tripping of PV systems</td>
<td></td>
</tr>
</tbody>
</table>

Source: Horowitz et al., 2018
From the internal structure of the DEN standpoint, BAU tends to make the DEN member selection process unfair and thus not socially equitable. As DEN is also designated as the public representatives in the decision making, the elected members coming from public/academicians tend to suffice the representativeness in the energy policy making. However, since the DEN members are dominated by The Ministers and two members of House of Representatives, the representations of civil society and academicians are thus arguably reduced and negligible. Comprehensive amendment to regulations related to DEN will open the avenue towards fairness in strategic renewables energy policymaking.

In navigating Indonesia's energy trilemma, there is still a gap between national and local focuses on RE utilisation. National stakeholders are still focused on improving energy access (Wibisono et al, 2022), while coal is considerably cheaper. RE development is not socially equitable, considering the contestation between the coal dilemma and RE technologies for improving energy access. While getting popular in urban society, solar PV is still not economically feasible for frontier areas where people's purchase power is inadequate. Nevertheless, the enactment of Village Law provides opportunities for village authorities to generate electricity independently (Wibisono et al, 2022), where low RE technology i.e. micro hydro power plants tend to be adopted by frontier areas in Indonesia to generate local electricity.

From the coal perspective, the utilisation of CCUS technologies nowadays is still not socially equitable, as the CCUS technology is still being developed and the adoption process takes a long time. CCUS technology can also justify the need for more land to be utilised as new coal exploration and perhaps coal power plants, whereas now the land conflict has put interest and needs of indigenous communities at expense. Offshore CCUS projects in Indonesia tend to be developed on former oil rigs39 40, which is still considered not economically viable by oil and gas companies41 42.

e. Flexibility

This sub-criterion measures the ability of the instrument options to be manipulated to consider cost and timeframe changes given potential changes such as overachievement of the targets, technology innovative activities and others (Shah, 2018). Due to the informality practices in Indonesian governance, we think that our proposed instrument options might be highly likely to be manipulated, particularly in the next two years the new President will be elected.

While to date the NRE Act has not been enacted, the NRE Act is considered unable to comprehensively address the issue of renewable energy management because it still considers fossil fuel energy, includes nuclear as a reserve fuel which is high risk for Indonesia, and still overlaps with many other regulations. The feed-in tariff is supposed to be regulated in this Act, particularly due to the current situation where many of previous regulations stipulating this have been repealed (see Figure 9). Many studies have been conducted with the aim of providing input on the NRE Act. On the other hand, considering the urgency of this law, DPR held a series of public hearings to listen to the inputs from various stakeholders. Regarding the carbon market, although there have been several rejections
from industries, even NGOs such as Greenpeace Indonesia and Wahana Lingkungan Hidup Indonesia (although the latter concerns about the low carbon tax), the carbon tax still remains synchronised with other tax mechanisms.

Reinstating the independence of DEN through regulations will also be difficult due to the high political cost of the current government in doing so and most importantly, a rather short timeframe for achieving NDC by 2030. As galvanising the role of DEN requires a regulation in the tier of a national bill and the presidential regulation, it requires a wide extent of time frame nor real cost. The internal structure and member composition of DEN is stipulated in the Energy Law 30/2007, followed by Presidential Regulation 26/2008 on the Formation of DEN and the Selection Procedure of DEN's Member Candidate. Also, as the candidates are selected by the House of Representatives, it means that they open the possibilities for the informal political transactions that favour the coal sector. The high political post will also be hard to bear to minimise the PEPs from the coal sector, as nowadays the member of DPR can be from any background, including coal sector. The influence of private sector remains substantial in pressuring the government to transition into renewable energy. Furthermore, for bureaucrats, particularly ministers, it takes a deeper measure to untangle the complex process set in place by the Civil Servants Act and prohibit PEPs from the coal sector to be ministers.

Regarding the policy instruments to regulate energy suppliers and consumers, the regulations being effective nowadays will also be easy to manipulate. The development of battery and electric vehicles have high flexibility to look for investments, particularly due to those two being the two main focus of RE industry development as stipulated in RIPIN 2015-2035. Although the national RE technologies localisation plan, or rather overall technology development plan has not been enacted yet, the discussions between the President and several Ministries and SpaceX have been started to induce the development of electric vehicle industries. This situation will be a window for both investment and RE technology localisation plans in the near future.

Other voluntary instruments are also highly flexible to be manipulated, particularly as there are no technical regulations yet, if not informal practices in policy making. These instruments include developing CCUS technology, higher coal tax, and prohibition of coal export. The presence of PEPs in the coal sector then again provides high influence to policy making. However, there is seemingly a good side in this flexibility, as the application process to register solar PV to PLN can be potentially shortened in less than one month.

f. Transparency and accountability

This sub-criterion shows whether the implementation and application of the policy instrument is transparent for all stakeholders, which also indicates whether the accountability is clear or not (Shah, 2018). From our assessment, we found that the issues in transparency and accountability of our proposed policy instruments can be classified into two categories: overlapping regulations and the strategic position of a regulation to improve, all of which in relation to the influence of PEPs from the coal sector. For example, The NRE Act will contain a number of provisions that have been regulated
in other laws and regulations such as Energy Act 2007, Electricity Act 2009, and Nuclear Power Act 1997.\textsuperscript{46,47} Another immediate example is the disharmony between the feed-in tariff mechanism and other tax policies. Although feed-in tariff policy has been mentioned in KEN 2014 to catalyse the investment of RE technologies, the Ministerial Regulation of EMR 4/2020 specifies the mechanism of electricity selling from IPPs is based on the local electricity generation basic cost. However, the feed-in tariff mechanism will be effective once the governmental regulation to follow the Tax Regulation Synchronisation Act 2021 has been enacted.

The carbon market regulations are also criticised as considerably low carbon tax will be an opportunity for high carbon emitters to do greenwashing. This argument has to do with the opportunity for them to continue emitting carbon and just somehow pay the government to deal with the following impact. For comparison, carbon tax in Indonesia is USD 2 per tonne, while the World Bank sets USD 30 to USD 40 per tonne.\textsuperscript{48} To ensure transparency and accountability of carbon tax, there should be several measures to implement: the management of tax payment scheme, the process of operational policy making for carbon tax implementation, and integrating the carbon tax to the Monitoring, Reporting, and Verification (MRV) system (Suryani, 2021). Next, in the lifting of the prohibition of coal export, the government claimed that the national coal supply crisis, being the sole reason for the coal export ban in the first place, had been managed. However, some claimed that it had to do with the pressure with the coal importing countries. Therefore, we assessed that this overall policy making process is far from transparency and accountability.

In a different policy area, DEN is supposed to advise the executive government in the energy sector. However, we assess that the current internal structure of DEN will be transparent and accountable if and only if the mechanism of DEN member selection is changed first. The following process i.e. the energy policy making including updated KEN and RUEN, will rely on that first step. Higher public representation will open more opportunities to make the policy making process more accountable. However, this is also in line with current conditions as the ministry related to climate change tends to hide/delay the communication on climate change mitigation and adaptation progress.

\textbf{g. Implementation network capacity}

This sub-criterion measures the extent to which responsible actors are able to design, support and manage the implementation of the policy instrument (Shah, 2018). This capacity is influenced by trained personnel, technological, infrastructure, credibility and transparency. From our assessment, our assessment suggests that the overall implementation network capacity to implement our proposed mandatory and voluntary instruments are still low in the short term, particularly in achieving NDC by 2030. However, we think that in the long term, or using the NZE target by 2060, the improvement of implementation network capacity can be accelerated.

While currently DEN consists of experts coming from public, private sector, and the government itself, it is possible to put RE champions as DEN's members. Current arrangement of DEN is highly influenced

by the position of ex-officio position of Minister of EMR as the head of DEN, where it is arguably possible for the Minister to bypass a proposed regulation regarding energy. There are also DEN members having political party affiliations and favouring coal over RE\textsuperscript{49}. However, as there are many informal practices in the current energy regime, there might be resistance from the coal sector’s PEPs that will induce many lobbying and political transactions that are not transparent and accountable. The President also is considered to have an echo chamber where the most influential PEPs can drive the policy discourse to lean also to the coal sector\textsuperscript{50}.

From the legislative government side, to be a member of The Energy Commission in DPR does not necessarily need to be a trained personnel and/or having an expertise in the energy sector. The distribution of DPR members to Commissions is rather based on the composition of the party faction\textsuperscript{51}, although there might be inner party discussion about who should be on which Commission. This situation is prone to political lobbying that can be dominated by DPR members leaning to the coal sector.

Although legislative and executive government is different, we assess that the issue here is political bargaining vis-a-vis political commitment to reform bureaucracy towards leaning to RE, particularly in achieving NDC by 2030. Currently, political bargaining on a strategic level tends to take a long time, before another process starts to make the decision operational. However, a major reform i.e. revising the Civil Servants Act 2014 to clearly separate bureaucracy and partisanship\textsuperscript{52} needs not only political will, but also a strong political commitment\textsuperscript{53}. A similar overhaul needs to be done to prohibit the double positions that are often present in state-owned enterprises. It is indicated that 62 members of the board of directors in state-owned enterprises are also commissioners in private companies\textsuperscript{54}. The prohibition of this double position will motivate a more competitive business environment in Indonesia.

From the perspective of energy policy making, prioritising what to do is done more in a pragmatic way. On the one hand, The NRE Act is a regulation initiated by DPR, where DPR continues to conduct discussions on the NRE Act. MoEMR as the leading institution is also actively studying and supporting the preparation of the NRE Act through internal discussions. However, it is not adequate since the NRE has not been enacted until now.

The MoF is currently also synchronising the tax regulations, including carbon tax, through a governmental regulation. The carbon tax itself is planned to be effective in July 2022. To support the carbon market, MoEMR is also preparing a procedure to cap the emission from coal power plants and another for carbon economic value dedicated to other power plants\textsuperscript{55}. Other climate change measures are also prepared by the MoEF i.e. linking carbon market with NDC and by the CMFMA i.e. assigning Carbon Economic Value Committee to supervise the carbon market implementation. Regarding the management of environment fund, apart from BPDLH whose functions include channelling finance

\textsuperscript{49} Interview with Respondent Y2 - A, 2021.
\textsuperscript{50} Interview with Respondent Y2 - B, 2021.
\textsuperscript{51} www.dpr.go.id/akd/komisi (in Bahasa Indonesia).
\textsuperscript{53} Interview with Respondent G, 2022.
towards green projects, the financial flow i.e. green sukuk as green bond has also been managed by the
commercial bank56.

Nevertheless, as feed-in tariff policy is highly influencing RE financing and investment, the subsidy
in fossil fuel sector seems to be counterproductive57. This situation is also exacerbated by the lifting
of the coal export ban, where there are indications that such action is motivated by economic gain.
In short, we see the inconsistency in practical policies and regulation related to RE in the context of
climate change, while strategic decision making tends to take a long time. Hence, it is safe to assume
that the GoI is not giving adequate political commitment and mobilise implementation network
capacity to RE development.

h. Administrative feasibility

Administrative feasibility measures the total work exerted by the government’s implementation
network and the enforcement of the policy instrument during the implementation process (Shah,
2018). From our analysis, we found that there are three main issues in administrative feasibility of our
proposed policy instruments.

The first one is the inevitable need for an integrated regulatory framework to support RE development.
The implementation of the NRE Act still requires support from both the executive and legislative
government to strengthen regulations and policies related to NRE development including the
importance of coordination between related ministries58. Furthermore, for feed-in tariff policy, fiscal
policy and other related policies need to be reformed, as the changing policy trajectory of feed-in
tariff policy has put hurdles to RE investment (Ministry of Finance, 2015). Similar approach is also
needed in enabling the carbon market, as fiscal policy and budgeting policy needs to be reoriented to
the carbon market, hence they will support the low carbon development. For both the RE technology
localisation and the CCUS technology development, a synergy between BPPT and MoI in terms of
National Industry Master Plan is needed, as both technologies are advanced. Current RIPIN 2015-2035
is not backed up by the National Technology Development Roadmap59 as the latter is not made yet.
Meanwhile, the localisation needs to specify the RE sectors—which technologies for which sector,
thus the prioritisation can be made. However, as many CCUS technology utilisations are still pilot
projects60 61, other policy measures need to be prepared as BAU is way cheaper than adopting a nascent
technology62 63. From consumers’ perspective, the solar PV installation has been made easy as they can
convert their electricity metre by applying to PLN; all which are regulated by technical regulation by
MoEMR.

58 https://www.dpr.go.id/berita/detail/id/38404t/Perlu-Penguatan-Aspek+Regulasi+untuk+EBT (in Bahasa Indonesia).
Indonesia).
62 https://katadata.co.id/happyfajrian/berita/6bb8857f94cbe0/teknologi-penangkapan-karbon-sangat-mahal-pln-seharga-pltu-baru (in Bahasa
Indonesia).
Indonesia).
The second issue is the policy trajectory of certain aspects needs to be more coherent and convergent. This issue mainly revolves around the galvanisation of DEN and minimisation of PEPs from the coal sector. Although by the regulations DEN has more strategic authority, there are times when DEN has to assist MoEMR in guiding local governments of making RUED. This precedent conflates the strategic position mandated by the Energy Law 2007, where the Minister of EMR acts as the Head of DEN. Galvanising DEN requires a strong political commitment from the President and thus the DEN’s members from the government side. We propose that the Minister of EMR should not be the head of DEN to avoid the abuse of power i.e. asking DEN to assist provincial/local governments in RUED making or bypassing the advice from other DEN members64. However, improving the independence of DEN has a low administrative feasibility due to the large burden to revise regulations about DEN and its policy trajectory.

Nevertheless, the most imminent issue from administrative feasibility is that political commitment should dominate political bargaining65. For minimising the role of PEPs from the coal sector in the government, it needs a literal bureaucratic reform, since Civil Servants Act needs to be updated to decrease the PEPs and thus hinder their role in policymaking. However, the current situation of informality practices in governance will also enable the PEPs to advocate against this cause66. The same commitment is also needed to be present in the implementation of carbon tax and limitation mechanism of coal export. In short, political commitment should be directed to shorten the policy making process from strategic to practical level, both in favour of RE if the NDC pledge wants to be achieved by 2030.

i. Market readiness

This sub-criterion measures the readiness of the market to adapt the required changes caused by the policy instrument (Shah, 2018). From our assessment, we found that the market is not adequately ready to implement our proposed policy instruments. While there are opportunities for kickstarting the transition to NRE as many fossil fuels companies are pivoting into NRE as a new direction, several threats also emerge. A number of big issuers in the energy and non-energy sectors have started to enter the new renewable energy business segment, such as Medco, PT Pool Advista Indonesia Tbk, PT Indika Energy Tbk, PT Bukit Asam Tbk, Adaro Energy Indonesia, TBS Energi Utama, and United Tractors. However, from their perspective, the community’s lack of knowledge about NRE projects is a challenge for NRE development. This situation intensifies as the absence of feed-in tariff policy also contributes to the less bankability of RE projects.

On top of that, there is seemingly another form of resistance from the coal sector. This situation manifests also in the strategic energy policy making. Through Energy Law 2007, the authority of DEN is indeed strategic yet limited. The development of the RE sector also needs ICF, where currently DEN has still limited authority to monitor and improve the current situation. However, the energy market (both coal and RE producer and consumers) is strategically influenced by the rearrangement of DEN and its authority.

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64 Interview with Respondent Y2 - A, 2021.
The political lobbying done by PEPs seemingly makes the market lean on coal. On the one hand, strong resistance from the coal sector, arguably amplified by PEPs, also occurs in the discourse of carbon tax and coal export limitation. This situation seemingly worsens by weak law enforcement over coal mining operations that will be facilitated by the presence of PEPs in the ownership and leadership of coal companies. On the other hand, developing CCUS technology is still too costly since in Indonesia it is still a pilot project and has not reached economical viability. Using CCUS technology will make the electricity generation cost increase to 91% (Firlina, 2016). Thus, BAU is considerably cheaper in the coal sector.

From a RE technology standpoint, advanced technology, both in RE or fossil fuels utilisation needs to be accelerated to support NDC achievement by 2030. The market readiness in localising RE technologies depends on the technical regulations, particularly in the case of solar PV installation. For RE manufacturing industries, the TKDN standards set by Kemenperin are perceived by the industries as challenging, as it makes the solar PV modules to be more costly and so will electricity generation cost. For solar PV, however, the standard used for the product is only national standard or SNI, thus it is easier to make a RE project economically feasible to do.

From a consumer perspective, the solar PV installation for homes has been supported by both the Ministerial Regulation of EMR 49/2018 and the Ministerial Regulation of EMR 13/2019, where it directs PLN about the installation, particularly the conversion of EX-IM electricity metre. APAMSI has also encouraged the solar PV companies to reach the market actively.

j. Sustainability

The sustainability sub-criterion indicates whether the expected changes from policy instruments last or not (Shah, 2018). From our assessment, we found that political commitment is an important factor in ensuring the sustainability of our proposed mandatory and voluntary instruments. While phasing down coal until 2060 to reach NZE and the use of nuclear power plants will be mentioned in The NRE Act, actually the options will affect the environment negatively and increase emissions in the energy sector and hinder the portion of NRE in the energy mix. The political commitment for NRE is also needed to accelerate the enactment of feed-in tariff policy that hopefully will attract the investors. On top of that, the lasting effect of the carbon market will be sustained if the carbon tax is adjusted equitably i.e. high carbon tax for big carbon emitters.

We also found that the nearing-end presidential term will also influence the sustainability of our proposed policy instruments. In the strategic energy policy making, galvanising DEN through the overhaul of regulations will be sustainable if and only if the bureaucracy follows the designated their main duties and functions. Currently, there are also supporting regulations, apart from similar understanding about the current climate crisis and the RE potentials. While the changing landscape of Indonesian energy sector towards favouring renewables will be an opportunity yet to be reaped by DEN by improvement of the institution’s independence, the political cost is considerably high to

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68 Interview with Respondent E, 2022.
70 https://iesr.or.id/group-women-and-farmer-group-on-ruu-ebt-not-new-renewable-energy-but-clean-renewable-energy
ensure this process happens before presidential election in 2024. The similar precaution also applies to the localisation of RE technologies, as the synchronisation between RIPIN 2015-2035 and National Technology Development Master Plan needs to be done in conjunction with the global efforts for clean energy transition. The opportunity of ICF and private sector pivoting to RE should be leveraged to support a clean energy transition.

The presidential transition in 2024 will also make our proposed voluntary instruments seemingly have no lasting effects. This situation is influenced by both the echo chamber around the President that affects the problem framing in the energy transition72 and the authority of the Minister of CMfMIA and PEPs from the coal sector. The Minister of CMfMIA's power is also a challenge as the recent repeal of coal export ban is declared by them.

The development of CCUS is rather too costly in reference to NDC 2030, and perhaps to NZE 2060 compared to NRE development73. In addition, a higher carbon tax still requires a high political cost, although once a higher tax on coal suppliers is consistently implemented, it will phase down coal production and reduce the volume of coal exports74.

5.1.4 Summary of evaluation results

From our evaluation, we found that indeed several policy instruments will provide a solid pathway to support the development of RE as much cleaner energy, particularly in reference to NDC 2030 and NZE 2060 (see Table 8). We put '+' sign to indicate whether a policy instrument performs well in a sub-criterion and '-' sign if otherwise (see Table 4 for further elaborations on each criterion). We left the cell blank if the data was not enough to justify our assessment. From all of the sub-criteria, only competitiveness and flexibility of policy instruments that could be used to assess all proposed policy instruments. When looking at the policy instruments, only all of the mandatory instruments and limitations on coal export could be evaluated against all sub-criteria. However, neglecting additional effect on the increase of RE share in the energy mix as a secondary sub-criterion, galvanising the role of DEN in Indonesian energy policy making could also be considered wholly evaluated.

### Table 8: Scorecard of energy policy evaluation analysis result

<table>
<thead>
<tr>
<th>Evaluation criteria</th>
<th>Mandatory Instruments</th>
<th>Voluntary Instruments</th>
<th>Direct consumer incentives for renewables utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Main criteria</td>
<td>Sub criteria</td>
<td>NRE Act</td>
<td>Incen-tising RE IPPs through Feed-in-tariff policy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enabling the carbon market in Indonesia</td>
<td>Galvanising the role of DEN in the energy policy making</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RE and bridging fuel supplier incentive</td>
<td>Coal supplier disincentive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Providing legal basis for DEN to lead the energy policy-making</td>
<td>Localisation on RE technologies</td>
</tr>
<tr>
<td>Increase of renewables share in the energy mix and environmental effects</td>
<td>Direct effect on the increase of renewables share in the energy mix</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Additional effects on on the increase of renewables share in the energy mix</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Political and social acceptability</td>
<td>Competitiveness</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Social equity</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td></td>
<td>Flexibility</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Transparency and accountability</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Feasibility of implementation</td>
<td>Implementation network capacity</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td></td>
<td>Administrative feasibility</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td></td>
<td>Market readiness</td>
<td>+</td>
<td>−</td>
</tr>
<tr>
<td></td>
<td>Sustainability</td>
<td>−</td>
<td>−</td>
</tr>
</tbody>
</table>

Source: Authors' analysis, 2022
Regarding the scorecard, our evaluation of proposed policy instruments shows different performance against evaluation criteria. For the increase of renewable energy share in the energy mix, all policy instruments except galvanising the role of DEN and providing supports necessary for RE technology localisation will possibly give direct effects to the increase of renewable energy share. However, we consider that the direct effect of developing CCUS technologies is counterproductive towards the increase of renewable energy as it backs up the argument to extend the use of coal. We could not provide assessment to the performance to the subsidised electricity price from PLN due to the networked electricity from PLN is mainly generated from coal power plant thus more elaborate data collection is necessary to further this assessment. For the competitiveness criterion, all policy instruments, except the disincentives towards coal sector, show possibly high national economic agility to react to international or national changes. While the climate crisis has been globally acknowledged, the long established fossil fuel industry in Indonesia, including coal sector, still shows resistance in pivoting or even changing direction into slightly leaning towards RE.

For the social equity criterion, although the NRE Act and feed-in tariff policy encourage RE sector, more operational regulation is needed to ensure that the maintenance cost of electricity infrastructure is equitably shared towards all consumers. This includes particularly the PLN consumers that also use the solar PV, for example, for the risks of electricity network infrastructure getting depleted faster. The localisation of technology is also needed here, where the R&D capacity should be planned by the government and the companies whose financial capacity is adequate. From this the innovation diffusion can occur where smaller companies can gain the technological transfer. From the consumer perspective, the RE is also segmented, where solar PV is accessible for those who can afford it, particularly in urban area. In frontier area, micro hydro power plant is among the cheapest RE technology that can improve their access towards electricity. Other than these, all policy instruments perform well in this criterion.

For the flexibility criterion, we assessed that all policy instruments are easily manipulate—either to be more efficient in term of operation or rather, to be changed completely and the overall progress goes back several steps. This situation owes to the informality in the Indonesian governance that allow the practices to be perpetuated. Furthermore, in the transparency and accountability criterion, only five policy instruments that can be evaluated due to the data availability, where mostly there are loopholes—either overlapping regulations or the strategic position of a regulation to improve—all of which manifest in relation to the influence of PEPs from the coal sector. Thus, we think that strong political commitments towards transition to RE and achieving NDC should manifest.

In the implementation network capacity, there are three policy instruments that cannot be assessed due to data availability. However, only enabling carbon market remains well performing against this criterion. This has to do with the efforts to synchronise the tax regulations before enabling the carbon market instruments. In contrast, all policy instruments do not perform well due to the horizontal and vertical silos inside the GoI, which in return makes the situation difficult to synergise in achieving NDC. The total work bore by the government in doing all policy instruments also considerably huge, due to the similar reasons aforementioned. However, the incentive for PLN consumers for installing solar PV can easily be done since it is done only by PLN based on the demand situation. For market readiness, only the NRE Act that could possibly be accepted by the market, as the national growth of RE sector keeps increasing. While consumer could be directed into RE-based electricity, the resistance from coal sector will be substantial. This situation is similar to the performance of all policy instruments.
against the sustainability criterion, where only three of them, i.e., enabling carbon market, localising RE technologies, and developing CCUS technology, can be sustainable in long term.

The evaluation results then signify the role of government and private sector, which is displayed in Table 9 below.

**Table 9** The role of government and private sector toward renewable energy development in Indonesia

<table>
<thead>
<tr>
<th>Main evaluation criteria</th>
<th>Sub criteria</th>
<th>Government</th>
<th>Private Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase of renewables share in the energy mix and environmental effects</td>
<td>Direct effect on the increase of renewables share in the energy mix</td>
<td>• Addressing vertical and horizontal silos; • Linking the technology development plan with the renewable energy plan; • More commitments towards RE policy-making; • Creating an incentive mechanism towards a nurturing investment climate for NRE investors, while disincentivising fossil fuel investors.</td>
<td>• Investing in the RE sector; • Diversifying to RE sector (for coal companies); • Actively contributing to R&amp;D in the RE sector.</td>
</tr>
<tr>
<td></td>
<td>Additional effects on the increase of renewables share in the energy mix</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Political and social acceptability</td>
<td>Competitiveness</td>
<td>Committing to international pledge on climate policies; • Addressing vertical and horizontal silos; • Ensuring a stronger policy trajectory towards just transition; • Eliminating the PEPs from official positions; • Ensuring transparency and accountability in the energy policy-making process.</td>
<td>• Participating in the RE industry development; • Investing in the RE sector; • Diversifying to RE sector (for coal companies); • Actively contributing to R&amp;D in the RE sector.</td>
</tr>
<tr>
<td></td>
<td>Social equity</td>
<td>• Invigorating DENs authority in energy policy-making; • Addressing vertical and horizontal silos; • Ensuring a stronger policy trajectory towards just transition; • Eliminating the PEPs from official positions; • Ensuring transparency and accountability in the energy policy-making process; Incentivising RE-based electricity consumers.</td>
<td>• Participating in the RE industry development; • Investing in RE sector; • Diversifying to RE sector (for coal companies); • Actively contributing to R&amp;D in RE sector.</td>
</tr>
<tr>
<td></td>
<td>Flexibility</td>
<td>• Invigorating DENs authority in energy policy-making; • Addressing vertical and horizontal silos; • Ensuring a stronger policy trajectory towards just transition; • Eliminating the PEPs from official positions; • Incentivising RE-based electricity consumers.</td>
<td>• Avoiding having strategic official positions to limit PEPs; • Participating in the RE industry development; • Investing in the RE sector; • Diversifying to RE sector (for coal companies).</td>
</tr>
<tr>
<td>Transparency and accountability</td>
<td>Ensuring transparency and accountability in the energy policy-making process.</td>
<td>Avoid having strategic official positions.</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Feasibility of implementation</strong></td>
<td>Implementation network capacity</td>
<td>More authority on DEN in the energy policy-making; Addressing horizontal and vertical silos in the government; More training to officials to support NDC-achieving implementation; Ensuring transparency and accountability in the energy policy-making process</td>
<td></td>
</tr>
<tr>
<td>Administrative feasibility</td>
<td>Clearer authorities and functions for pertinent ministries and/or offices.</td>
<td>Supporting the capacity development of certain ministries/authorities.</td>
<td></td>
</tr>
<tr>
<td><strong>Administrative feasibility</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market readiness</td>
<td>Ensuring a stronger policy trajectory towards just transition; Incentivising RE-based electricity consumers; Disincentivising the fossil fuel industry.</td>
<td>Avoid having strategic official positions to limit PEPs; Participating in the RE industry development; Investing in the RE sector; Diversifying to RE sector (for coal companies); Actively contributing to R&amp;D of RE and bridging fuels.</td>
<td></td>
</tr>
<tr>
<td>Sustainability</td>
<td>Ensuring a stronger policy trajectory towards just transition; Incentivising RE-based electricity consumers; Disincentivising the fossil fuel industry</td>
<td>Avoiding having strategic official positions to limit PEPs; Participating in the RE industry development; Investing in the RE sector; Diversifying to RE sector (for coal companies); Actively contributing to R&amp;D of RE and bridging fuels.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Horowitz et al., 2018

### 5.2 The Baseline Condition Enabling the Private Sector’s Involvement in The Indonesian Energy Landscape

To provide context to energy policy evaluation, several baseline conditions where the private sector have been involved should also be constituted. In this study, three conditions remain substantial in providing a landscape where the private sector is regulated by and also acts upon.

**– Condition 1: That Indonesian climate-energy policy trajectory is converging and favouring RE**

In 2021, GoI has updated NDC. While the emission targets for both scenarios remains similar, the main differences in the newest commitment include the synchronisation of the NDC document with National Medium-Term Development Plan 2020-2024 and the vision of Indonesia 2045, along with the Long Term Strategy to adhere to the Paris Agreement. Other differences will be displayed on Table 10.

### Table 10 Differences between the NDC 2016 and NDC 2021

<table>
<thead>
<tr>
<th>Point</th>
<th>NDC 2016</th>
<th>NDC 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synchronisation with national strategy</td>
<td>Referring the Nawa Cita concept76</td>
<td>Referring National Medium-Term Development Plan (RPJMN) 2020-2024 and the vision of Indonesia 2045*</td>
</tr>
<tr>
<td>The GHGs emission projection in BAU scenario</td>
<td>Energy sector CM2 scenario: 1,271 MtCO₂e&lt;br&gt;FOLU sector CM2 scenario: 84 MtCO₂e&lt;br&gt;Emission reduction target:&lt;br&gt;• Energy sector CM2 scenario: 398 MtCO₂e&lt;br&gt;• FOLU sector CM2 scenario: 650 MtCO₂e</td>
<td>Energy sector CM2 scenario: 1,407 MtCO₂e&lt;br&gt;FOLU sector CM2 scenario: 68 MtCO₂e&lt;br&gt;Emission reduction target:&lt;br&gt;• Energy sector CM2 scenario: 441 MtCO₂e&lt;br&gt;• FOLU sector CM2 scenario: 692 MtCO₂e</td>
</tr>
<tr>
<td>Long Term Strategy</td>
<td>Not available</td>
<td>Available, adhering to Paris Agreement Article 4.19 (including gender equality and job decency)</td>
</tr>
<tr>
<td>Explanation on assumption on BAU scenario and targets</td>
<td>Not available</td>
<td>Available</td>
</tr>
<tr>
<td>The GoI’s commitment in international conventions</td>
<td>Not available</td>
<td>Available</td>
</tr>
<tr>
<td>The translation of Katowice Package as the operationalisation procedure of Paris Agreement</td>
<td>Not available</td>
<td>Available</td>
</tr>
</tbody>
</table>

Source: IESR, 202177

Beside the update of NDC in 2021, the GoI also declared intention to reach NZE by 2060 in COP2678. The main goal of this intention is to maintain the green economy growth while at the same time avoid middle income trap. By this goal, the NZE will also adhere to the NDC and the Indonesia 2045 vision, all of which also consider the budgeting reallocation after Covid-19 pandemic, no trade-off between NZE target and green economy growth, and governmental comprehensive and cross-sectoral capacity. The budget needed to reach NZE is approximated by MoNDP at USD 1 billion from 2021-2060, apart from the additional cost that will account for 3-5% of annual GDP79.

From our evaluation, the convergence of energy policy trajectory will happen if strong political commitment is present. While our assessment of several policy instruments shows that the influences of PEPs from the coal sector are still present in energy policy making and potentially will last, the political commitment can be enhanced by improving the capacity and thus heightening the

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76 The Nawa Cita concept covers nine priorities for national development that were introduced by President Joko Widodo at the beginning of his first term in 2014.
feasibility of implementing such policy measures. This improvement can target the implementation network capacity, administrative feasibility, and flexibility of policy instruments to be manipulated in a counterproductive way. Thus, such an integrated approach can influence both market readiness in embracing clean energy transition and sustainability of policy instruments themselves.

— Condition 2: That DEN not only has more authority but also more independence from PEPs from industry sector

Another condition that relates to Condition 1 is that DEN might be given more authority in leading the energy policy making process and independence from coal sector’s PEPs. The energy policy trajectory that is converging by the NDC 2021 and the NZE 2060 needs to be complemented by the policies in a bottom-up approach.

From our evaluation assessment, providing more authority and emphasising the independence of DEN will improve the political and social acceptability. This criterion can be elaborated into four sub-criteria: competitiveness, social equity, flexibility, and transparency and accountability, where all of which shows supremacy over the other two criteria. The assessment shows also that indeed the complex energy policy making process does not necessarily result both in the increase of RE share in the energy mix and the feasibility of implementation. Particularly for the latter, a rigorous effort to situate and rearrange the policies to be convergent might be hurdled by the political lobbying from the coal sector, which is exactly why the DEN needs to be free from such influence.

— Condition 3: That BPDLH has adequate capacity to manage and allocate financial resources to energy transition

As BPDLH was established in 2019, the agency was set to implement the NDC 2016 as the gatekeeper of the environment and forestry fund management in Indonesia. This function seemingly has been emphasised by NZE 2060 as the new long term target. As stipulated by Ministerial Regulation of Finance 124/2020, BPDLH has responsibilities to manage the environmental fund, including climate fund, that is from both national and international sources, and can allocate it to national and sub-national governments, citizens, and researchers.

In the RE sector, BPDLH needs to untangle the overarching problems of RE project’s bankability. However, several conditions to improve the BPDLH’s capacity in doing so include:

- Strong buy-ins from sectoral government interests, which in this case include PLN, MoEMR, and MoSOE;
- Budget for competent technical and financial staff to evaluate and assess RE project as BPDLH’s operational expenditure;
- A platform for monitoring and evaluation for project’s pipeline along with its synergy between current platforms from other ministries, e.g. KRISNA as a budgeting performance evaluation system in MoNDP and the MRV system from MoEF; and

• Capacity improvement and synergy with other financial institutions, such as Jamkrindo (a credit guarantee company), Askrindo (a credit insurance company), and other special mission vehicles from MoF\(^{82}\).

Other technical conditions include that a project already has an offtaker, that a project is reaching financial close, and that a project is given to the developer who has fulfilled obligations. These conditions remain uppermost to ensure the gatekeeping function of BPDLH in securing and allocating ICF. However, another opportunity also rises as commercial banks also do research regarding the changing global pattern that now is leaning towards green economy investment\(^{83}\). However, By synchronising these efforts, the strong financial support and management towards NDC achievement, particularly also navigating the Sustainable Finance Roadmap Phase II (2021 - 2025) (OJK, n.d.).

### 5.3 The private sector's roles in the Indonesian RE sector

From the literature review and our assessment of proposed policy instruments, we found several roles in the Indonesian RE landscape that could be fulfilled by the private sector, particularly in accordance with the NDC achievement by 2030 and NZE targets in 2060.

— Policy entrepreneur

From Kingdon's multiple streams approach (Kingdon, 1995), the presence of policy entrepreneurs will emerge around the rise of policy opportunity windows. The discernible qualities of policy entrepreneurs include their persistence; their negotiation skills; and their ability to be present, listened to, and recognised by either technical expertise, leadership, or strategic position as policymakers. As they possess entrepreneurial skills, certain moments will be seized by them to further their ideas and take action upon them.

From our analysis, the private sector coming from coal or RE background can be policy entrepreneurs, although in the Indonesian case, the previous seems to be more influential. This situation may be resulted from the official coal establishment that has been operating for more than five decades, compared to the RE policy making champions that seize the opportunity windows from the recent global climate commitments i.e. NDC. Several bureaucratic positions have been strategically filled by PEPs from the coal sector, which resulted in an echo chamber that navigates the Indonesian energy trilemma to lean on the discourse of coal as a bridging fuel, considering the coal abundance in the nation. From this, RE is considered to fulfil the gap where frontier areas are still disconnected from PLN's electricity grid (Wibisono et al., 2022). Such narratives need to be moderated either by the presence of PEPs from the RE sector, or rather, by limiting the influence of PEPs from the coal sector. While the government could mobilise a reform of pertinent regulations i.e. Civil Servants Act and/or stricter policies to prohibit double directorial positions in state-owned enterprises, political commitment in favour of NDC achievement by 2030 needs to outweigh the short-term economic gains.


\(^{83}\) Interview with Respondent Y1 - C, 2020.
Further illustration of policy entrepreneurs in the Indonesian energy sector will be elaborated in Section 5.5.

— Advocate

Apart from being a policy entrepreneur, the private sector can also advocate for their causes through think tanks or RE company associations. This network can successfully raise the important discourses that should be responded to by the government. For example, The Indonesian Solar Energy Association (AESI) consider the TKDN as a challenge in improving the economic viability of solar PV projects.

As many of the AESI members also work on think tanks such as Institute for Essential Services Reform (IESR), the advocacy is often based on thorough studies (see IESR, 2021b). The association is consistently approaching the government through DEN to discuss the possibility to relax TKDN policy, although up to the report writing, no follow up on this policy was done by the government.

— Financier

The development of financial instruments to support the RE sector has also allowed Indonesia to mobilise domestic and international funds. GoI has introduced green sukuk as a Sharia laws-compliant green bond in 2018 to support low carbon developments (May and von Lüpke, 2020). During 2018-2019, green sukuk accounts for a total of US$2 billion. However, to attract financiers in Indonesia, the public-private partnership needs to be carefully designed since their coalition differs from one country to another. For example, wind power plants in China are government-centred, as the state-owned investors collaborate with state-owned banks and sub-national governments (Zhang, 2020). Another immediate example is the presence of National Development Banks (NDBs), which also play an important role in financing the RE projects. KfW from Germany supports access to finance for a broad range of market participants, including households, private companies, municipalities, and large corporations under FiT policies. The institutional stability provides the opportunities for these KfW and the NDBs from China and Indiato have consistently funded renewables for decades (Zhang, 2022). This institutional stability arguably allows for these NDBs to test business models into different political situations, policy context, and markets (ibid.).

— Research and development contributor

Although the GoI has BPPT as the agency to think on the research and development side, a study found that different levels of roadmaps will comprise different directions (Amer & Daim, 2010). The national roadmap of RE development tends to focus on the energy trilemma of the nation and how energy policy should be formulated. This roadmap also covers the growth direction for industry and also as important, a framework for public-private partnerships. In Indonesia, KEN, RUEN, and RIPIN aggregate exemplify the national roadmap of RE development. However, more technical regulations are needed as specific frameworks for public-private partnerships are not directed in these strategic policies. In this area, Presidential Regulation 38/2015 and Ministerial Regulation of National Development Planning 2/2020 are among the strategic policies for public-private partnership. However, the national human development master plan should be developed altogether, as several RE technologies require higher technological adeptability (Mohd Chachuli et al. 2021).

84 Interview with Respondent E, 2022.
The industrial/sectoral roadmaps, nonetheless, are used to identify vision, common needs and evaluate barriers, constraints and risks faced by the industry from technical, political, and commercial aspects (ibid.). This type of roadmap can be developed by either industries who collectively participate in the industry associations or the collaboration between industry and government. The contents of this type of roadmap include a detailed analysis of industry and emphasise on relevant emerging technologies, market issues, technology development strategy, R&D challenges, commercialisation obstructions, and industry performance targets. Up to writing of this report, the industrial/sectoral roadmaps for RE development in general and RE development by energy sources in particular have not yet been made.

The third type of roadmap is organisational roadmap. The best practice in developing this roadmap is done by Bonneville Power Administration who invited major actors in RE technology development in a workshop (ibid.). The workshop provided findings for BPA to rank business drivers, business challenges, opportunities, targets, promising technologies, technological gaps that hinder deployment of promising technologies, and prioritised renewable energy-related R&D investments suitable for the company. In the Indonesian context, RUPTL for the IUPTL holders including PLN and other IPPs could be also tailored to the development of the RE technologies. This roadmap can also benefit from the inputs from the Research and Development Centre for Electricity, NRE, and Energy Conservation Technologies of MoEMR and BPPT.

Apart from the technological deployment roadmaps, the same fraction of attention should also be directed to the innovation process and diffusion of the RE technologies development. Several studies have documented the positive impacts of public R&D investments in both different national settings (Chang et al., 2022; Huang et al., 2012; Margolis and Kammen, 1999; Miremadi et al., 2019; Mohd Chachuli et al., 2021; Plank and Doblinger, 2018; Qi et al., 2022; Wu et al., 2020; Yu et al. 2016) and regional one (Grafström et al., 2020; Khezri et al., 2021; Kim and Kim, 2015; Ni et al., 2022; Wang et al., 2018). Nevertheless, the performance of RE technologies against financial or effort investment tends to follow an S-shaped curve: slow initial improvement, followed by accelerated improvement, and diminishing improvement (Schilling and Esmundo, 2008). Several RE technologies i.e. wind and geothermal have more economical viability than fossil fuels in a short timespan. However, more spotlights to solar PV investment from the government, weighed down also by the excessive coal subsidies are counterproductive for other RE technologies since the innovation performance of these technologies have been already flattening.

From this, selective funding mechanisms that come directly from the government can encourage the competitiveness of private companies in doing R&D (Plank and Doblinger, 2018; Yu et al., 2016). The mechanism can emphasise on the applicant’s research capacity and their previous performance. The mechanism should also provide the progress-based incentives where after the funding agencies re-assess the R&D in several time spans, they allocate bonus-payments depending on patent citation data or the assessment of an external jury (Plank and Doblinger, 2018). Furthermore, the patents can be qualitatively assessed to increase the robustness of evaluation measures. From such a process, the government’s R&D funding mechanism can allocate the financial resources, both from national and international sources, efficiently. The efficient allocation of R&D funds is needed particularly to implement a nurturing R&D culture where the failure is tolerable to some extent and venturing out into the uncertainty of R&D projects that are technologically, economically, and socially relevant. Another mechanism that should also be developed is the policy instruments to support the collaboration.
between academic and research institutions and the private companies as both support for the downstreaming research results from the materials and replicability and escalation capacity (Huang et al., 2012). The policy instruments can be incorporated to the R&D funding mechanism aforementioned.

5.4 Contextualising the evaluation results into Kingdon’s multiple streams approach

From our evaluation assessment and analysis, the relationship between government and the private sector is present and should be strengthened in order to achieve NDC by 2030 and transition to NZE by 2060. However, the imminent policy windows to catalyse the overall efforts need to be carefully seized. From Figure 13, a nearby policy window will open in 2024 as the presidential election will be held in that year. Several factors are also building up the situations, particularly the remaining dominance of coal over RE, financial refocusing due to Covid-19 pandemic and new capital city relocation, and other measures to mobilise local and international finance to the achievement of climate pledge. Our evaluation shows that institutional arrangement through policy instruments can be directed to support the development of RE as clean energy sources. However, a strong political commitment from the government is the vital component to ensure the implementation runs smoothly.

Figure 13 Multiple streams in Indonesian energy sector towards NDC achievement and NZE 2060

Source: Authors’ analysis, 2022
5.5 Key takeaways

• Several policy instruments could be developed and categorised whether they are mandatory or voluntary instruments, and then assessed in the context of energy policy trajectory towards achieving NDC by 2030 and even longer term strategies.
• Different dimensions and contexts of energy policy should be strategically evaluated before going deeper into more technical regulation assessment.
• Our proposed policy instruments were assessed as being able to provide a solid pathway to support the development of RE as much cleaner energy in Indonesia, particularly in reference to NDC 2030 and NZE 2060.
• Three main conditions remain vital in implementing our proposed policy instruments: the converging agenda setting towards RE in energy policy making, the independence of DEN from the coal sector’s influence, and the enhancement of BPDLH as the environmental fund manager in Indonesia.
• We found that the private sector can substantially contribute to the advancement of the RE sector by being policy entrepreneurs, advocates, financiers, and/or R&D contributors.
• From Kingdon’s multiple streams approach, a policy window will be open due to several factors, and thus needs a strong political commitment to focus the efforts towards the achievement of NDC by 2030 and NZE by 2060.
Chapter six

Conclusion
6. Conclusion

In this section, we will summarise our findings based on literature review and our analysis. We then highlight our academic contribution to growing literature on the roles of the private sector in the energy landscape. We close our conclusion by presenting our limitations, both on methodology, overall results, and SNAPFI project context and suggesting further research directions.

6.1 Summary of findings and practical recommendations

This study explores to what extent the climate-energy policies can enhance the private sector role in the context of NDC achievement by 2030 and NZE by 2060. We used public policy evaluation analysis and content analysis to investigate the relationship. Several mandatory and voluntary policy instruments were developed to assess their impacts on achieving NDC by 2030. Such a measure was taken since the Indonesian energy landscape has been heavily influenced by the coal sector, where RE sources need to be escalated to catalyse the climate pledge achievement.

Our evaluation assessment of these policy instruments, however, shows mixed results. While several policy instruments have been prepared and/or enacted, several instruments indeed are able to increase the RE shares in the energy mix, as stipulated in both RUEN and NDC. However, the political and social accessibility and feasibility of implementing such instruments are complex. Informality practices in Indonesian governance has enabled energy policy making and implementation favouring the coal sector than RE, particularly in navigating energy trilemma. As RE requires more capital to be established as dominant in the Indonesian energy regime, the discourse needs to be moderated and upheld. Hence, the mandatory and voluntary policy instruments can be collectively effective in cementing a pathway to achieve NDC by 2030 and NZE by 2060.

From this point, three main conditions remain vital in implementing our proposed policy instruments. The development of RE requires the converging agenda setting in energy policy making. The influence of PEPs from the coal sector are hindering productive efforts toward a cleaner energy transition. An integrated approach that combines the advancement of implementation network capacity, administrative feasibility, and flexibility of policy instruments to be manipulated is needed to influence both market readiness in embracing clean energy transition and sustainability of policy instruments themselves. The second condition is the independence of DEN from the coal sector’s influence. Providing more authority and emphasising the independence of DEN will improve the political and social acceptability towards the clean energy transition. The third condition is that BPDLH as the environmental fund manager in Indonesia needs to be enhanced. The current global discourse that revolves around collective actions to mitigate and adapt to climate change also signifies the importance of ICF. The capacity to mobilise finance from international sources needs to be equipped to BPDLH, particularly concerning the challenges in developing new RE projects. Here, other policy instruments must be developed to improve all these conditions.

We also found that the private sector has an influential role in helping the GoI in achieving NDC by 2030. The emergence of RE technologies in Indonesia has invited companies of all sizes to utilise such opportunities. In this study, we found that being policy entrepreneur, advocate, financier, and/or R&D
contributor is possible for the private sector. While this study encourages their contribution to the escalating RE sector in Indonesia, the GoI needs to develop stronger mechanisms to support them. These mechanisms include the linking National Industry Master Plan (RIPIN) 2015-2035 to the national technology development roadmap and human resources development master plan–where both are still not made yet and a selective R&D fund allocation mechanism tailored to the geographical context of the private sector.

As this is the third-year study of SNAPFI project, we also found that Kingdon's multiple streams approach (Kingdon, 1995) can be used to assess the emerging factors surrounding the opening of policy windows. An immediate policy window will be open in 2024, mainly to the presidential election, and thus needs a strong political commitment to focus the efforts towards the achievement of NDC by 2030 and NZE by 2060.

### 6.2 Academic contribution to literature

Centred in the political economy dimension of the Indonesian energy landscape, this study has developed an evaluation framework to assess the policy instruments that are in place, being prepared, and/or proposed by the evaluator themselves. We also provide the scorecard that documents our assessment, where it can be incorporated into strategic energy policy making. Our evaluation assessment should add more structure to previous qualitative energy policy evaluation (Chen, 2011; Klessmann et al. 2011; Yoon and Sim, 2015), complement the quantitative energy policy evaluation (Carley, 2009; Lee and Shih, 2010; Zhang et al. 2014), and provide a different standpoint to more technical assessment that has been growing in the literature (Gatzert and Vogl, 2016; Hu et al., 2021; Liu et al., 2018; Menegaki, 2018; Wang and Zhan, 2019). This assessment is also adding energy policy evaluation literature in the context of Indonesia, both quantitatively (Andadari et al. 2014; Hidayatno et al., 2020; Kraal, 2019; Othman et al., 2009; Sambodo and Novandra, 2019) or qualitatively (Jaelani et al., 2017; Santika et al., 2020).

In this study, we also specified the possible roles of the private sector, particularly in the RE development. These roles have added the private sector's role categorisation in the Indonesian RE sector (Maulidia et al., 2019). We also contextualise RE value chain theoretical frameworks into the Indonesian context with its pertinent stakeholders (Liera et al., 2013; Maulidia et al., 2019).

As Kingdon's multiple streams approach (Kingdon, 1995) is used to illustrate the policy windows as opportunities yet to be seized, our evaluation assessment also becomes one of structured operationalisation of this theory.

### 6.3 Study limitations and further research

While we have successfully conducted the energy policy making analysis in the context of the Indonesian RE sector and how the private sector should contribute to the achievement of NDC 2030, several limitations emerge. While the methodological framework in this study owes to a Regulatory Impact Assessment or RIA (Radaelli, 2004; OECD, 1997; Shah, 2018), however we modified the
assessment only to the evaluation of current energy policy and discourses in Indonesia—not necessarily include the AHP and cost benefit analysis that should improve the rigour of the study, particularly that RIA is designed to conflate the pertinent expertise and extensive information to evaluate policies (Radaelli, 2004). This practice leads to how we assess the policy instruments against all criteria. RIA itself is designed to see whether the expert judgements indeed converge to certain dimensions of policy instruments or not through a series of analytical hierarchy processes (AHP). To fill this gap, we have tried to gather relevant news, interview excerpts, statistics, and all possible data sources to equip ourselves with the capacity to evaluate. In the end, the lack, or rather, unavailability of data, gives us hurdles to judge the performance of our proposed policy instruments.

As RIA is also an ex-ante evaluation technique, ex-post evaluation analysis along with mid-term endline analysis also need to be done to see the impacts of policy instruments implemented by the government, although it is still a long way to go to do endline analysis. The mid-term analysis here can be combined with the analysis of how policy windows manifest (Kingdon et al, 1984).

From our interviews, our respondents are limited to the government and coal company representatives, while only one respondent comes from the RE sector. To expand the extent of representation of the latter, we elaborate on the statements from the previous and use keywords to gather more information around the private sector roles in the energy sector. While considerably limited, as this limitation is also noted in previous studies (Shah, 2018), our propositions related to connecting the private sector roles with the NDC achievement by 2030 remain contextual to the current situation in Indonesia.

From this point, several directions of further research manifest. More elaborations on the evaluation criteria should be done to ensure that other policy dimensions are covered. As this study also adapts the RIA framework, a proper RIA should also be done to also gather the expert judgement from the AHP stage. This direction will provide a more structured evaluation towards Indonesian energy policies in accordance with the NDC achievement. The expansion of the study scope that probes the connection of climate finance policies with the role of private sectors is also suggested, particularly as Indonesia also already has Sustainable Finance Roadmap Phase II (2021 - 2025) and those in the next phases. For Kingdon's multiple streams approach (Kingdon, 1995), a series of policy windows, particularly set every five years in Indonesia due to the presidential election, can be threaded into a singular line. A comprehensive illustration of Kingdon's multiple streams approach can also be performed by referring to the energy policy trajectory spanning for decades (see Maulidia et al. 2019). Therefore, the impact of policy instruments related to RE energy could be thoroughly traced and acted upon.
Chapter seven

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7. References


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Medium Term National Development Plan (RPPMN) 2020-2024


Presidential Regulation Number 22/2017 concerning The National Energy General Plan (Rencana Umum Energi Nasional-RUEN).


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Chapter eight

Appendix
8. Appendix

Interview Questions and Discussion Topics

A. Coordinating Ministry of Maritime Affairs and Investment
   1. Coal sector governance: the core background
   2. Actors involved in the Indonesian coal industry network and coalition
   3. Lobbying and negotiation practices in the process of shifting from fossil fuels to renewable energy
   4. Policy conditions in Indonesia and their relation to energy policy
   5. The effect of global pressures on policy-making in the energy sector
   6. Policy conditioning in the policy-making process in Indonesia

B. Geothermal Power Plant Company
   1. Background of geothermal energy development
   2. Financing mechanism for geothermal energy project development
   3. Future development of geothermal energy in relation to the presidential regulation on carbon economic value
   4. Private developer opinion on renewable energy development in Indonesia
   5. Private developer opinion on the Directorate General of Renewable Energy and Energy Conservation in the development of renewable energy in Indonesia

C. Coal Company
   1. Opinion about the NDC targets and other climate commitments from the Government of Indonesia, and perception on the government’s effort and policy responding to the climate change and energy sector.
   2. Opinion/perception of climate-related policy or political support in Indonesia and its implication to the enabling environment of energy sector development. To what extent climate policy in the energy sector has influenced the development of the coal industry, including investment in the coal sector.
   3. Coal company perspective regarding CCS and co-firing technology in coal development.
   4. What are the prospects and financing mechanisms for the coal industry in the midst of the lack of government attractiveness, the shifting of investment in coal companies to renewable energy industries and the increasingly stringent banking sector in providing loans for upstream coal industry activities.
5. Possible barriers and opportunities in developing the coal industry, related to the climate-related policy framework in Indonesia.

D. Asosiasi Energi Surya Indonesia—Indonesian Solar Energy Association (AESI)

1. To what extent climate policy in the energy sector has influenced the development of solar energy, including investment in the solar energy sector.

2. Opinion or perception of policy or political support for the development of solar energy and the achievement of the NDC target.

3. In achieving the NDC target, especially from the energy sector, New Renewable Energy (NRE) is the backbone in reducing emissions in the Indonesian energy sector. How Indonesia’s climate change commitments, especially in the energy sector (including global commitments) affect the development of solar energy? What is the role of AESI in promoting solar PV in the development of renewable energy to achieve the NDC target?

4. Regarding climate change action, Indonesia received International Climate Finance (ICF). One of the international funding is the Green Climate Fund (GCF) which is allocated for mitigation actions in Indonesia. Related to this, how is AESI’s perspective on the existence of ICF and to what extent ICF has an effect on AESI’s plans/strategies in the development of solar energy.

5. Barriers and challenges in adopting new renewable energy policies, especially related to solar energy.

E. Dewan Energi Nasional—National Energy Council (DEN)

1. The role of DEN in supporting the energy transition towards renewable energy to achieve the NZE target through the National Energy Policy.

2. Strategy by DEN to accelerate the achievement of the national energy mix target by 2025.

3. Opinion/perception on issues related to the informality in climate governance in the energy sector from the perspective of DEN.

4. Barriers and challenges in achieving the NDC and NZE targets, especially in terms of national policies and regulations in the energy sector.

F. Badan Riset Nasional Indonesia—National Research and Innovation Agency (BRIN)

1. Political perspective on centralised phenomena in Indonesian governance including in the energy governance.

2. Political perspective on the absence of boundaries between politicians and businessmen as reflected in the number of politicians who hold concurrent positions as commissioners in state-owned and private companies.

3. Related to the phenomenon of government administration which tends to be centralised, what is the role of local government in the current political system, how is the tendency of local governments to respond to global issues, and the extent to which the climate agenda has been understood by the local government.
6. Medco Energy

1. Opinion about the NDC targets and other climate commitments from the Government of Indonesia, and perception on the government’s effort and policy responding to the climate change and energy sector.

2. Opinion/perception of climate-related policy or political support in Indonesia and its implication to the enabling environment of energy sector development. To what extent climate policy in the energy sector has influenced the development of the oil and gas industry, including investment in the oil and gas sector.

3. History of Medco from a drilling company to become one of the leading oil and gas company, including Medco’s transition to have a long-term plan in the energy business by developing the New Renewable Energy (EBT) business which leads to electricity. How is the development strategy?

4. What are the prospects and financing mechanisms for the oil and gas industry in the midst of the lack of government attractiveness, the shifting of investment in oil and gas companies to renewable energy industries and the increasingly stringent banking sector in providing loans for upstream oil and gas industry activities?

5. Possible barriers and opportunities in developing the oil and gas industry, related to the climate-related policy framework in Indonesia.

6. Medco’s involvement in policy making, for example involvement in public consultations, providing input in drafting regulations/policies related to energy.