Master Thesis

# The impact of the oil policy in Indonesia on achieving the National Energy Mix Target

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**List of Abbreviations**

| | |
|---|---|
| RUEN | : Rencana Umum Kebijakan Nasional (National Energy Policy Plan) |
| MEMR | : Ministry of Energy and Mineral Resources |
| BPS | : Badan Pusat Statistik (Central Bureau of Statistics) |
| NRE | : New Renewable Energy |
| DEN | : Dewan Energi Nasional (National Energy Council) |
| RE | : Renewable Energy |
| NEC | : National Energy Council |
| ASEAN | : Association of Southeast Asian Nations |
| KEN | : Kebijakan Energi Nasional (National Energy Policy) |
| Bpd | : Barrels per day |
| IEA | : International Energy Agency |
| EU | : European Union |
| EOR | : Enhanced Oil Recovery |
| SKK MIGAS | : Satuan Kerja Khusus Pelaksana Kegiatan Usaha Hulu Minyak dan Gas Bumi (Special Task Force for Upstream Oil and Gas Business Activities) |
| BaU | : Business as Usual |
| PB | : Planned/Policy Based |
| RK | : Rencana Kerja (Work Plan) |
| GR | : Government Regulation |
| VAT | : Value Added Tax |
| ESDM | : Energi dan Sumber Daya Mineral (Energy and Mineral Resources) |
| MIGAS | : Minyak dan Gas Bumi (Oil and Gas) |
| EBTKE | : Energi Baru Terbarukan dan Konservasi Energi (New Renewable Energy and Energy Conservation) |
| DitJen | : Direktorat Jenderal (Directorate General) |
| Persero | : Perusahaan Perseroan (Limited Liability Company) |
| MS Teams | : Microsoft Teams |
| EBT | : Energi Baru Terbarukan (New Renewable Energy) |
| EKC | : Environmental Kuznets Curve |
| EV | : Electric Vehicle |
| PT | : Perseroan Terbatas (Limited Liability Company) |
| PLN | : Perusahaan Listrik Negara (State Electricity Company) |
| PLTA | : Pembangkit Listrik Tenaga Air (Hydropower Plant) |
| PLTU | : Pembangkit Listrik Tenaga Uap (Coal-Fired Steam Power Plant) |
| TKDN | : Tingkat Komponen Dalam Negeri (Domestic Component Level) |
| CCS | : Carbon Capture and Storage |
| CCUS | : Carbon Capture, Utilization, and Storage |
| PKUK | : Penugasan Khusus Usaha Kelistrikan (Special Assignment for Electricity Business) |
| NZE | : Net Zero Emissions |

**Abstract**

This research investigates oil dependence in Indonesia and the government's role in making policies for the energy transition. This study was conducted to determine the factors of high dependence on oil. Obstacles to optimizing Renewable Energy as transitional energy and government steps in making appropriate policies to maximize existing potential to ensure energy security and sovereignty. Interviews with policymakers and policy implementers were conducted to collect data using thematic analysis to synthesize each Interviewee's main idea. The analysis results will answer the research question, *"What is the role of Government policy in eliminating dependence on oil towards a sustainable transition from national lock-in to achieve the 2030 and 2050 General National Energy Plan (REUN) targets?"* Unclear government policies are an obstacle to the energy transition, especially for investors. S. The Indonesian government is beginning to realize the pattern of the public indulging in cheap fuel, so they are inefficient in consuming energy. So, the government revised the National Energy Policy (KEN) by adding the Indonesian gold variables 2045 and NZE 2060. This study chose national lock-in and sustainability transition as a conceptual framework to answer the research question and elaborate on the results. Thematic analysis was chosen because it was considered most suitable for processing qualitative data from semi-structured interviews. Although this research only focuses on Indonesia, future research can expand the context by comparing it with other countries. This research offers an analysis to understand the conditions of high and entrenched oil dependence, the difficulty of implementing the renewable energy transition, and the importance of the government's role in making a policy for the sustainability of the energy mix in Indonesia.

# 1. Introduction

## 1.1. Research Background

Indonesia as the fourth largest country in terms of population in 2023 , number making Indonesia a strong developing country with a projection of becoming the larger making Indonesia a strong developing country with a projection of becoming the largest developing country. Indonesia is also a solid developing country and is projected to become the most prominent economic country and number four in 2050 (John Hawksworth et al., 2017). Rapid growth has driven up electricity demand by 6% annually since 2000 (Langer et al., 2021). This surge is attributed to population and economic expansions, with transportation mobility and the industrial sector as significant contributors. Based on the composition of primary energy, Indonesia has the highest percentage of other ASEAN countries, Indonesia contributes the highest percentage of other ASEAN countries, and Indonesia contributes the highest percentage of other ASEAN countries. Indonesia contributes 36% of ASEAN (Vidinopoulos et al., 2020), predominantly the composition of primary energy sourced from fossil fuels at 69,6 % (MEMR, 2023) . Despite substantial coal reserves, Indonesia falls short of meeting its oil demands for fuels, relying heavily on imports; in 2023, it rises to 17.66% oil imports from 2022 (MEMR, 2023), exacerbating the country's fossil fuel dependency amidst ample renewable energy potential (BPS, 2022).

The government aims to reduce fossil fuel dependency in primary energy sources to reduce oil imports and transition towards renewable energy, as outlined in The General National Energy Plan (RUEN) (Reyseliani & Purwanto, 2021) and enacted through Presidential Regulation No. 22/2017. However, by 2050, the plan forecasts that 69% of the primary energy supply will still be sourced from fossil fuels, with only 31% from renewables, indicating a reluctance to deviate from fossil fuel dependence significantly (Rahman et al., 2021).Policies favoring fossil fuels over renewables persist, despite Indonesia holding 40% of global geothermal reserves yet utilizing only 5% (Nasruddin et al., 2016).

Benefiting from stable global oil supplies amidst geopolitical fluctuations, Indonesia strives to achieve a target of 1 million barrels per day by 2030 to reach daily oil consumption, with a specialized unit dedicated to this goal and Pertamina as a state-owned company, controlling 90% of the country's crude oil supply (Rahman et al., 2021). However, attracting foreign investment remains challenging, hindering progress toward the 2030 target. Most oil production caters to transportation needs, with substantial subsidies for the vehicle fuel sector. Government support for refinery enhancements persists, reflecting the prioritization of fossil fuels for economic reasons.

This research delves into the factors contributing to Indonesia's high fossil fuel dependency, the challenges of transitioning to renewable energy, and the role of government policies in achieving ambitious energy mix targets by 2030 and 2050.

### 1.2. Research Objective

To develop this research are the research objectives:

- Analysis of Hindering factors to achieve sustainability transition with renewable energy.
- Analysis of Indonesian government policy to achieve the 2025 and 2050 ambitious energy mix targets.

### 1.3. Research Question

To develop this research, this is the following research question (RQ):

What is the role of government policy in eliminating dependence on oil and moving towards a sustainable transition from national lock-in to achieve the 2030 and 2050 General National Energy Plan (REUN) targets?

## 2. Context Review

### 2.1. Oil Consumption in Indonesia

As a developing nation, Indonesia heavily relies on oil as its primary energy source. Oil production in the country experienced a decline of 4.31% annually from 2018 to 2023 (MEMR, 2023). In 2023, Indonesia's oil production stood at 605,500 (MEMR, 2023) barrels per day (bpd), while oil consumption reached 1,604,000 bpd (EI, 2024), necessitating imports to meet the demand. With the country's economic growth and population expansion, the oil demand is projected to continue increasing in the foreseeable future. The government's role in supporting oil and refinery production optimization until 2040, particularly in the transportation sector, contributes to this upward trend. As a state-owned enterprise, Pertamina holds the majority of oil wells in Indonesia following its acquisition of Chevron in August 2021, accounting for 26% of the country's oil production.

As of 2023, Indonesia's proven oil reserves stood at 2.41 billion bpd, with potential reserves estimated at 2.29 billion bpd (MEMR, 2023). Given the current capabilities, these reserves are expected to meet demand until 2030. However, Indonesia faces challenges in attracting investors to optimize potential oil reserves, coupled with aging existing oil fields (Maulidia et al., 2019). Currently, the country relies on operational oil stocks managed by Pertamina, which only cover consumption for 22 days, falling short of the international standard of 90 days recommended by the International Energy Agency (IEA) and the European Union (EU). Rahman (Rahman et al., 2021) highlights Indonesia's heavy dependence on oil, leading to increased emissions and a national lock-in phenomenon due

to the government's reliance on oil as the primary fuel source. Forecasts indicate a downward trend in crude oil production by 2050 due to limited exploration, suboptimal use of enhanced oil recovery (EOR) techniques, and low investment interest in upstream oil. The Special Task Force for Upstream Oil and Gas Business Activities (SKK Migas) has established an ambitious target to achieve petroleum production of 1 million barrels per day by the year 2030.

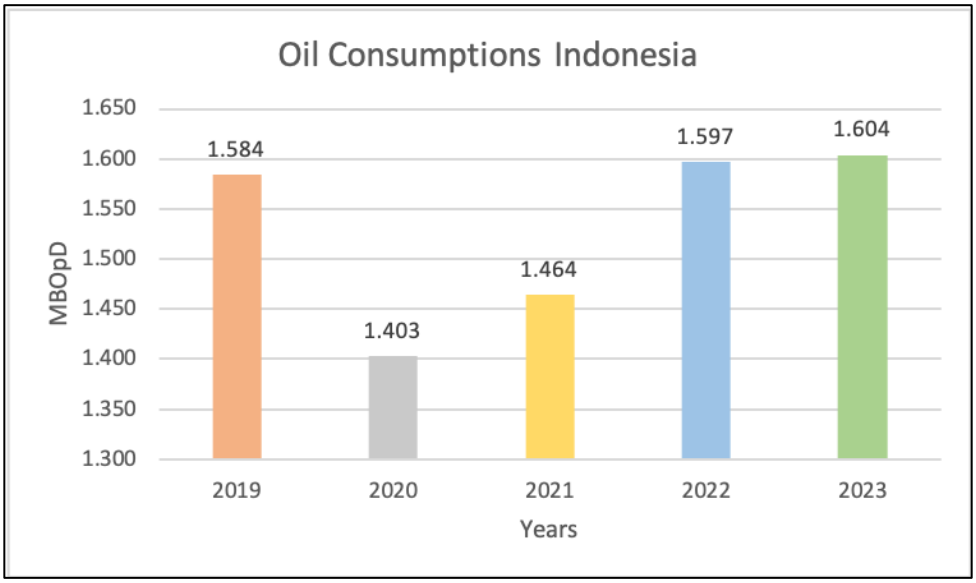


Figure 1 Oil Consumption in Indonesia (EI, 2024)

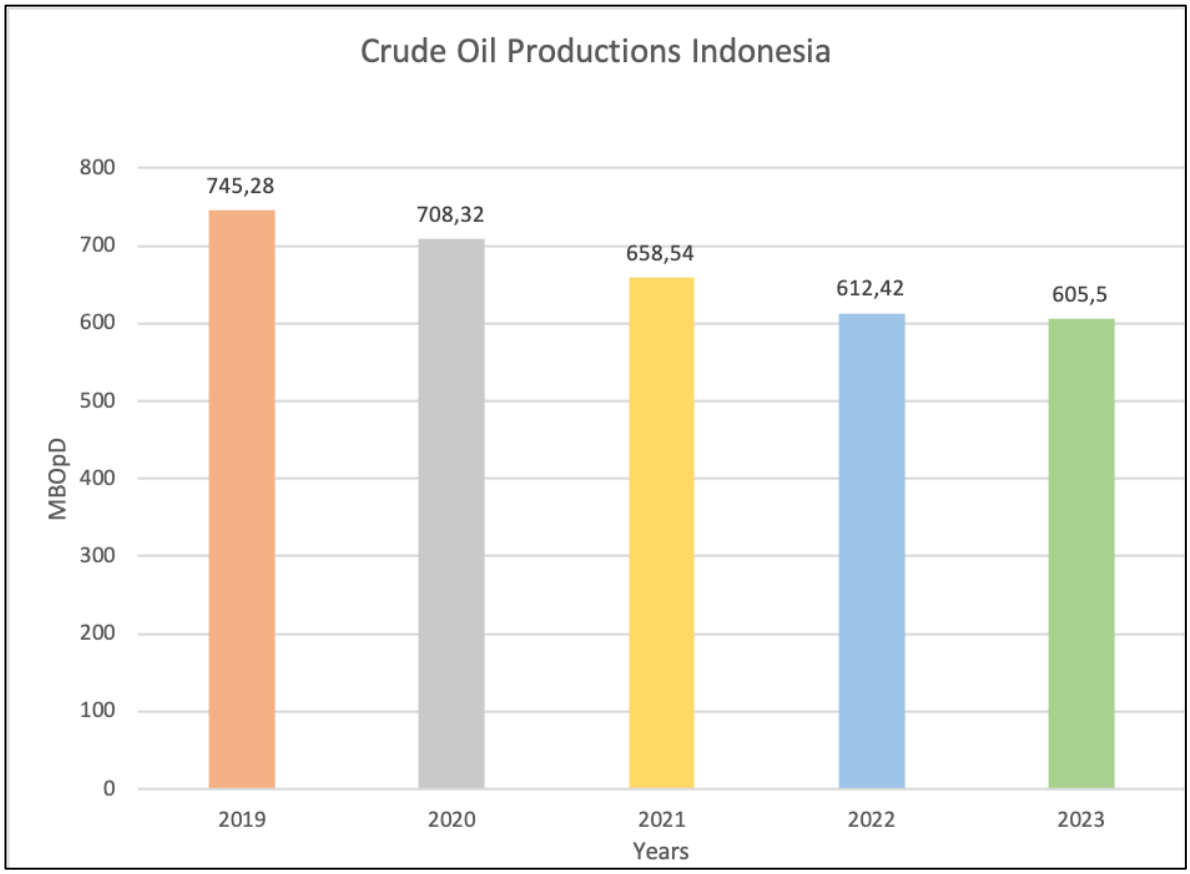


Figure 2 Crude Oil Production in Indonesia (MEMR, 2023)

## 2.2. National Target of Energy Mix

The government commenced setting energy mix targets after the Paris Agreement, notably through Government Regulation No. 79 of 2014 on National Energy Policy (KEN), which aims for a renewable energy mix of at least 23% by 2025 and 31% by 2050. KEN mandates a reduction of oil usage by 25% in 2025 and sets a target of 1% annual improvement in energy efficiency to support these objectives (DEN, 2019). Renewable energy's share is anticipated to rise by 29% by 2050, achievable through optimizing solar panels, biomass, geothermal, and hydro as power sources, transitioning to electric vehicles, and substituting biofuels for fossil fuels in the transportation sector. The sluggish progress in Indonesia's renewable energy (RE) development is attributed to high infrastructure costs and the unavailability of necessary components domestically, resulting in elevated expenses. Moreover, the government's continued support for fossil fuels and the absence of incentives for RE further impede its development (Budiarto & Surjosatyo, 2021).

The National Energy Council, which the government appointed as the institution responsible for integrating all stakeholders in achieving the REUN target, created several scenarios as a reference for achieving the REUN target. In 2018-2019, scenarios were made for the long term up to 2050, as seen in the figure. Still, after the COVID-19 pandemic since 2021, scenarios were created for ten years, making monitoring and adjusting to developing new assumptions easier. Even though the basic assumptions used are the same as before, the target

values achieved in each year's scenario differ. A comparison of the target values can be seen in the figure. Implementing the PB scenario appears to be the government's most appropriate course of action To attain renewable energy mix objectives (Wahyuni & Ardiansyah, 2022).

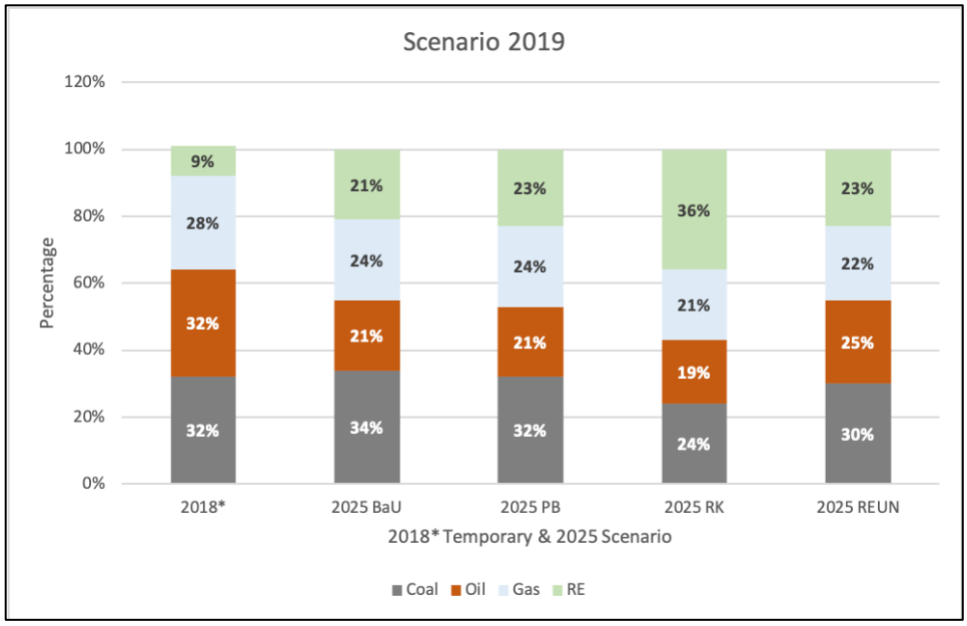


Figure 3 Assumption Scenario for 2019 REUN (DEN, 2019)

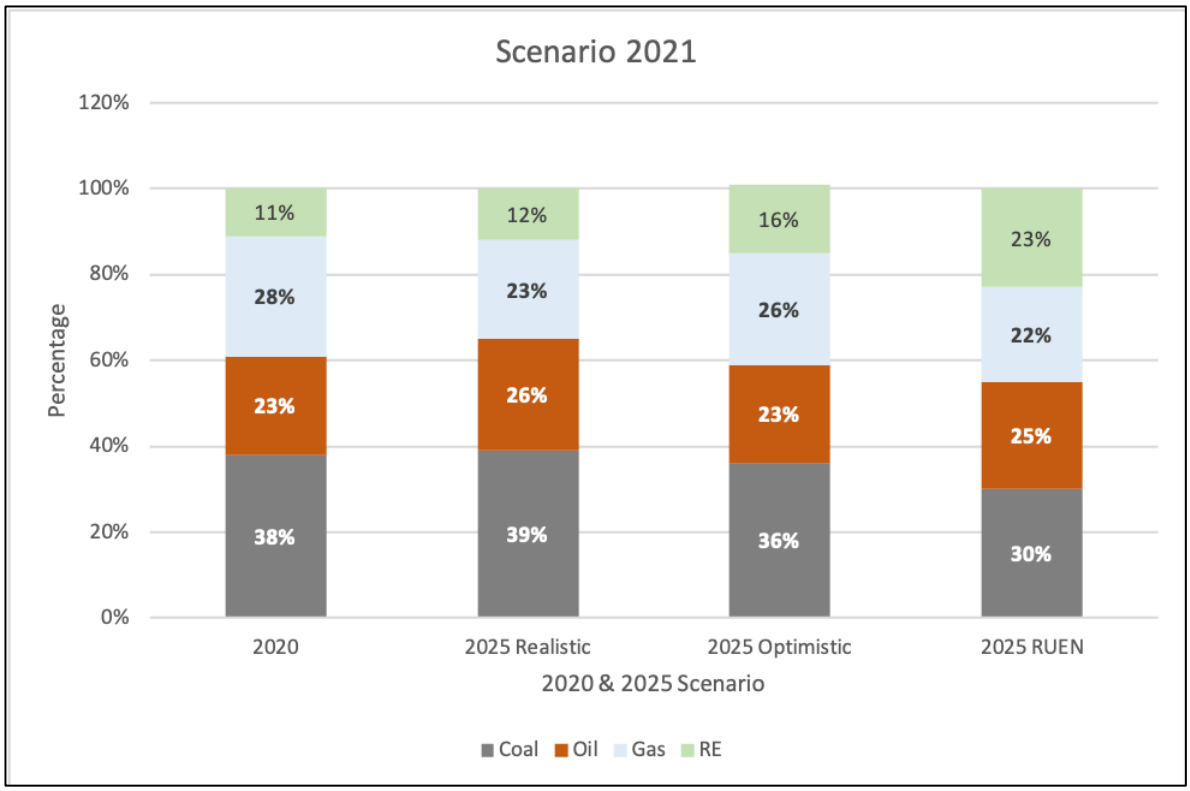


Figure 4 Assumption Scenario for 2021 REUN (DEN, 2021)

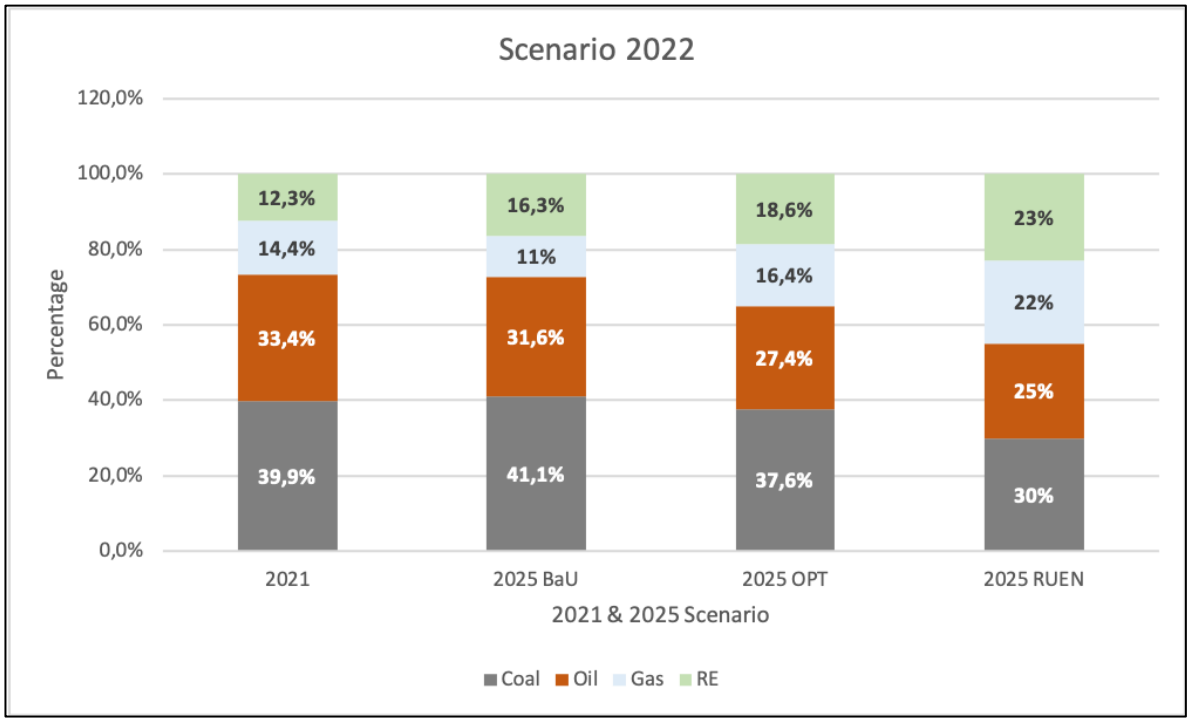


Figure 5 Assumption Scenario for 2022 REUN (DEN, 2022)

## 2.3. Government Subsidies on Energy

According to Article 33 of the Constitution, which stipulates that "land, water, and natural resources are owned by the State and utilized to the fullest for the welfare of the people," Indonesia's energy resource management system is overseen by state-owned enterprises, with private companies required to pay royalties, obtain permits, or share profits from commercial production (Rahman et al., 2021). Facing challenges in attracting investors to the oil and upstream sectors, the government initiated a revision of Government Regulation (GR) No. 79 of 2010 to GR No. 27 of 2017 on Cost Recovery and Taxation in Upstream Business by the end of 2015. This revision aims to enhance investor interest in the competitive global market by reducing exploration and exploitation taxes and exempting from customs duty, value-added tax (VAT), and import tax (2019). Additionally, the government ratified Government Regulation No. 8 of 2017 on Gross Split PSC, introducing a new scheme in oil and aligned with GR No. 53 of 2017 on Gross Split PSC. Taxation contractors will be fully responsible for all upstream activities, and the income will be split with the government. This scheme will make the contractors more flexible and efficient because they do not need to manage cost recovery with the government. Both policies were made to attract investors (DEN, 2019).

Energy subsidies have become ingrained in Indonesian society both socially and politically . Oil energy subsidies have been in place since 1965 during President Soeharto’s regime, initially supported by the country's oil exports until 2003. However, fluctuations in oil prices post-2003 led to subsidies being funded from the national budget (Chelminski, 2018; Ichsan et al., 2022). Despite economic growth of 5%, oil product subsidies persist. Subsidies, though

providing cheaper energy, can lead to increased food prices and trade distortions (Chelminski, 2018). Overly generous subsidies strain the government budget significantly if oil prices rise, exacerbating fiscal challenges. Moreover, studies indicate that only 36% of government subsidies benefit low-income earners, with a mere 1% reaching low-income people (Dutu, 2016). Continuous energy subsidies hamper reallocating funds to more productive sectors beneficial for society and the environment.

## 2.4. Opportunities for Renewable Energy in Indonesia

The substantial reliance on oil has impeded the realization of renewable energy potential in Indonesia. As of 2020, renewable energy accounted for only 14.71% of total energy consumption, with fossil fuels dominating at 85.64%, falling short of the General National Energy Plan (REUN) target of 23% by 2025 (Budiarto & Surjosatyo, 2021). Significant efforts are required to bridge this gap and meet the renewable energy target. Although the opportunity for renewable energy in Indonesia is abundant under Presidential Regulation No. 22/2017 (REUN), its utilization could have been better, representing a missed opportunity. However, there has been a notable decrease in renewable energy prices over the past decade due to ongoing research and development, particularly in advanced technologies (IRENA, 2019) . Solar photovoltaics (PV) have exhibited the most significant cost reduction (82%) from 2010 to 2019 among power projects not reliant on public subsidies, followed by declines in concentrating solar power (47%), onshore wind (40%), offshore wind (29%), and bioenergy (13%) (IRENA, 2019). This cost reduction serves as a compelling rationale to transition from fossil fuel dependency to renewable energy. Such a shift requires government support through appropriate regulations and incentives, notwithstanding prevailing political and economic factors favoring fossil fuel usage in industry (Clark et al., 2020). The government must reassess existing policies and emulate successful transitions to renewable energy witnessed in countries like the USA, China, and the EU (Musa et al., 2018). Despite the recent enactment of Omnibus Law No. 11/2020, which offers incentives for fossil fuel investments, renewable energy, apart from geothermal, remains marginalized, underscoring the government's reluctance to embrace renewables as a mainstream energy source (Rahman et al., 2021).

Given Indonesia’s status as the world's largest palm oil producer, the government is particularly interested in biofuels as a renewable energy option (Dixon et al., 2016). The government has implemented B40 biofuel, a blend of 40% palm oil and 60% diesel, since 2020 (Rahman et al., 2021). Incentives have been extended to biofuel companies, yet Pertamina, a state-owned enterprise, is the primary beneficiary, authorized to produce biofuel domestically by Presidential Regulations No. 61/2015 and No. 66/2018(Arie Yanwar Kapriadi, 2019) . However, the increasing demand for biofuels raises concerns about land issues associated with oil palm plantation expansion (Puricelli et al., 2021; Rulli et al., 2019).

Table 1Renewable Energy Potentials In Indonesia (REUN) (Rahman et al., 2021)

Renewable energy potentials in Indonesia as stated in Presidential Regulation No. 22/2017 (RUEN).

| Energy sources | Potential capacity[a] (Mega Watt) | Installed capacity (Mega Watt) | % utilization of potential capacity | Reliability | Environmental impacts |
|---|---|---|---|---|---|
| Geothermal | 29,544 | 1,438.5 | 4.9% | High | Low |
| Hydro | 75,091 | 4,826.7 | 6.4% | High | Low |
| Mini & micro hydro | 19.385 | 197.4 | 1.0% | Medium | Low |
| Biofuel | 32,654 | 1,671.0 | 5.1% | High | Medium |
| Solar | 207,898 | 78.5 | 0.04% | High | Low |
| Wind | 60,647 | 3.1 | 0.01% | Low | Low |
| Waves | 17,989 | 0.3 | 0.002% | Medium | Low |

Note: Reliability and environmental impact are based on authors' assessment.
[a] Total capacity based on all currently known opportunities.

Indonesia's dependencies on oil have become a lock-in since oil has become a primary source, especially for transportation. To enhance and increase economic activity, the government provides incentives and subsidies to the oil industry and petrol for the public. Even now, as production decreases to support the demand for oil, the government imports oil to meet the country's needs.

Indonesia's landscape is highly dependent on oil; Oil consumption will increase yearly due to population growth and economic growth while the oil production rate decreases and makes the government import. The government, through SKK MIGAS, has set a target to reach 1 million barrels per day by 2030; the target looks ambitious while oil production continues to decline. The government sets targets based on KEN and REUN for the energy mix in 2025 and 2050 and oil production. The target seems too ambitious. However, Indonesia has much renewable energy potential for various primary energies to achieve the energy mix target. Subsidies provided by the government are not evenly distributed to the energy sector; most subsidies tend to be for fossil fuels, including Oil and Petroleum, compared to renewable energy.

## 3. Conceptual Framework

### 3.1. Sustainability Transitions

In seeking to comprehend the concept of energy transition, diverse resources focusing on energy transition and sustainability are utilized. As mentioned, the facets of the energy transition are significantly more intricate than a mere shift from fossil fuels to renewable energy sources. The energy supply sector is perceived as a socio-technical system. Aside from encompassing technical elements like materials and knowledge, this system is also impacted by a network of actors and institutions (Markard et al., 2012). Its intricacy as a socio-technical system entails numerous repercussions. (Köhler et al., 2019) They identified characteristics of sustainable transitions, providing a more profound understanding of the challenges faced by the government in their implementation.

To begin with, this socio-technical system comprises various elements, including culture, technical aspects, policies, infrastructure, industry, and markets. The transition does not follow a linear trajectory; interconnected developments shape it. For instance, significant technological breakthroughs can expedite the process, whereas disruptions in the market can impede the transition. Secondly, a sustainable transition involves many actors from diverse

backgrounds, such as politics, industry, civil society, households, and other entities. Due to their diverse values and interests, these actors often hold differing views on the most desirable innovations.

Additionally, there exists a substantial correlation between stability and change. Transition necessitates alterations across various sectors; however, many systems are already locked in, posing challenges to change. The prolonged duration of transitions is attributed, in part, to the need for the system to 'open up' to attain new stability. Before this occurs, uncertainties abound as the precise outcomes of innovations and potential solutions remain unpredictable. The ultimate characteristic of a sustainable transition is its normative direction. Sustainability is a shared objective, yet the private sector commonly lacks incentives to contribute actively, primarily due to the prisoner's dilemma and the free-rider problem (Köhler et al., 2019). Consequently, achieving sustainability relies on public policy, spanning various levels of government.

### 3.2 National Lock-In

The concept of lock-in theory is closely associated with fossil fuels or carbon. Lock-in refers to a situation where a particular technology, product, or system becomes dominant and difficult to replace due to various complex factors such as economics, politics, and social dynamics. According to Unruh (2000), locking in fossil fuels is a situation where dependence on fossil fuels becomes dominant, and replacing it with renewable energy is problematic. Over the last century, significant developments and investments in fossil fuels have made fossil fuels as primary energy more accessible and cheaper. However, in the last few decades, with many movements and campaigns regarding the environmental impact caused by fossil fuel, many developed countries have begun to switch to renewable energy; there have been many international agreements to jointly switch to renewable energy to achieve the carbon-neutral target by 2050. Developed countries can help developing countries by providing knowledge and experience together to move away from high dependence on fossil fuels.

However, in the context of renewable energy (RE), the lock-in concept shifts towards securing the position of renewable energy when it receives substantial support from the government and gains widespread acceptance in society. Although renewable energy cannot immediately supplant other energy sources, if its development aligns with economic and political contexts similar to those that facilitated the carbon lock-in, it may lead to a comparable outcome. Lock-in of renewable energy can occur as infrastructure costs decrease due to ongoing technological advancements and improvements in a country's economy. The positive perception of renewable energy as safe and environmentally friendly further enhances its acceptance among society (Muller et al., 2011). It is important to note that the lock-in of renewable energy differs from the traditional lock-in of carbon sources such as fossil fuels and nuclear energy, which are notoriously difficult to replace. Throughout the development process, renewable energy is constantly compared with carbon lock-ins (Aklin & Urpelainen, 2018). The very striking difference lies in the difference in infrastructure in developing countries such as Indonesia; fossil fuel itself already has infrastructure that has become an investment from the previous decade, and substantial economic and political support makes its implementation easier, whereas renewable energy requires significant

initial capital in infrastructure and a decentralized system which is different from Fossil fuels require a different approach in the transition to renewable energy.

In the economic realm, reducing costs fosters a more competitive economy of scale among producers, installers, and renewable energy users. The ease of constructing renewable energy projects on a larger scale leads to more cost-efficient construction processes. However, achieving cost reductions in renewable energy may take several decades. With growing competition in the renewable energy sector, governments must implement supportive policies to promote its growth and stability. Empirical evidence suggests that resistance from heavy industries diminishes when renewable energy growth is integrated into the national electricity mix (Cheon & Urpelainen, 2013). Consequently, reducing renewable energy costs creates economic and investment opportunities in the global market, attracting interest from other countries to learn and emulate cost-reducing strategies, thereby facilitating the cross-border adoption of renewable energy solutions (Lewis & Wiser, 2007).

In the global political arena, renewable energy development varies depending on each country's capabilities. Countries with substantial fossil fuel resources may face challenges transitioning to renewable energy due to their high dependence on fossil fuels. However, the potential for energy convergence emerges over time, primarily as global politics increasingly advocate for a shift towards renewable energy. According to Asif (Asif & Muneer, 2007) , Reducing reliance on fossil fuels can enhance a country's energy security, as renewable energy sources are more widely available and can be produced locally. Government policies play a crucial role in overcoming opposition to renewable energy. Effective collaboration between declining infrastructure costs and government policies can accelerate the growth of renewable energy.

Moreover, policy diffusion and learning between countries can motivate others to increase their adoption of renewable energy solutions. Emulating successful policies from other countries can lead to institutional isomorphism and facilitate the formulation of practical renewable energy policies (Meyer et al., 1997). Transitioning to renewable energy can also position governments as proponents of green jobs and bolster the export potential of the renewable energy industry (Cheon & Urpelainen, 2012; Lewis & Wiser, 2007).

Several factors contribute to lock-in: the significant investments made by the fossil fuel industry, the extensive research and development required to optimize fossil fuel utilization, and the significant technological advancements aimed at achieving less cost in energy production . Over decades, fossil fuel usage has become deeply entrenched, posing challenges to transitioning to renewable energy sources, which are more risky and uncertain (Aklin & Urpelainen, 2018). Starting from the lowest position in the energy market competition, renewable energy faces hurdles in replacing primary energy sources (Aklin & Urpelainen, 2018). The public's mindset assumes that air and environmental pollution originating from fossil fuels can still be local. People prefer to think about electricity prices compared to the effects of pollution that may occur in other parts of the world (geography) and the effects that occur far in the future (time). For instance, very few countries still implement carbon emission taxes for industry to increase market competition with renewable energy. Political obstacles significantly impact lock-in, in contrast to renewable energy with a decentralized system, where energy infrastructure is centralized in the giant fossil fuel

industry. Large industries wield significant political influence, making it easier to lobby policymakers and maintain the status quo (Aklin & Urpelainen, 2018).

The author uses national lock-in as a theory in this research because Indonesia is highly dependent on fossil fuels. The significant investment made by the oil company Pertamina as a state-owned company in upstream oil and gas means that the government, through the Special Task Force for Upstream Oil and Gas Business Activities (SKK Migas), has a target of increasing oil production per day to 1 MBD in 2030 to aim oil consumption demand. High incentives and subsidies for fossil fuels differ from renewable energy, making the transition to sustainability a political obstacle. The government's ambiguity in making energy mix targets in the General National Energy Plan (REUN) raises questions, particularly in light of Indonesia's commitments to reduce greenhouse gas emissions following the 2015 Paris Agreement. Based on the literature review and theoretical framework carried out in this study, the author has two hypotheses, which will be analyzed after conducting interviews with stakeholders;

- H01 Hindering factors such as unclear policy frameworks and subsidies and high dependence on oil significantly obstruct the sustainable transition towards achieving renewable energy transitions

- H02: Proactive and comprehensive public policies in Indonesia play a significant role in promoting the sustainable transition

## 4. Methodology

### 4.1 General Research

In this research, I used a qualitative data approach to collect data. The qualitative method was chosen because the research topic relates to each institution's role and requires a structured description to understand the decision-making process. The primary data was collected by conducting semi-structured interviews directly. Primary data is selected to fulfill each stakeholder’s role and each institution’s perspective on oil policy. After collecting the data, the analysis will be carried out using the thematic analysis method.

### 4.2 Interview

In interviews, the author discussed with several colleagues from previous work in MEMR to determine the correct stakeholders to get excellent and accurate data. Regarding a policy topic, two main elements are needed: stakeholders as regulators or policymakers, in this case, government agencies and implementers of regulations, namely companies. Table 4 describes each stakeholder’s role and relationship to this research.

Table 2 Interviewee profiles

| Code | Interview Dates | Institution | Institution Remarks |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Interviewee 1 | 1 June 24 | Special Task Force for Upstream Oil and Gas Business Activities (SKK Migas) | Oversees and coordinates exploration, exploitation, and **development activities in the oil** and gas sector. |
| Interviewee 2 | 1 June 24 | Ministry of Energy and Mineral Resources (ESDM) - Directorate General of Oil and Gas (Ditjen Migas) | **Regulates and manages** the upstream sectors of the oil and gas industry. |
| Interviewee 3 | 3 June 24 | Ministry of Energy and Mineral Resources (ESDM) - Directorate General of Oil and Gas (Ditjen Migas) | **Regulates and manages** the downstream sectors of the oil and gas industry. |
| Interviewee 4 | 7 June 24 | PT Pertamina (Persero) | **State-owned company** that manages oil and gas resources as well as the development of renewable energy in Indonesia resource. |
| Interviewee 5 | 13 June 24 | National Energy Council (DEN) | **Formulates and coordinates national energy policies (REUN)** that encompass all types of energy sources. |
| Interviewee 6 | 24 June 24 | Ministry of Energy and Mineral Resources (ESDM) - Directorate General of New Renewable Energy and Energy Conservation (EBTKE) | Focuses on the **development** and promotion of **renewable energy** and **energy efficiency**. |

After determining stakeholders who have in-depth competence related to oil policy in Indonesia from various perspectives, such as regulators, industry, and experts, to aim for comprehensive results, the next step is to design interviews. When creating semi-structured interview questions, the main questions will be in general form and not too detailed. The purpose of this semi-structured interview is to dig deeper into the first response from the answers given so that it will produce more detailed follow-up questions afterward. Each formulated question does not direct the personal opinion of the interviewee but is based on the perspective of the institution where the interviewee works. The question began by asking about the role of institutions in achieving national energy mix targets. This question would be directed at the current situation regarding oil policy from the consumption, production, and import sectors. The second question is to determine the effectiveness of subsidies and incentives in the oil and gas industry, and the discussion will continue regarding the factors of high dependency on oil to date. The third question discusses the potential for NRE and the factors that hinder its development. This third question will mention government policies in achieving mixed energy targets by optimizing NRE sources. The fourth question will discuss

the position of the large oil and gas industry in influencing regulators in making policies. The last question aims to summarize the interviewee's response, and if they forget to mention some points in their previous answer, they can summarize the last question. Not all stakeholders will get the same questions; questions will be adjusted to the competencies of each institution interviewed. Interview questions can be seen in the table 5.

Table 3 Research material and accessing method.

| Questions | **Desired key points answer** | **Answered the Hypothesis** | **Stake holder** |
|---|---|---|---|
| Can you explain your role in institutions related to national energy mix targets, and how long have you worked in this field? | Current situation in oil production, consumption, and import. | Fossil fuel energy in Indonesia has become a lock-in. | All |
| From the perspective of your organization, are the incentive and subsidy policies for the oil industry still relevant and appropriate to fulfill the Indonesian National Energy Plan (REUN)? | • effectiveness of subsidy and incentives for the oil and gas industry<br>• high dependency oil factors | • Fossil fuel energy in Indonesia has become a lock-in.<br>• The lack of clarity in government policy regarding the renewable energy mix target is an obstacle to the transition to renewable energy. | All |
| Based on data from Presidential Regulation Number 22 of 2017 (REUN), Indonesia has high renewable energy potential. Yet, implementation until 2020 has only reached 14.71%, with the remainder still dominated by fossil fuels, including petroleum. From your organization's | • factors that inhibit the development of RE<br>• Effectiveness of policies that support the achievement of national targets in the RE sector | • Fossil fuel energy in Indonesia has become a lock-in.<br>• The lack of clarity in government policy regarding the renewable energy mix target is an obstacle to the transition to | All |

| | | | |
|---|---|---|---|
| perspective, what factors inhibit the energy transition? | | renewable energy. | |
| From the perspective of your organization, will the increasing development of state-owned enterprises such as Pertamina, which operates in the oil industry, impact small industries in the renewable energy sector? | a large oil and gas industry may or may not influence policymakers | Dominance in large industries makes it easier to lobby policymakers. | All Except Interviewee 4 |
| What are your aspirations for the future of the energy sector in Indonesia? | discussing aspects they felt were overlooked during the interview or clarifying previous statements | - | All |

After making a list of questions, the author wrote a letter of request to each institution and attached a list of questions and a concern form via email from the website and colleagues. All interviews were conducted via Microsoft Teams, each lasting approximately 45 minutes, and questioning with Bahasa Indonesia to make it more accessible with the interviewee using their native language.—a list of questions at the address to answer research questions and hypotheses in this research.

### 4.3 Thematic Analysis

After determining the date to conduct an online interview, I analyzed the data in the next stage before analyzing data from video and audio recordings during interviews I needed to transcribe. MS Teams already has auto transcription, but because interviews are conducted in Indonesia and MS Teams does not yet provide a transcription feature in Indonesian, the author uses another application, RevMax, to transcribe video and audio recordings. After the auto transcribe has been carried out, it must be checked manually to correct minor typos before the full interview transcript is sent to the interviewee for final crosscheck. After receiving approval, I transcribed it into English and was ready for coding. According to (Nowell et al., 2017) thematic analysis, it is used to process qualitative data with various epistemologies and research questions. Thematic analysis was chosen because it has a flexible approach and can be modified according to needs but produces detailed analysis (Braun & Clarke, 2006)(King, 2004). When conducting analysis starting from the coding stage, the approach used is inductive or open coding; some call it bottom-up coding. This approach does not use a pre-existing code book; the creation of the code book in this research is carried out in stages based on the transcribed interviews obtained and then combining the

codes or critical points and combining the codes according to the commons found into a theme. In carrying out the analysis, it is possible to find the interviewee's personal opinion, and it does not reflect the institutional perspective, so in cases like this in the discussion section, it will be explained if the points discussed are the interviewee's opinion. The code book can be seen in Table 4.

Table 4 Code Book

| Theme | Definition | Sub-theme | Statement Focus |
|---|---|---|---|
| **Benefits of Renewable Energy** | Statements that describe positive aspects of renewable energy development | Environmental | Benefits of renewable energy for reducing carbon emissions and pollution |
| | | Economic | Financial savings from transitioning to renewable energy |
| | | Energy Security | Access to sustainable and reliable energy sources |
| **Barriers to Renewable Energy** | Comments that describe obstacles to adopting renewable energy | High Costs | Initial high costs of infrastructure and technology |
| | | Regulatory Hurdles | Complicated bureaucratic processes and lack of clear regulations |
| | | Public Awareness | Low public understanding and acceptance of renewable energy solutions |
| | | Technological Challenges | Challenges in developing and deploying new renewable technologies |
| **Policy Influence** | Statements that describe how policies affect renewable energy adoption | Subsidies and Incentives | Impact of government subsidies on fossil fuels vs. renewable energy |
| | | Regulatory Support | Role of government regulations in facilitating or hindering renewable energy projects |
| **Economic and Social Impact** | The effect of renewable energy on local economies and communities | Job Creation | The role of renewable energy projects in creating new jobs |
| | | Economic Multiplier Effect | How renewable energy projects contribute to broader economic benefits for local industries |
| | | Social Acceptance | How renewable energy projects are received by local communities and their impact on quality of life |
| **Stakeholder Expectations** | Statements that reference stakeholders' hopes and suggestions | Policy Recommendations | Suggestions for policy changes to enhance renewable energy adoption |
| | | Vision Alignment | The importance of aligning different stakeholders towards a shared vision for energy transition |
| **Dependence on Oil** | Statements highlighting reliance on oil and its implications | Energy Security | Importance of maintaining energy security amidst high oil consumption |
| | | Economic Dependence | How reliance on oil contributes to national revenue and economic stability |
| | | Transition Challenges | Challenges in shifting from oil to renewable energy |

Ethical reflections are made and submitted because this research involves human behavior. From the start, it has been explained that the desired answer is an institutional perspective, and when a personal opinion is expressed, it will still be analyzed with notes. Regarding confidential matters, consent is sought from potential interviewees before the interview session, and the first part of the invitation letter contains a consent form. This research uses the principle of consent, privacy of data use, and the fact that the nature of participants in this research is voluntary. This research only considers the data collection results that received consent from participants. Due to anonymity, potential interview respondents have the right to vote anonymously.

## 5. Result and Discussion

This section will contain the discussion of each interview conducted with each stakeholder. The answers from each interviewee will be correlated with the conceptual framework as a reference. This section will also discuss the research questions and hypotheses mentioned earlier.

### 5.1 H1: Hindering factors obstructing the sustainable transition towards achieving renewable energy transitions.

Based on Presidential Regulation Number 22 of 2017 (RUEN), Indonesia has very high renewable energy potential, but its implementation still needs to be improved. According to REUN targets, renewable energy use in the energy mix will be 23% by 2025, but the realization in 2023 will only reach 13.09%. There was an increase from the previous year of 0.79%. Based on the latest scenario (Hymne) by DEN, 2025, renewable energy use in the energy mix is 17.5%. Compared to the existing potential, it is questionable why renewable energy development could be faster. Based on interviews conducted, several factors hinder the development of renewable energy:

#### 1. Dependencies on Oil

Dependence on oil in Indonesia is still very high, but supply and demand need to be balanced, requiring oil imports to meet needs. According to REUN targets, the use of oil as primary energy in 2025 is expected to be 25%, but in 2022 it was still consuming 31.4%. Although there has been a downward trend from 2021 (33.4%) after the EV incentive policy was implemented, achieving the 25% target in the current situation seems impossible. Therefore, DEN created a new scenario (Hymne) of 29.8% in 2025. Several factors cause the high dependence on oil.

a) Subsidies and incentives

The culture of fuel subsidies (BBM) has been in place since 2004, and it is aimed at people with low incomes so they can use cheaper fuel. However, according to interviews with the Ministry of Energy and Mineral Resources (MEMR), these subsidies still need to be well-targeted, with many affluent people still buying subsidized fuel. “This is a natural human trait; when there is a cheaper price comparison, that will be chosen.” To date, the government continues to study and tighten regulations so that subsidies are well-targeted, as the government spends a lot on fuel subsidies, yet the implementation could be more effective. The government has begun discussing a gradual reduction in fuel subsidy funds yearly to avoid social unrest if subsidies are cut drastically. On the other hand, these subsidies also aim to increase public consumption, thus boosting Indonesia's economic growth to achieve the Indonesia Emas 2045 target.

b) Energy Security

According to Interviewee 4, “Energy security and sovereignty are crucial points.” People currently pit fossil fuels against renewable energy (EBT). However, they forget that energy security and sovereignty for a country are crucial, reflecting on several past tragedies, such as oil crises, wars, and previous pandemics, said interviewee 3. Tax reduction incentives and gross splits in the upstream oil and gas industry are significant in achieving this. Oil production in Indonesia has declined due to depleting reserves, lack of interest from new investors, and lack of exploration, said Interviewee 1. SKK Migas, a government agency in the upstream oil and gas sector, hopes to produce 1 million barrels by 2030, but in 2023, daily oil production only reached about 550 thousand barrels. Therefore, incentives and gross splits are needed to attract foreign investors to explore new oil reserves. Increasing oil production reduces ongoing oil imports, and the EV incentive policy has the same goal.

c) High Economic Value

The oil and gas industry is the most significant contributor to state revenue. Oil and gas were initially sought because they are needed in various sectors such as transportation, industry, and electricity. Interviewee 3 believes, “The use of oil and gas will never be completely replaced at any time.” When coal began to be used as primary energy, oil and gas continued to be used in contrast to EBT, which is used as an additional energy, not the primary energy source. As a developing country with economic priorities, oil use will continue because as the economy grows, so does energy consumption. However, once it reaches its peak, energy consumption will gradually decline while the economy continues to grow, according to the Environmental Kuznets Curve (EKC) theory. When the EV incentive policy was implemented, the government did not increase the tax rate for conventional vehicles, Interviewee 4 said. If examined, increasing the tax on conventional vehicles would make EV and conventional vehicle prices more competitive. However, this cannot be optimally implemented because Indonesia still wants to increase public consumption to boost economic growth towards Indonesia Emas 2045.

d) Society's Patterns

This factor is quite critical and challenging to change in a short time. The government is starting to educate early on energy management and efficiency. This program requires quite a long time, but the results will be felt in the future. The driving culture in Indonesia has already begun with teenagers today. Many use motorized vehicles to go to school; even when they want to buy something 1-2 KM away, they use motorbikes. Compared to the culture in the Netherlands, where people are encouraged from an early age to use bicycles or walk, this would significantly reduce energy consumption if implemented. For workers, public transportation in Indonesia is increasingly developing, with many affordable options, but many still choose to drive privately despite the higher cost and fatigue from traffic. “The energy concept in Indonesia must meet the 4A concept (Availability, Affordability, Accessibility, and Acceptability) Said interviewee 2. This is still the government's reference when making regulations related to oil policy in Indonesia.

e) Industrial Sector Investment

Many industries have built long-term infrastructure using oil and other fossil fuels. Because they require significant and stable energy sources, fossil fuels remain the primary source, while EBT is only an additional source.

**2. Uneven and Unstable Renewable Energy Potential**

Indonesia is a tropical country that receives sunlight all year round, but it has high and unpredictable rainfall in some areas, so solar panels cannot be optimally used everywhere. Using solar panels in every home also faces challenges because, according to the Electricity Law, PKUK is under PT PLN's authority, so using solar panels as a power source for each home must be consulted with PLN. “The Single Buyer discussion at PT PLN is a sensitive topic.” Interviewee 6 recommends that this discussion be discussed with related parties (PT PLN) and can be carried out in further research. Wind power still faces challenges because Indonesia’s wind is not as strong as that of the North Sea Region. “Indonesia has two wind sources, the west and east winds, requiring more advanced technology to be used,” said Interviewee 5. Geothermal production in Indonesia is ongoing and continues to be developed, but it requires a significant investment. The most easily and widely used potential currently is biofuel due to abundant palm oil resources. Interviewee 1 believes that we must maximize all existing potentials to achieve a sustainable transition, making biofuel usage a quick and easy solution to implement. Meanwhile, hydropower faces social dynamics issues when building a DAM, affecting many residential and plantation areas. Therefore, DAM construction for hydropower is under review, with community participation to avoid social upheaval.

**3. Large Investments but Small Economic Value**

Renewable energy is an alternative primary energy source that requires significant infrastructure investments. As a vast archipelagic country, Indonesia faces challenges in energy distribution. Areas with high renewable energy potential are far from energy demand centers such as cities and industrial centers, requiring significant infrastructure investments. Investors focus on economic value, and with renewable energy's extended return on investment, it takes work to implement in developing countries. “Several investors canceled due to no price certainty to guarantee investment risks,” according to interviewee 5. Bureaucratic obstacles are also a significant barrier for foreign investors.

**4. Non-Comprehensive Regulations**

The regulations supporting renewable energy industry development have yet to be optimal. One reason is that foreign financing requires using local components (TKDN) in their products, as reflected in the Minister of Energy and Mineral Resources Regulation No. 12 of 2017. Foreign financing stipulates removing the TKDN component and not including it in bidding documents. Interviewee 6 states that this requires a joint solution to benefit both parties. Policies related to incentives and subsidies are still being studied because parliament does not want these policies only to benefit entrepreneurs, but consumers should also feel these incentives and subsidies. According to a personal opinion interviewee, policies in Indonesia often adopt shortcuts, providing immediate solutions but inefficient in the long run. For example, online motorcycle taxis positively impact public consumption behavior to

boost the economy but negatively affect energy consumption efficiency and increase plastic waste.

The interview data highlight factors such as high economic value, social behavior norms, and political influence reinforcing this lock-in. Despite Indonesia's significant renewable energy potential, implementation has been sluggish, with the country falling short of its REUN targets. The persistence of fossil fuel subsidies and the focus on energy security, often at the expense of renewable energy development, further entrench the status quo, making the transition to sustainability a daunting task.

Moreover, the national lock-in is exacerbated by the fragmented and noncomprehensive approach to renewable energy policy, which is essential for overcoming the challenges identified in the sustainability transitions framework. The analysis shows that while there is awareness of the need for a transition, the need for cohesive and forward-looking policies hinders progress. For instance, the regulations requiring local components (TKDN) in renewable energy projects create barriers for foreign investors, slowing down the necessary technological and infrastructural advancements. The high initial capital required for renewable energy projects and the decentralized nature of renewable energy systems contrasts sharply with the centralized and well-established fossil fuel infrastructure, making the transition even more complex. As highlighted by the evolving scenarios in the REU, the government's ambiguity in setting clear and unified energy mix targets reflects the broader issue of inconsistent policy direction. This inconsistency, coupled with socio-political factors such as subsidies and public consumption patterns, reinforces the national lock-in, making the sustainability transition in Indonesia not just a technical challenge but a deeply socio-political one.

Government policies on renewable energy need to be more comprehensive, especially in providing certainty for investors. Each institution has a different vision for moving toward an energy transition. Foreign investment is crucial for developing renewable energy technology and infrastructure, which require significant funding. Complicated licensing and bureaucracy show that stakeholders in government institutions share different visions, making the government's role unclear in jointly achieving sustainability transitions.

### 5.2 H2: Indonesia's proactive and comprehensive public policies significantly promote the sustainable transition.

#### 1. Indonesia's Policies to Achieve the National Energy Mix Target 2025

To meet the REUN 2025 target based on KEN, the Indonesian government has created several policies to achieve this target:

a) Policy Revision

The government is revising KEN policies because the previous edition passed in 2014 is no longer relevant. The revision aims to align two national strategic targets: Indonesia Emas 2045 and Net Zero Emissions (NZE) 2060. In the energy outlook, DEN has repeatedly

changed scenarios to achieve the energy mix target and adjusted to existing capabilities, reducing previous ambitious targets. The current scenario consists of two schemes: the Hymne Scenario, which describes the Business as Usual (BaU) scenario with existing policies, and the Mars Scenario, which implements policies towards Indonesia Emas 2045 and NZE 2060. The results will be compared with REUN projections. In the updated picture in 2022, the latest scenario and REUN targets are compared. The REUN targets and scenarios may change after passing the new KEN policy.

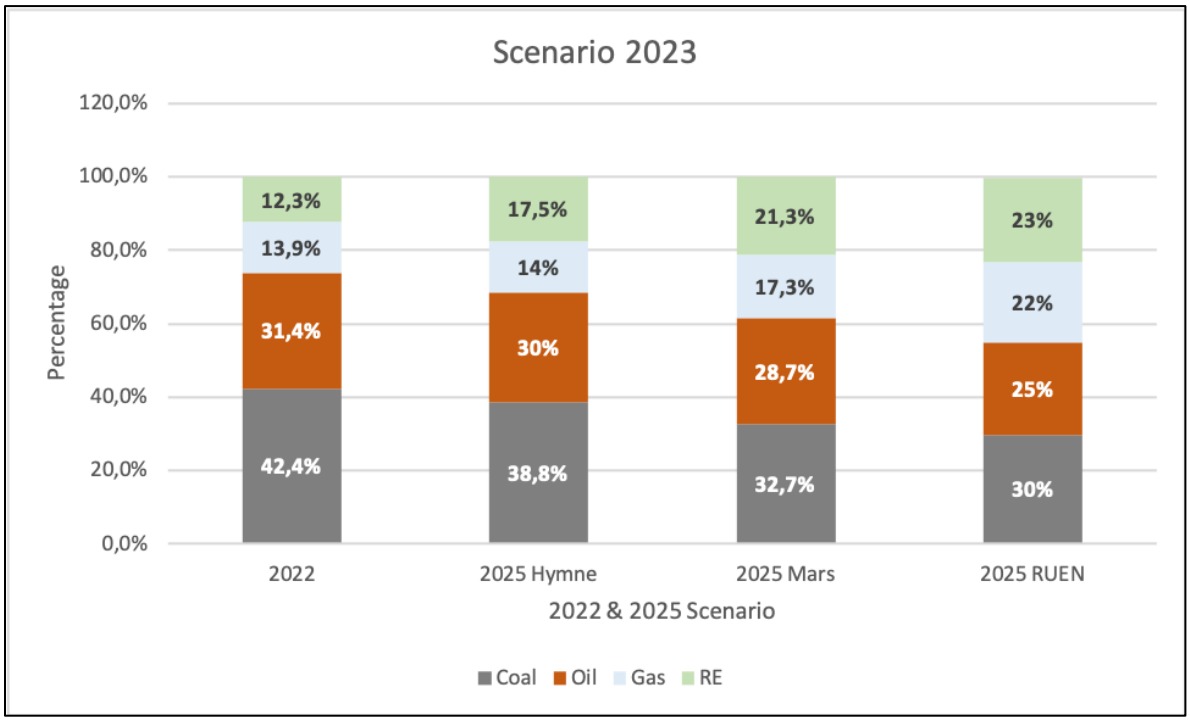


Figure 6 New Scenario toward achieving national energy mix target (DEN, 2023)

b) Incentives and Subsidies

Incentives and subsidies are still very much needed to maintain energy security. Upstream sector incentives are crucial to attracting foreign investors in oil reserve exploration, according to Interviewee 1. The main goal of upstream sector incentives is to meet national oil needs, maintaining a balance between supply and demand. Petroleum subsidies are still beneficial for the food logistics sector. Well-targeted subsidies are essential, and the government is currently registering eligible citizens for subsidies so that when implemented, all data will be recorded in a database. Once well-targeted, excess subsidy funds can be allocated to the renewable energy sector. EV incentives aim to reduce petroleum import needs. However, charging EV batteries at home or office still relies on fossil fuel electricity; this policy also aims to reduce emissions from the transportation sector, according to Interviewee 4.

c) Coal Phase-Out

By 2030, the government will no longer issue permits for new coal-fired power plants (PLTU) except in special economic zones such as industrial centers. The government is also starting to retire inefficient PLTUs one by one. In the new KEN policy revision to realize NZE 2060 and Indonesia Emas 2045, PLTUs will continue to operate but with regenerated technology to be cleaner, such as using Carbon Capture and Storage (CCS) and Carbon Capture, Utilization, and Storage (CCUS). Thus, the new policy will maintain energy security while significantly reducing emissions. “There is never an oil phase-out, only a coal phase-out,” quoted Interviewee 4. Coal is a widely used primary energy source but is now being phased out due to high emissions and unstable economic value. Oil will always be a primary energy source, and its emissions are less harmful than coal.

d) Development of New Renewable Energy and Continuous Education Socialization

Indonesia's abundant palm oil resources drive the government to develop biofuels by increasing the EBT content in petrol fuels. Besides palm oil, development is also being carried out using algae and cooking oil. Indonesia will start implementing nuclear power plants in 2033 after a comprehensive safety assessment and public acceptance around the site. Hydrogen development is also a potential new resource option. This renewable energy development is being intensified alongside government socialization and education, from early to higher education, aiming for energy management efficiency. When development and socialization are optimally implemented and supported by the government and all stakeholders, future renewable energy use will be achieved.

In Indonesia’s energy transition context, the conceptual framework of sustainability transitions and national lock-in provides a crucial lens for analyzing the country’s efforts to shift from fossil fuel to renewable energy. The sustainability transition framework emphasizes the complexity of the energy sector as a socio-technical system, where interconnected developments across culture, policy, infrastructure, and market dynamics play a pivotal role.

The transition remains challenging despite the Indonesian government’s initiatives, such as policy revisions, incentives, and subsidies to promote renewable energy. The entrenched reliance on fossil fuels, particularly oil, illustrates the national lock-in phenomenon. This lock-in is reinforced by substantial investments in fossil fuel infrastructure, economic dependencies, and the political influence of large industries that resist changes. Consequently, while policies like the coal phase-out and the development of new renewable energy sources are steps in the right direction, these deep-seated structural factors hinder Indonesia’s sustainable energy transition.

Moreover, the national-lockin theory underscores the difficulties in replacing dominant fossil fuel systems with renewable energy, which requires technological advancements and significant policy and societal behavior shifts. In Indonesia, the lock-in is evident in the ongoing need for petroleum subsidies, the reliance on fossil fuels for energy security, and the slow progress in renewable energy adoption despite the country’s vast potential. The government’s efforts, such as revising the national energy policy (KEN) and introducing scenarios like hymne and Mars, reflect attempts to navigate these challenges. However, the sustainability transition remains fraught with this obstacle, including economic constraints,

non-comprehensive regulations, and the need for continuous socialization and education to change consumption patterns. As the framework suggests, achieving a sustainable transition in Indonesia will require a concerted effort to ‘open up’ the existing system, overcoming the inertia of the national lock-in through coordinated policies, investments, and societal shifts toward renewable energy.

It is linked to the conceptual framework of sustainability transitions, where the government's role as a policymaker is vital to support sustainability transitions. The revised KEN policy shows that the government is beginning to have a shared vision by incorporating other scenarios in forming new, comprehensive policies. The revision of KEN currently being carried out is expected to unite all institutions to have the same vision and facilitate the achievement of energy transition in the future.

### 5.3 Research Boundaries and Limitations

Several limitations of this research are outlined to ensure that the research objectives can be achieved within the time limits given by the University of Twente. This research only focuses on the impact of oil policy in Indonesia on achieving national energy mix targets. In this case, whatever the type of role, various energy stakeholders in Indonesia are asked to participate for specific purposes. This research framework was carried out from November 2023 to July 2024 and was based on previously existing policies.

## 6. Conclusions and Recommendations

### 6.1 Conclusions

After analyzing the impact of Oil Policies to achieve national energy mix targets in Indonesia to answer hypotheses related to Lock-In oil on energy sources, ambiguous government policies in facing the energy transition, and government steps in achieving national energy mix targets, conclusions can be drawn as follows:

First, the ease and availability of much oil and being an oil-importing country until 2004 have accustomed people to using oil as a primary energy source. The industrial sector has also invested heavily in its infrastructure to use oil as an energy source. Although since 2004, oil production has decreased to meet demand, the government has started to import and provide subsidies and incentives for the community and the oil and gas industry. This culture of cheap fuel has become extreme and challenging to eliminate. Also, the many subsidies that need better-targeted increase oil dependence even more. With these factors, oil consumption in Indonesia has become Lock-In and requires time to move towards an optimal transition gradually.

Second, the use of RE in Indonesia still needs to be improved due to limited technology and infrastructure, limited potential, and a location quite far from the center of demand, which are also obstacles. According to Interviewee 5, RE is an energy addition, not a primary energy source such as oil, gas, and coal. The lack of investor interest is the leading cause of delays in the energy transition. Uncertain policies and complicated bureaucracy constrain investors, so certain risks are not guaranteed. Other policies that still benefit the fossil fuel industry make the government's goals for the energy transition unclear. The pattern of society needing to be made aware of RE and energy efficiency is a new problem besides the need for more investment. Inappropriate subsidy policies cause these obstacles to flow from upstream to downstream.

Third, the government is revising the energy policy through the DEN, which is believed to be responsible for achieving the national energy mix target. This revision is based on pressure from several other institutional stakeholders who consider the current policies (KEN & REUN) no longer relevant. As a developing country, Indonesia has other strategic targets, such as Golden Indonesia 2045 and Net Zero Emission 2060. This new policy revision will include these two target schemes to produce a new policy that aligns with it. Currently, the government has implemented a coal phase-out in 2030. It optimizes the existing oil and gas potential to maintain energy security and sovereignty by using clean and safe technology such as CCUS and CCS to support the 2060 NZE target. Policies for investors are also being reviewed to simplify the investment process. In the upstream sector, the government is starting to campaign and include energy efficiency narratives from early education to improve societal patterns in the future.

## 6.2 Recommendations

Several recommendations for future research are based on the knowledge the author gained while formulating and writing this research. Firstly, in collecting data, it would be better to include interviews with private energy companies, even though this research conducted interviews with Pertamina, the largest state-owned energy company; by interviewing the private sector, It can create new hypotheses regarding whether there are differences in government treatment of state-owned companies and private. Second, carry out a comparative study with coal policy in Indonesia because, with the coal phase-out in 2030, it will be interesting to know the next steps for the coal industry and PT PLN as a state-owned company in the energy mix. Third, the study can focus on the NZE 2060 points and review what technology is used and whether its implementation follows theory and with the difficulty of finding investment, whether this clean technology is compelling enough, and what the economic value is after making a significant investment. Fourth, research can be expanded by comparing policies with those of other countries with the same characteristics as Indonesia, such as Thailand and the Philippines, and comparing Japan, which has the highest efficient energy consumption. Research can be carried out in collaboration with other researchers in that country to provide a more comprehensive understanding.

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## Appendix

### ANNEX 1. Interview Invitations and Questions

FACULTY OF BEHAVIOURAL, MANAGEMENT AND SOCIAL SCIENCES (BMS) The Section of Governance and Technology for Sustainability (CSTM)

With this letter, I am Muhammad Raihan Pranaya a registered student at the University of Twente, The Netherlands, studying a Master's program in Environmental and Energy Management (MEEM).

Name : Muhammad Raihan Pranaya

Student no. : S3169499

Program : Master of Environmental and Energy Management (MSc)

I am in the final phase of my studies. I am conducting research for my master's thesis titled ***"The Impact of the Oil Policy in Indonesia on Achieving the National Energy Mix Target.*** **"** To get the needed information, **I would like to invite you for an interview**, which will be a part of my thesis. Your answers to the below questions will be treated confidentially and for study purposes only. Accordingly, this invitation also works as consent permission (by doing the interview, the interviewee is permitted to use the data for study purposes). In addition, you have the right to stop during the interview process if you wish for personal reasons. The interview session will take approximately 45 minutes.

The interview questions are:

**1. Can you explain your role in institutions related to national energy mix targets, and how long have you worked in this field?**

*1. Bisakah Anda menjelaskan peran Anda di institusi yang terkait dengan target bauran energi nasional, dan sudah berapa lama Anda bekerja di bidang ini?*

**2. From the perspective of your organization, are the incentive and subsidy policies for the oil industry still relevant and appropriate to fulfill the Indonesian National Energy Plan (REUN)?**

*2. Dari perspektif organisasi Anda, apakah kebijakan insentif dan subsidi untuk industri minyak masih relevan dan sesuai untuk memenuhi Rencana Umum Energi Nasional (RUEN)?*

**3. According to data from Presidential Regulation Number 22 of 2017 (REUN), Indonesia has a high renewable energy potential. However, implementation until 2020 has only reached 14.71%, with the remainder still dominated by fossil fuels, including petroleum. From your organization's perspective, what factors inhibit the energy transition?**

*3. Berdasarkan data dari Peraturan Presiden Nomor 22 Tahun 2017 (RUEN), Indonesia memiliki potensi energi terbarukan yang tinggi. Namun, implementasi hingga tahun 2020 baru mencapai 14,71%, dengan sisanya masih didominasi oleh bahan bakar fosil, termasuk minyak bumi. Dari perspektif organisasi Anda, faktor apa saja yang menghambat transisi energi?*

**4. From the perspective of your organization, will the increasing development of state-owned enterprises such as Pertamina, which operates in the oil industry, impact small industries in the renewable energy sector?**

*4. Dari perspektif organisasi Anda, apakah perkembangan perusahaan-perusahaan milik negara yang semakin meningkat seperti Pertamina, yang beroperasi di industri minyak, akan berdampak pada industri kecil di sektor energi terbarukan?*

**5. What are your aspirations for the future of the energy sector in Indonesia?**

*5. Apa aspirasi Anda untuk masa depan sektor energi di Indonesia?*

***The interview and discussion will be conducted in Bahasa Indonesia.**

Please let me know when would be the most convenient date and time for you. If you have any questions, please feel free to contact me at

muhammadraihanpranaya@student.utwente.nl

Your cooperation will be highly appreciated. Thank you in advance for your time and consideration in this matter.

Sincerely,
Muhammad Raihan Pranaya

**ANNEX 2 Consent Form**

**INFORMED CONSENT FORM**

| | |
|---|---|
| **Project Title** | The impact of the oil policy in Indonesia to achieve the National Target |
| **Purpose of the Study** | The purpose of this research project is<br>• Analysis of key factors that cause high dependence on fossil fuels.<br>• Analysis of Indonesian government policy to achieve the 2025 and 2050 ambitious energy mix targets. |
| **Procedures** | You will participate in an interview lasting 30-45 Minutes.You will be asked questions about_____ Sample questions include: "_____".<br>*The list of questions will sent before the interview |
| **Potential Risks and Discomforts** | There are no obvious physical, legal or economic risks associated with participating in this study. You do not have to answer any questions you do not wish to answer. Your participation is voluntary and you are free to discontinue your participation at any time. |
| **Potential Benefits** | Participation in this study does not guarantee any beneficial results to you. As a result of participating you may better understand. |

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| **Confidentiality** | Your privacy will be protected to the maximum extent allowable by law. No personally identifiable information will be reported in any research product. Moreover, only trained research staff will have access to your responses. Within these restrictions, results of this study will be made available to you upon request.<br><br>As indicated above, this research project involves making audio recordings of interviews with you. Transcribed segments from the audio recordings may be used in published forms (e.g., journal articles and book chapters). In the case of publication, pseudonyms will be used. The audio recordings, forms, and other documents created or collected as part of this study will be stored in a secure location in the researchers' offices or on the researchers password-protected computers and will be destroyed within ten years of the initiation of the study. |
| **Right to Withdraw and Questions** | Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalised or lose any benefits to which you otherwise qualify. The data you provided before you stopped participating however will be processed in this research; no new data will be collected or used.<br><br>If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the author. |

| | |
|---|---|
| **Statement of Consent** | Your signature indicates you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree that you will participate in this research study. You will receive a copy of this signed consent form.<br><br>I agree to participate in a research project led by Muhammad Raihan Pranaya, The purpose of this document is to specify the terms of my participation in the project through being interviewed.<br><br>1. I have been given sufficient information about this research project. The purpose of my participation as an interviewee in this project has been explained to me and is clear.<br><br>2. My participation as an interviewee in this project is voluntary. There is no explicit or implicit coercion whatsoever to participate.<br><br>3. Participation involves being interviewed by (a) researcher(s) from the Online Meeting The interview will last approximately 30-45 minutes. I allow the researcher(s) to take written notes during the interview. I also may allow the recording (by audio/video tape) of the interview. It is clear to me that in case I do not want the interview to be taped I am at any point of time fully entitled to withdraw from participation. |

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| | 4. I have the right not to answer any of the questions. If I feel uncomfortable in any way during the interview session, I have the right to withdraw from the interview.<br><br>5. I have been given the explicit guarantees that, if I wish so, the researcher will not identify me by name or function in any reports using information obtained from this interview, and that my confidentiality as a participant in this study will remain secure. In all cases subsequent uses of records and data will be subject to standard data use policies at the EU (Data Protection Policy).<br><br>6. I have read and understood the points and statements of this form. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.<br><br>7. I have been given a copy of this consent form co-signed by the interviewer. | |
| **Signature and Date** | **NAME PARTICIPANT** | **NAME AUTHOR** |
| | **SIGNATURE** | **SIGNATURE** |
| | **DATE** | **DATE** |

## ANNEX 3 Thematic Analysis Data

This section will outline the findings obtained from interviews with each stakeholder. The analysis was conducted using thematic analysis, and the results are presented in a table format, categorized by the conclusions of each stakeholder interview.

1. Interviewee - SKK MIGAS

| Theme | Definition | Relevance | Key Findings | RQ Answer |
|---|---|---|---|---|
| Role & Responsibilities | Description of the role and responsibilities of the speaker at the institution | Demonstrating the position and responsibilities within the Institution, as well as the key role in relation to REUN. | • Overseeing renewable energy projects in the oil and gas industry<br>• Promoting the acceleration of Clean Energy/Net Zero Emissions (NZE)<br>• Encouraging energy usage efficiency | Directing oil and gas companies to initiate renewable energy projects and recommending energy efficiency measures to support Net Zero Emissions (NZE). |
| Incentive and Subsidy Policies | Supportive Policies for the Oil and Gas Industry | Explaining the importance of these policies to support renewable energy projects and attract investment interest. | • To attract investors<br>• To maintain national energy security<br>• To reduce dependence on oil imports<br>• To support the acceleration of renewable energy development (geothermal & biofuel) | • Relevant for maintaining energy security and reducing oil imports by attracting investor interest<br>• To facilitate the development of renewable energy (geothermal & biofuel) in the oil and gas industry |

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| Challenges in Energy Transition | Obstacles and challenges faced in the process of transitioning to renewable energy | Identifying key barriers that need to be addressed to achieve renewable energy targets | • High investment costs for infrastructure and exploration<br>• Investors perceive the renewable energy sector as unprofitable and face bureaucratic hurdles<br>• Lack of competent human resources and technology<br>• Uneven distribution of renewable energy potential in Indonesia as an archipelagic country<br>• Low public awareness and mindset towards renewable energy<br>• Delay in renewable energy development due to the pandemic | • Lack of investment because it is not profitable for investors; complex and uncertain bureaucracy also plays a role<br>• Inadequate human resources and technology capabilities in Indonesia<br>• Uneven and substandard renewable energy potential in Indonesia<br>• Inefficient and ineffective energy consumption patterns among the public |
| Influence & Lobbying | The Influence of Large State-Owned Enterprises on the Government | Significant influence of major state-owned oil and gas companies on government policymaking | Impactful because many oil and gas industries are also starting to develop renewable energy projects | Facilitating the development of renewable energy (Geothermal & Biofuel) in the oil and gas industry |
| Economic and Social Impact | Impact of Energy Policies and Projects on | Demonstrating how energy policies and related projects can | Multiplier effect on vendors and subcontractors in the renewable | Economic multiplier effect by involving many vendors in the development of |

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| | Local Economy and Society | provide broad economic and social benefits, especially for small industries and local communities | energy sector within the oil and gas industry | renewable energy in the oil and gas industry |
| Expectation | Stakeholder Expectations for the Energy Sector in Indonesia | Solutions and Criticisms for Policymakers to Reduce Dependence on Oil and Develop Renewable Energy | • Integration of all stakeholders from upstream to downstream<br>• Strengthen policies towards renewable energy<br>• Increase incentives and subsidies for renewable energy<br>• Ensure risk security and enhance comfort for investors<br>• Collaborate with international companies and developed countries for the development of human resources and technology<br>• Raise public awareness about energy consumption efficiency | • There is a need to revise policies and simplify bureaucracy to attract investors and provide risk assurance<br>• Collaborate with institutions in developed countries to enhance human resource competence and technology development<br>• Educate the public on energy efficiency and clean energy derived from renewable sources |
| Dependence on Oil | High Level of Oil Consumption in Indonesia | Breaking Down the Factors Contributing to Oil Dependence | • Ensuring energy supply<br>• High demand for oil in transportation<br>• High economic value generation | • Energy security is crucial given the high consumption for transportation<br>• Indonesia has several targets, with the nearest being Golden |

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| | | | | Indonesia 2045, focusing on increasing GDP, thus economic growth acceleration is still very much needed |
| Government roles | Policies Made by the Government | Government Steps to Achieve National Targets | • Development of solar power plants (PLTS)<br>• Increased use of biofuels | Continuous development of renewable energy technologies to optimize existing potential |

2. Interviewee – ESDM MIGAS 1

| Theme | Definition | Relevance | Key Findings | RQ Answer |
|---|---|---|---|---|
| Role & Responsibilities | Description of the role and responsibilities of the speaker at the institution | Demonstrating the position and responsibilities within the Institution, as well as the key role in relation to REUN. | • Developing an energy outlook<br>• Monitoring the progress of the energy sector towards REUN 2025 and 2060 targets<br>• Acting as the regulator for fossil fuel energy | Monitoring progress towards achieving REUN targets by creating supportive regulations and presenting annual reports |
| Incentive and Subsidy Policies | Supportive Policies for the Oil and Gas Industry | Explaining the importance of these policies to support renewable energy projects and attract investment interest. | • Acknowledging the existing potential oil (and gas) reserves<br>• Optimizing gas as a transitional energy source<br>• Ensuring energy security<br>• Ensuring the purchasing power of the public | • Ensuring energy security by optimizing existing resources, thus maintaining public purchasing power and boosting economic growth<br>• Optimizing gas as a cleaner transitional energy source, aiding |

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| | | | | government efforts in achieving Net Zero Emissions (NZE) |
| Challenges in Energy Transition | Obstacles and challenges faced in the process of transitioning to renewable energy | Identifying key barriers that need to be addressed to achieve renewable energy targets | • High dependency on fossil fuels<br>• Difficult and underdeveloped EV infrastructure<br>• Government commitment in terms of budget and regulations<br>• Increased coal usage due to rising energy demand<br>• Misallocated subsidies | • Due to the non-competitive pricing between EVs and conventional vehicles, when EV taxes are reduced, conventional vehicle taxes should be increased<br>• Government commitment needs to be unified among all stakeholders to facilitate the implementation of primary energy distribution<br>• Proper allocation of state funds towards the development of renewable energy would be more beneficial and effective in achieving national targets |
| Influence & Lobbying | The Influence of Large State-Owned Enterprises on the Government | Significant influence of major state-owned oil and gas companies on government policymaking | It is true that the oil and gas industry is starting to develop the renewable energy sector | Simplifying and supporting the development of renewable energy (Geothermal & Biofuel) in the oil and gas industry to enhance sustainability and meet energy targets. |

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|---|---|---|---|---|
| Economic and Social Impact | Impact of Energy Policies and Projects on Local Economy and Society | Demonstrating how energy policies and related projects can provide broad economic and social benefits, especially for small industries and local communities | • 4A Concept (Availability, Affordability, Accessibility, and Acceptability):<br>• Economic Multiplier Effect | • The 4A concept forms the foundation of energy security implemented by the government, ensuring availability by reducing energy imports and utilizing all domestic potentials.<br>• The economic multiplier effect is significant as it involves numerous vendors in the development of renewable energy (Geothermal & Biofuel) within the oil and gas industry. This engagement stimulates local economies, creates jobs, and promotes technological advancements. |
| Expectation | Stakeholder Expectations for the Energy Sector in Indonesia | Solutions and Criticisms for Policymakers to Reduce Dependence on Oil and Develop Renewable Energy | • Alignment Between Availability and Affordability<br>• Supporting Policies Among Stakeholders<br>• Establishing a shared vision among stakeholders ensures rational and achievable targets<br>• Rational Target Setting and Reducing Ambitious Stigma<br>• | • When energy security is achieved, maintaining public purchasing power becomes easier.<br>• When stakeholders share the same vision and support each other, the set targets become more rational and easier to achieve together. |

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| Dependence on Oil | High Level of Oil Consumption in Indonesia | Breaking Down the Factors Contributing to Oil Dependence | • Maintaining Energy Security<br>• Significant Revenue Source for the Country<br>• Meeting Transportation Needs | Incentives and subsidies for oil are essential to reduce oil imports and increase public consumption to boost economic growth in line with Indonesia's Golden 2045 vision. However, if subsidies are well-targeted, the allocated funds can be used for the development of renewable energy, thereby ensuring energy security. |
| Government roles | Policies Made by the Government | Government Steps to Achieve National Targets | • Development of solar power plants (PLTS)<br>• Increased use of biofuels<br>• Coal phase-out by 2030<br>• Incentives for EVs | • Renewable energy (EBT) is intermittent, so a substantial energy source like gas is still needed in the energy transition.<br>• Policies for providing incentives for EVs and coal phase-out by 2030, as well as the massive use of biofuels, can enhance the energy mix of renewable energy. |

3. Interviewee - ESDM MIGAS 2

| **Theme** | **Definition** | **Relevance** | **Key Findings** | **RQ Answer** |
|---|---|---|---|---|
| Role & Responsibilities | Description of the role and | Demonstrating the position and | • Monitoring the progress status of downstream natural gas | Monitoring progress to achieve REUN targets by creating supportive |

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| | responsibilities of the speaker at the institution | responsibilities within the Institution, as well as the key role in relation to REUN. | • Regulator of fossil fuel energy (natural gas)<br>• REUN modeling team | regulations in the downstream oil and gas sector. |
| Incentive and Subsidy Policies | Supportive Policies for the Oil and Gas Industry | Explaining the importance of these policies to support renewable energy projects and attract investment interest. | • Still need significant oil production<br>• Demand for transportation in the food sector<br>• Importance of providing well-targeted subsidies | The high demand for fuel in the food transportation sector requires well-targeted fuel subsidies for logistics vehicles, but so far, many subsidies are still not well-targeted. |
| Challenges in Energy Transition | Obstacles and challenges faced in the process of transitioning to renewable energy | Identifying key barriers that need to be addressed to achieve renewable energy targets | • Cheap fuel prices<br>• Lack of adequate and comprehensive regulations<br>• High EV prices<br>• Misallocated subsidies and incentives<br>• Low awareness of using public transport<br>• Indonesia is a developing country and has not yet reached its peak energy usage<br>• Lack of investors<br>• Uneven and unstable renewable energy potential<br>• High infrastructure costs for renewable energy<br>• Social dynamics problems | • The cheap subsidized fuel prices have become ingrained in society leading to a consumptive but inefficient pattern.<br>• The non-competitive pricing of EVs and conventional vehicles requires adequate policies and regulations.<br>• Uneven renewable energy potential and Indonesia's status as a developing and archipelagic country make it challenging to attract significant investments in renewable energy.<br>• Inefficient energy usage patterns and low awareness levels among the public can cause social dynamics issues when building |

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| | | | • Lack of competence and technology<br>• • Optimization of workload distribution among state-owned enterprises (BUMN) | new hydroelectric power plants (PLTA).<br>• There must be a unified vision and workload distribution among stakeholders to ensure that each institution's functions are not overtaken. |
| Influence & Lobbying | The Influence of Large State-Owned Enterprises on the Government | Significant influence of major state-owned oil and gas companies on government policymaking | Yes, because the oil and gas industry is now starting to develop the renewable energy sector. | Facilitating the development of renewable energy (Geothermal & Biofuel) in the oil and gas industry. |
| Economic and Social Impact | Impact of Energy Policies and Projects on Local Economy and Society | Demonstrating how energy policies and related projects can provide broad economic and social benefits, especially for small industries and local communities | • Fuel and electricity subsidies have become a cultural norm.<br>• • Social dynamics when creating hydroelectric power plants (PLTA). | • This subsidy culture makes society complacent about overconsumption of energy.<br>• Policies for building new hydroelectric power plants must involve all stakeholder elements to avoid social upheaval. |
| Expectation | Stakeholder Expectations for the Energy Sector in Indonesia | Solutions and Criticisms for Policymakers to Reduce Dependence on Oil and Develop Renewable Energy | • Energy security is paramount.<br>• Optimization of existing natural resources. | When we can optimize all available resources, energy security will be achieved. |

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| Dependence on Oil | High Level of Oil Consumption in Indonesia | Breaking Down the Factors Contributing to Oil Dependence | • Maintaining energy security<br>• Society's lifestyle<br>• Transportation needs based on society's patterns<br>• Cheap fuel prices<br>• Relatively cheap fuel-powered vehicles<br>• • Industries that use fuel as raw material | Indonesia's priority still focuses on economic growth, where increasing the economy also increases energy demand, so energy security is crucial to maintain economic growth. |
| Government roles | Policies Made by the Government | Government Steps to Achieve National Targets | • Development of solar power plants (PLTS)<br>• Increased use of biofuels<br>• Incentives for EVs<br>• Stopping the issuance of new coal power plant permits<br>• Tightening access to subsidized fuel and electricity<br>• Revising the energy mix targets<br>• • Creating new scenarios | The government has revised and evaluated the energy mix targets, with the current target aligning with the NZE 2060 concept, so the coal phase-out in 2030 can significantly impact the energy mix in 2060. |

4. Interviewee – PT.Pertamina

| Theme | Definition | Relevance | Key Findings | RQ Answer |
|---|---|---|---|---|
| Role & Responsibilities | Description of the role and responsibilities of the speaker at the institution | Demonstrating the position and responsibilities within the Institution, as well as the key role in relation to REUN. | Creating Pertamina Energy Outlook | Presenting the energy outlook publicly as a form of reporting and monitoring progress |
| Incentive and Subsidy Policies | Supportive Policies for the Oil and Gas Industry | Explaining the importance of these policies to support renewable energy projects and attract investment interest. | • Necessary to increase GDP<br>• Supporting the Indonesia Emas 2045 target | Indonesia's priorities still focus on economic growth |
| Challenges in Energy Transition | Obstacles and challenges faced in the process of transitioning to renewable energy | Identifying key barriers that need to be addressed to achieve renewable energy targets | • Low investor interest<br>• Unstable renewable energy potential<br>• Archipelagic country<br>• Renewable electricity (electricity monopoly)<br>• Renewable energy is an energy addition<br>• • Industries require large amounts of energy | The decline in investor interest in the energy sector is a major concern cause Investors in the oil and gas sector are still needed to increase GDP |

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| Influence & Lobbying | The Influence of Large State-Owned Enterprises on the Government | Significant influence of major state-owned oil and gas companies on government policymaking | Yes, because the oil and gas industry is now starting to develop the renewable energy sector | facilitating the development of renewable energy (Geothermal & Biofuel) in the oil and gas industry |
| Economic and Social Impact | Impact of Energy Policies and Projects on Local Economy and Society | Demonstrating how energy policies and related projects can provide broad economic and social benefits, especially for small industries and local communities | • Population, economy, and energy will always be directly proportional<br>• Multilayered economy can occur if existing policies are clear<br>• • Avoid chaos when there are extreme policy changes | Indonesia cannot reduce its energy consumption yet because it has not reached peak energy demand. As a developing country, it is still oriented towards economic growth and stability. |
| Expectation | Stakeholder Expectations for the Energy Sector in Indonesia | Solutions and Criticisms for Policymakers to Reduce Dependence on Oil and Develop Renewable Energy | • Energy security is paramount<br>• Energy sovereignty<br>• Balanced supply and demand<br>• Changes in societal lifestyle<br>• Increase investment in the industrial sector<br>• Enhance human resource capabilities | • The energy sector problems in Indonesia are very complex. The public, spoiled by the government, presents its own challenges<br>• Energy security and sovereignty are priorities to maintain economic and social stability |
| Dependence on Oil | High Level of Oil Consumption in Indonesia | Breaking Down the Factors Contributing to Oil Dependence | • The importance of energy sovereignty and security<br>• Generating high economic value | • Oil will always be needed, forever. Renewable energy is just an addition. What needs to be reduced is coal (Coal Phase Out) because of its high emissions. |

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| | | | • Indonesia is still energy-hungry<br>• Oil cannot be replaced like coal<br>• Utilizing existing potentials<br>• • Necessity as a logistics energy | • • Indonesia has a large palm oil potential, making biofuel an optimal option |
| Government roles | Policies Made by the Government | Government Steps to Achieve National Targets | • Synchronizing Indonesia Emas 2045 and NZE 2060 targets<br>• Development of hydrogen vehicles<br>• Incentives for EVs<br>• Optimization of biofuels, used cooking oil, and HVO<br>• • Starting the coal phase-out | • EV policies in general have already reduced emissions<br>• • The government sets instant policies to boost public consumption, which will lead to increased economic value. Although the impact on energy demand is rising, the supply is not. |

5. Interviewee - DEN

| **Theme** | **Definition** | **Relevance** | **Key Findings** | **RQ Answer** |
|---|---|---|---|---|
| Role & Responsibilities | Description of the role and responsibilities of the speaker at the institution | Demonstrating the position and responsibilities within the Institution, as well as the key role in relation to REUN. | • Monitoring of REUN implementation<br>• • Distributing national targets to provinces | Formulating REUN from the national to provincial level and monitoring progress within a yea |

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| Incentive and Subsidy Policies | Supportive Policies for the Oil and Gas Industry | Explaining the importance of these policies to support renewable energy projects and attract investment interest. | Needed, especially in the fuel sector | Necessary to drive the economy and avoid social unrest |
| Challenges in Energy Transition | Obstacles and challenges faced in the process of transitioning to renewable energy | Identifying key barriers that need to be addressed to achieve renewable energy targets | • Social barriers when building hydroelectric power plants (PLTA)<br>• Uneven potential of renewable energy (EBT)<br>• Large investments<br>• Lack of firm commitment among governments<br>• Certainty for investors<br>• Over supply of electricity<br>• Cheap fuel prices<br>• Public mindset<br>• Technology that is not yet ideal<br>• • Bureaucratic difficulties | • As an archipelagic country, the potential for renewable energy is uneven, and it is challenging to build infrastructure to channel power to city/industrial centers<br>• Government commitment and regulations are not firm and lack a unified vision<br>• Decreased investment due to price uncertainty and complicated bureaucracy<br>• Society's mindset is not yet ready to move towards clean and efficient energy |
| Influence & Lobbying | The Influence of Large State-Owned Enterprises on the Government | Significant influence of major state-owned oil and gas companies on government policymaking | Yes, because the oil and gas industry is now starting to develop the renewable energy sector | facilitating the development of renewable energy (Geothermal & Biofuel) in the oil and gas industry. |
| Economic and Social Impact | Impact of Energy Policies and | Demonstrating how energy policies and | Avoiding social unrest when there are massive changes | The social and economic impact remains a priority for developing countries, so |

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| | Projects on Local Economy and Society | related projects can provide broad economic and social benefits, especially for small industries and local communities | | energy security is crucial to reduce the need for oil imports. |
| Expectation | Stakeholder Expectations for the Energy Sector in Indonesia | Solutions and Criticisms for Policymakers to Reduce Dependence on Oil and Develop Renewable Energy | Commitment from every stakeholder towards the new policy revisions | A shared commitment from the new regulatory stage to the implementation stage for the development of renewable energy. |
| Dependence on Oil | High Level of Oil Consumption in Indonesia | Breaking Down the Factors Contributing to Oil Dependence | • Cheap fuel prices<br>• No restrictions or efforts to limit the purchase of fuel-powered vehicles<br>• Ensuring energy security<br>• • Public mindset | • Misallocated fuel subsidies are a mistake that must be corrected immediately<br>• • Weak regulations on conventional vehicles |
| Government roles | Policies Made by the Government | Government Steps to Achieve National Targets | • Halting permits for new coal power plants after 2030<br>• Government vehicles based on EV<br>• Incentives for EVs<br>• Study on building nuclear power plants in 2032<br>• Policy revisions by adding the NZE 2060 variable<br>• • Use of biofuels | • Coal phase-out is a step towards making renewable energy the primary energy source in the upstream sector<br>• EV policy is a downstream sector policy that will facilitate the achievement of NZE 2060<br>• • The revision of the National Energy Policy (KEN) is in the approval stage in parliament, which sets new targets and |

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| | | | | incorporates the NZE 2060 scenario, aligning with the Indonesia Emas 2045 target |

6. Interviewee – ESDM EBTKE-

| Theme | Definition | Relevance | Key Findings | RQ Answer |
|---|---|---|---|---|
| Role & Responsibilities | Description of the role and responsibilities of the speaker at the institution | Demonstrating the position and responsibilities within the Institution, as well as the key role in relation to REUN. | • Formulation and implementation of policies<br>• Development of work standard norms<br>• • Providing technical guidance and supervision in the field of energy conservation | Monitoring energy efficiency and conservation and aligning it with the national NDC 2030 target to reduce gas emissions |
| Incentive and Subsidy Policies | Supportive Policies for the Oil and Gas Industry | Explaining the importance of these policies to support renewable energy projects and attract investment interest. | • Needed, especially in the fuel sector<br>• • No subsidies in the renewable energy sector yet | • Necessary to drive the economy and avoid social unrest, but subsidies must be well-targeted to be optimal<br>• • Renewable energy subsidy schemes are still being studied to ensure that the impact of these subsidies is directed to consumers, not businesses |
| Challenges in Energy Transition | Obstacles and challenges faced in the process of | Identifying key barriers that need to be addressed to achieve | • Economic viability of renewable energy | • Return on investment in the renewable energy industry is not |

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| | transitioning to renewable energy | renewable energy targets | • Lack of infrastructure and technology<br>• • Lack of regulations to support investments | as high as in the oil and gas industry<br>• Energy sources are far from demand centers due to the vast archipelagic country<br>• • Local content requirements (TKDN) are a barrier for foreign investors |
| Influence & Lobbying | The Influence of Large State-Owned Enterprises on the Government | Significant influence of major state-owned oil and gas companies on government policymaking | - | - |
| Economic and Social Impact | Impact of Energy Policies and Projects on Local Economy and Society | Demonstrating how energy policies and related projects can provide broad economic and social benefits, especially for small industries and local communities | Avoiding social unrest during massive changes | Socialization and public opinion surveys on public acceptance of nuclear power plants (PLTN) with a focus on safety standards within clear regulations |
| Expectation | Stakeholder Expectations for the Energy Sector in Indonesia | Solutions and Criticisms for Policymakers to Reduce Dependence on Oil and Develop Renewable Energy | • Optimization of all existing potentials<br>• Good energy efficiency management across all regions | • To support NZE 2060, it is expected that there will be optimization of existing potentials, both renewable energy and oil and gas, using |

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| | | | | environmentally friendly and clean technologies<br>• • Energy efficiency and management should be continuously implemented by all societal elements, starting from early education to higher education to change energy usage culture from an early age |
| Dependence on Oil | High Level of Oil Consumption in Indonesia | Breaking Down the Factors Contributing to Oil Dependence | Cheap fuel prices | Misallocated fuel subsidies are a mistake that must be corrected immediately |
| Government roles | Policies Made by the Government | Government Steps to Achieve National Targets | • Revising the National Energy Policy (KEN)<br>• Incentives for EVs<br>• Development of HVO and Biofuel<br>• Development of nuclear power plants (PLTN)<br>• • Coal phase-out | • Coal phase-out is a step towards making renewable energy the primary energy source in the upstream sector, although coal power plants (PLTU) will still be built in special economic zones using clean and environmentally friendly technologies<br>• EV policy is a downstream sector policy that will facilitate the achievement of NZE 2060<br>• The revision of KEN is in the approval stage in parliament, which sets new targets and includes the NZE 2060 scenario, |

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| | | | | aligning with the Indonesia Emas 2045 target<br>• • Research and development of biofuels and the realization of nuclear power plant (PLTN) construction |