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MASTER THESIS

IDENTIFYING BARRIERS OF STAKEHOLDER ENGAGEMENT IN ACCELERATING RENEWABLE ENERGY IN INDONESIA BASED ON A COMPARATIVE STUDY OF WEST JAVA AND CENTRAL JAVA

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Writer

ABSTRACT

Due to its capacity to deliver energy sources with lower or even zero emissions, renewable energy has emerged as one of the solutions to meet Indonesia's energy needs. It is crucial to consider the existence of several stakeholders with conflicting interests as the process of RE development encompasses a diverse spectrum of stakeholders, from state to non-state. Advocacy Coalition Framework is used as it provides concepts of actor, beliefs, and coalition. Therefore, acknowledging stakeholders' interests makes it possible to identify coalitions among stakeholders that eventually influence the policymaking and development process. The coalitions are identified based on the organizations' perspective regarding energy trilemma as the main challenge of energy governance. As two provinces that managed to publish Local Energy Plan and actively integrate RE within their strategic planning, the comparative study between Central Java and West Java aimed to acknowledge barriers that hinder the RE development process at the sub-national level. The highlighted barrier is the lack of involvement from stakeholders in the decision-making process of RE development in their respective provinces. Both provinces' Energy and Mineral Resources Agency took the leading role and became the brokerage between stakeholders. However, this has caused the rest of the stakeholders to become merely supporting stakeholders. Then, both provinces acknowledge that the barriers to engaging with stakeholders mainly involve PT. PLN (State Electricity Company). They limit the amount of RE utilization due to the oversupply issues. They also stated that the lack of awareness regarding energy diversification at the public level delayed the development process due to rejection and misunderstanding. It is crucial to create an annual discussion for all stakeholders to become involved in the RE development process' planning stage to accommodate these issues. It is also essential for all stakeholders to actively campaign to enhance public awareness of the importance of transitioning to RE. Moreover, creating specific initiatives similar to Central Java can help provinces focus on certain types of RE utilisation and build a positive image for their regions.

Keywords: Advocacy Coalition Framework, Central Java, Energy Trilemma, Stakeholder, West Java

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ABBREVIATIONS

IEA **International Energy Agency**

IESR **Institute of Essential Services Reform**

IRENA **International Renewable Energy Agency**

KEN ***Kebijakan Energi Nasional*** **(National Energy Policy)**

MEMR **Ministry of Energy and Mineral Resources**

RUED ***Rancangan Umum Energi Daerah*** **(Local Energy Plan)**

RUEN ***Rancangan Umum Energi Nasional*** **(National Energy Plan)**

PJB ***Pembangkitan Jawa-Bali*** **(Java-Bali Power Plant)**

PLN ***Perusahaan Listrik Negara*** **(State Electricity Company)**

CHAPTER 1 Introduction

1.1 Research Background

Corona Virus-2019 has brought the world into an unfamiliar perspective, from how we oversee this pandemic globally and how we consume our energy. According to World Energy Outlook created by IEA (2020), Covid-19 disrupted the way the energy sector works more than any other event these past years, and the effect will last for years to come. In 2020, we managed to lower our global energy-related emissions by 5.8% (IEA, 2021) since most of the activity is converted into the comfort of our homes. However, unlike the emission, the energy demand is increasing. As a developing country, Indonesia has become one of the fastest-growing countries in energy consumption (IRENA, 2017). Based on the report created by IRENA in 2017 regarding renewable energy prospects in Indonesia, our economic development, escalation in population, and urbanization are the main factors of the rise in our consumption.

Renewable energy has become one of the main explications for rising energy demand. The renewable energy trend has increased rapidly for the past two decades and will grow even more in the forthcoming future. The rise in our electricity demands triggers this growth. Besides that, the increasing awareness of climate change issues among global citizens and the urgency to develop lower-emission technology also play a big part in this situation. The momentum of the Paris Agreement and the Sustainable Development Goals Agenda of 2030, which the United Nations created in 2015, drives the declining costs of clean and renewable energy such as solar and wind. Solar and wind are expected to become the backbone of the transformation from fossil fuel-based energy to more sustainable renewable energy because of their well-distributed availability and accessibility.

1.2 Problem Statement

As mentioned above, renewable energy has become one of the ways to fulfill energy demand in Indonesia due to its ability to provide energy sources with lower or zero emissions. According to Freeman (2010), stakeholders as individuals and organizations vary significantly in terms of the interests they represent, the scope and depth of their expertise, and their ability to influence choices, all of which can alter over time and are context-dependent. Since renewable energy development involves various stakeholders, from state to non-state, it is critical to consider the existence of several stakeholders with disparate interests. Addressing each stakeholder's needs will increase their short- and long-term performance (Nasr et al., 2019). The central government is a significant stakeholder in developing renewable energy at the national level. To comply with the plan of increasing the RE percentage within the energy mix, the central government creates a national energy plan (in Indonesian: *Rencana Umum Energi Nasional*) that states the targets and the action plan. The regional

government must also create a local energy plan at the province level (in Indonesian: *Rencana Umum Energi Daerah-Provinsi*) to support the national energy plan. By 2022, twenty-five out of thirty-four provinces published their local energy plan. Several factors support the province's local energy plan establishment. For example, the province of the special area of the capital, Jakarta, managed to comply due to its presence as the capital province of Indonesia. On the other side, due to its tourism background, the province of Bali established its local energy plan. However, establishing a local energy plan is only the beginning of the RE development process. Currently, the percentage of RE within the energy mix is 12.16 %, while the target for 2022 is 15.69 %. This percentage implies that the progress of RE development at the local level is not optimized to support the national target.

According to Dr. Ir. Sujarwanto Dwiatmoko, M.Si., Head of the Department of Energy and Mineral Resources of Central Java, in an article published by SolarHub (2019), Central Java is the first province to publish its local energy plan. The Province of Central Java has launched measures to become the first Solar Province, with the assistance of many stakeholders ranging from local governments to non-governmental organizations such as the Institute for Essential Services Reform (IESR). As a non-governmental organization, IESR contributes to the partnership by providing technical help, policy research and analysis, market research, and capacity building. In 2022, Central Java surpassed its annual target of increasing RE in its energy mix. This condition demonstrates that when the government provides a clear and consistent vision, other stakeholders will support the ideas based on their respective backgrounds.

The remainder of Indonesia's 33 provinces may have the same objective as Central Java, but they continue to face challenges. Because several stakeholders are engaged, stakeholders may be concerned about a conflict of interest during the process of RE development. It is critical to recognize the kind of impediments that stakeholders in other provinces may or may not experience for them to support the local province's energy strategy. To successfully achieve the energy transition, it is critical to analyse stakeholder goals and requirements to reduce the risk of a conflict of interest.

1.3 Research Objectives and Contribution

This research aims to identify the socio-technical boundaries of stakeholders' engagement and their limitations and challenges that might hinder the process of RE development in Indonesia. The socio-technical boundaries scope is considered in the RE development process as it includes interaction between humans and technology. The available technology limitation may influence stakeholders' decisions. This research can contribute to future policy and decision-making processes by acknowledging the boundaries of stakeholder engagement in Indonesia's renewable energy development process. There is still a limited number of research regarding stakeholders' engagement

and its impact on Indonesia's RE development process. Hopefully, this research can give a new perspective and help accelerate the whole development process.

1.4 Research Questions

For this research, the main question is '*What are the barriers to stakeholder engagement in developing renewable energy at the sub-national level to support Indonesia's national targets?'* To answer this question, the process of analysing stakeholders is necessary. The researcher focused on two of the biggest provinces on Java Island. Both provinces submitted their local energy plan earlier than the rest. However, Central Java aims to become a Solar Province that utilises a new RE type to be utilised on a large scale, while West Java focuses more on existing geothermal power plants and the potential to increase the RE percentage within the energy mix. This condition could become a good representative for any province that intends to increase RE within their energy mix and diversify their energy source through creating initiatives such as Central Java or maximizing the potential of existing sources such as West Java.

For this purpose, there were several sub-research questions formulated which helped the process of analysis:

- **SRQ1** – Who are the stakeholders involved in the renewable energy development efforts in West Java and Central Java?
- **SRQ2** – What are the beliefs of each stakeholder?
- **SRQ3** – What kind of coalition is formed from the presence of these stakeholders based on their beliefs?
- **SRQ4** – What barriers to engaging with stakeholders among coalitions hinder the RE development process (specifically in West Java and Central Java)?

1.5 Thesis Outline

This thesis consists of seven chapters. The first chapter of this master thesis gives an overview of the study issue, the problem statement, the aim or objectives, and the research question. It is then followed by the second chapter, which outlines the context of this study. This chapter covers the study conducted in Central Java and West Java provinces. The next chapter discusses the conceptual framework that describes the underlying theory employed in the research. Then, the fourth chapter outlines the methods utilized to conduct this study to answer the research questions. The fifth chapter shows the findings from the data gathering activity. The sixth chapter then examines the data analysis and displays the data and results gathered from each stakeholder. Finally, the concluding chapter offers a conclusion, recommendations, and the preposition for future study.

CHAPTER 2 Research Context

2.1 Renewable energy policy in Indonesia

The Indonesian government finally announced its commitment to net-zero by 2060 and the phase-out of old coal-powered power plants by the 2040s with international aid. An encouraging sign of progress can also be found in the policy and regulatory realm, where key policies and regulations such as National Development Contributions that aimed to comply with Paris Agreement through integrating the climate agenda into the national development plan, Electricity Supply Business Plan (in Indonesian: *Rancangan Usaha Penyediaan Tenaga Listrik*) 2021-2030 period, and regulation no. 26/2021 on rooftop solar PV has been updated and improved. Despite predictions that technical solutions such as technological development for lower emission and energy efficiency for fossil-based energy will grow more expensive than the renewables plus storage option, the low carbon scenario still includes a high share of fossil fuels plus carbon capture and utilization and storage/sequestration. Furthermore, while renewable capacity addition grows in the recently issued Electricity Supply Business Plan 2021-2030, coal will still dominate the total generating mix for the next ten years.

2.2 Renewable energy policy at the sub-national level

The local energy plan created by the regional government aimed to support the central government's national energy plan. It is essential to look on a smaller scale to see whether some considerable progress is being made as Indonesia is an archipelago state. The tendency to rely on fossil energy has become a strategic issue in two of the largest provinces in Java: West Java and Central Java.

Figure 1 Map of Java Island (Source: dmaps.com)

In West Java's and Central Java's Energy and Mineral Resources Strategic Planning, both provinces stated that renewable energy had not been implied optimally within the energy mix. In their

strategic planning, both provinces highlighted energy diversification, efficiency, and energy conservancy as strategic issues.

2.2.1 Central Java

Central Java is a province with a population of 36.742.501 and a total area of 32.800 square kilometres (Central Bureau of Statistics, 2021). As one of the biggest provinces on Java Island, Central Java is projected to have an electricity demand of up to 56.304 GWh by 2030 (Central Bureau of Statistics Central Java Province, 2018). According to Central Java's infrastructure and natural resources agency, the energy source comes from coal and hydropower plants in Central Java. The local energy plan of Central Java was published in 2018. It stated that the Central Java provincial government aims to reach a renewable energy percentage of 21.32% by 2025 and 28.82% by 2050.

To support the increasing renewable energy targets within the energy mix, the government issued Governor's Circular Letter No. 671.25/0004468, which refers to installing rooftop PV in government units, commercials, and industries. This policy aims to attain the energy mix target of the province and energy efficiency purposes. As Central Java has a target to become a Solar Province Initiative, the provincial government also issued Provincial Secretary's Letter No. 671/0015817 to accelerate the installation of rooftop solar PV in government buildings and C&I sectors in 2021. However, according to Nusantara (2021), there are challenges in the process of renewable energy development in Central Java as follows: the limitation of construction services for building renewable infrastructure, electricity prices produced by renewable still unable to compete with the conventional electricity price due to the high investment and production price, easy accessibility of the general public to the fossil-based energy, the regulation still unable to force the general public and companies to start transitioning their energy use to renewables, no financial incentives or benefits for those who utilize renewables, and the new regulation regarding standards for solar panels that still trigger discussions between importer and supplier of solar panels in Indonesia.

2.2.2 West Java

West Java is a province with a population of 49.935.858 and a total area of 35.377 square kilometres. To comply with the national energy plan, the Government of West Java issued a local energy plan with targets of 20% of renewable energy within the regional energy mix by 2025. To support this objective, the government issued a policy of The Governor Regulation No. 56 of 2012 concerning Regional Action Plans for Reducing Green House Gas Emissions, stating that West Java Province aims to reduce 7,68% of the total GHG emission by 2023. According to the Local Energy Plan of West Java 2018-2023, this effort can be made by utilizing renewable energy on and off the grid, substitute fuel, and energy efficiency.

However, due to the Covid-19 pandemic, the target is adjusted as it affects the installation process of renewable energy facilities. The newest target sets up a 5,13% GHG emission reduction in 2023. However, according to the latest version of the strategic plan of the West Java Energy and Mineral Resources Agency, there are several challenges faced in the process of renewable energy development in West Java as follows: policies that have not supported the achievement of economic viability for RE investments, RE potential data is not yet available properly, constraints in the sustainability and quality of RE supply, mastery of technology is still limited, the lack of availability of financing instruments per investment needs, the licensing process is complicated and time-consuming, and land and spatial planning problems.

2.3 Current renewable energy state

2.3.1 Central Java

In 2020, with the target of 11,6% renewable energy within the regional energy mix, Central Java managed to produce 11,89% of renewable energy. This percentage consists of solar home system power plants with capacity installed in a total of 33,1 KWp, rooftop solar photovoltaic with capacity installed in a total of more than 5500 KWp, micro-hydro with a total capacity of 359,04 MW, communal solar power plants with capacity installed in a total of 561 KWp, and geothermal with capacity installed in a total of 60 MW in Dieng field (Central Java's Energy and Mineral Resources Agency, 2021). Other renewable energies such as biogas, waste-to-energy, and several geothermal fields are still developing.

However, there is still plenty of potential for renewables in Central Java. Geothermal reserves potential in Central Java is 1.633 MW which accounts for 5.7% of national reserves. The potential for a hydro power plant that can be utilized is 386,32 MW, spread across Central Java's regency and cities. Biogas is expected to have a total potential of 14,5 million SCF. According to Febby Tumiwa, the director of IESR, Central Java has solar potential reaching up to 193-670 GWp (CNBC Indonesia, 2021).

2.3.2 West Java

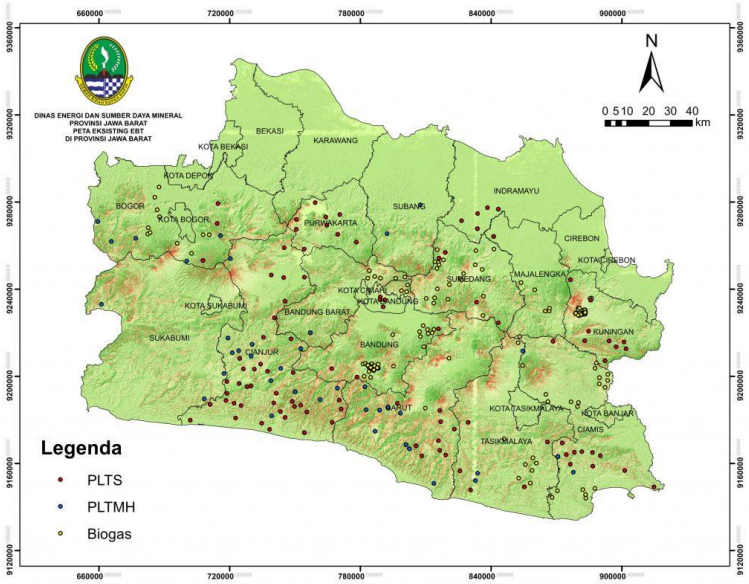

Figure 2 Map of Distribution of Renewable Power Plant in West Java (solar power, micro-hydro, and biogas)

As the most populated province in Indonesia, West Java has thirty-two power plants with a total capacity of 8.336,2 MW. The province produced electricity sourcing from 61,71% fossil-based energy (specifically coal, oil and gas, and diesel) to fulfil the electricity demand for the people of West Java (West Java Energy and Mineral Resources Agency, 2018). In addition, renewable energy contributes 38,29% from hydro power plants in Cirata, Saguling, Jatiluhur, and other smaller-scale hydropower plants. Geothermal power plants also account for 1.198,7 MW with ten power plant facilities.

According to West Java's energy and mineral resource data and statistics profile in 2018, West Java has various types of renewable energy potential, including micro-hydro potential: ± 5,600 MW, solar potential: 4.8 kWh/m^2/day, wind potential (south coast of West Java): 4 m/second, potential cattle waste: equivalent to ± 300,000 m^3/day 70% methane gas, from cattle of ± 3,000,000 head of cattle, and the potential for organic waste/garbage is relatively high: 20,000 m^3/day (within the scope of Bandung basin). A giant floating solar power plant has been constructed in Cirata Dam, West Java. It is expected to become South-East Asia's largest floating solar PV with a capacity of 145 MW. According to Bellini (2021), this power plant is under construction by Abu Dhabi-based RE company Masdar and an Indonesian-based RE company PT. PJB. The construction process will be completed in the fourth quarter of 2022.

2.4 Comparative study

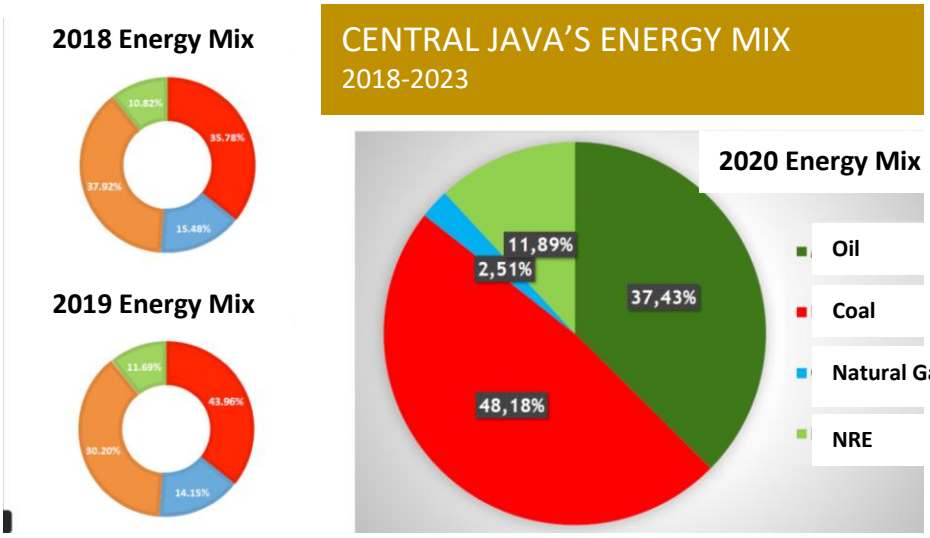

Figure 3 Central Java's Energy Mix (Nusantara, 2021)

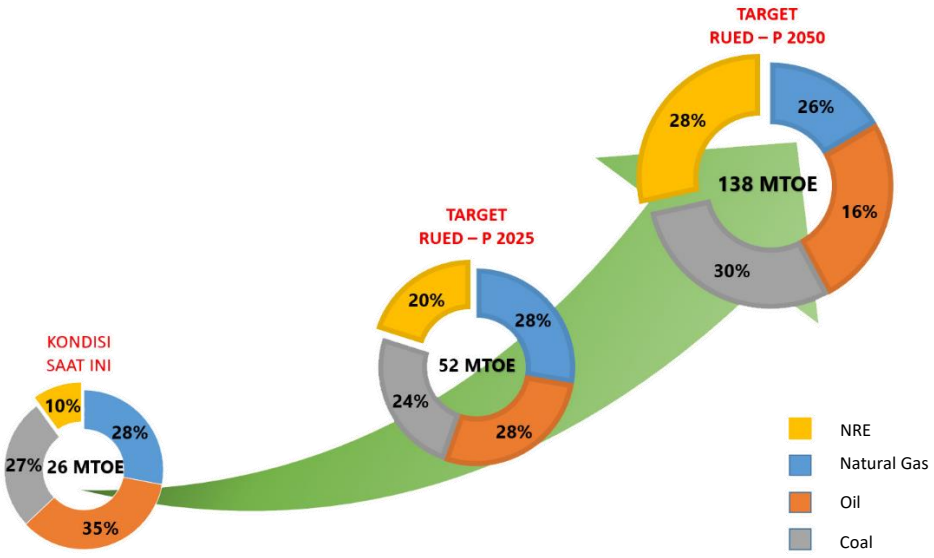

Figure 4 West Java's Energy Mix (2015) (Source: http://esdm.jabarprov.go.id/alamanfix/ accessed on 12 April 2022)

Central and West Java are progressing at varying speeds according to the proportion of renewable energy in the energy mix and the regional policies explained in the previous section. These two provinces have a similar potential in solar and geothermal energy production, yet there are differences. Central Java is accelerating significantly in solar power deployment due to the initiatives, while West Java focuses on geothermal as it becomes a significant contributor to energy supply. This research aims to identify how each province exceeds its preference for renewable energy types through different engagements between stakeholders. By acknowledging how each province works,

it is possible to exchange information for more renewable energy deployment in both types of renewable energy in the future.

Knowing what variables may impede or promote RE development and deployment is critical to guarantee that the development process can be expedited and expanded across Indonesia. One of the differences regarding stakeholder engagement that has been identified is in the process of creating a local energy plan. Central Java managed to submit its local energy plan in 2018, while West Java submitted it in 2019. As constructing a local energy plan involves stakeholders from diverse backgrounds, Central Java's stakeholder is more cooperative and well prepared. Bukhari (2011) states that a comparative study investigates and analyses two or more disciplines or ideas. The two provinces mentioned are investigated and compared, demonstrating how these two provinces are similar or different. The comparison variables for the two provinces are stakeholders' interaction and regional policy. From this comparison, it is possible to acquire information on why one province decided to opt for a particular type of renewable energy based on stakeholder interaction.

CHAPTER 3 Conceptual Framework

3.1 Stakeholder theory

According to Freeman (1984), a stakeholder is an individual or group that can affect or be affected by organizational goals. Stakeholders' interests are determined by different expectations and values that align with the objectives (Lin et al., 2018). As different stakeholders come from diverse backgrounds and interests, they are primarily concerned about the conflict of their interests in the shared project (Lin et al., 2017).

The development of RE involves multiple stakeholders, from state to non-state stakeholders. To accomplish the national goal of reducing GHG emissions and increasing RE utilization, acknowledging each stakeholder's wants and needs to ensure value creation is crucial to collaboration without trade-offs (Bowie, 2015). Taking this into consideration, stakeholders' interactions with one another will affect every process within their respective organizations. Each stakeholder who contributes to the decision-making process and benefits from the outcome becomes the primary focus of stakeholder theory (Phillips et al., 2003). As this engagement involves multiple stakeholders, it is essential to balance each stakeholder's interests by considering their viewpoints (Schwarzkopf, 2006). This initiative eliminates the possibility of a conflict of interest among the concerned stakeholders.

3.2 Advocacy Coalitions Framework (ACF)

As this study focuses on stakeholders, the ACF theory helped explain how collaboration within and across coalitions is essential for policy change. It contains explanations about various sorts of stakeholders and beliefs that influenced the process of RE development at the sub-national level. Therefore, the ACF section is divided into two parts: the first is an explanation of the ACF concept, and the second is ACF adaption for the study.

3.2.1 Concept of ACF

a. Policy Subsystem

According to Lindberg and Kammermann (2021), the policy subsystem embodies the systematic policy creation process. A policy subsystem defines as a group of actors from a range of public and private organizations that are actively engaged in a particular policy problem or topic, such as agriculture, and who strive to influence public policy in that domain regularly (Sabatier, 1998). Policy subsystems are categorized according to their subject, geographic span, and stakeholders. They consist of diverse people who discuss an issue on a national, subnational, or international level (Jenkins-Smith et al., 2014).

b. Actor

An actor is an individual or organization who has a choice in their decision. In this research, the term actor is defined as stakeholders. As actors can influence the policy-making process, they are guided by interests in terms of their goals and motivations for coalition involvement (Szarka, 2010). However, actors' interests and preferences are bounded by rationality as there are limitations. As participants of the policy subsystems, actors are not limited to the commonly accepted "iron triangle" of administrative agencies, legislative committees, and interest groups but also include multi-scale government, academia, and the media, which is traditionally not included in other policy theories (Edmonds, 2020).

c. Belief

Policy core beliefs encapsulate a policy domain's essential normative commitments, causal perceptions, and value priorities (Sabatier, 1998). The belief system is classified into a three-tiered hierarchical structure (Sabatier & Jenkins-Smith, 1999). Deep core beliefs are a form of fundamental and solid belief. It is a by-product of our worldview or early indoctrination and can be challenging to modify (Sabatier & Weible, 2007). The second is policy core beliefs. Edmonds (2020) asserts that while policy fundamental beliefs such as views on the role of government and equitable distribution of wealth are very stable, external forces can influence them. The last type is secondary aspects. This belief is subject to change over time, is prevalent across policy sectors, and is based on preferences for policy instruments. Secondary aspects beliefs refer to more specific preferences and decisions made within a particular policy subsystem and are required for the implementation of policy core beliefs (Zafonte & Sabatier, 2004)

d. Coalition

A coalition is an association of actors who share common values or policy objectives. According to Szarka (2010), ACF does not investigate the interplay between individual actors' interests and beliefs as motivators or the relationships between actors with diverse motivations. It is frequently assumed that sharing beliefs and motivations is necessary for coalition development (Szarka, 2010). Since the policy-making process is a complex network of interactions between several actors, this will form diverse groups with disparate beliefs. Each member of this coalition aspires to be the most influential in winning. There are three sorts of typical coalition formations that are ideal. The first one is adversarial when two opposing coalitions exist. The next type of coalition is collaborative. This coalition exists when there is a person with different beliefs in each coalition. The last one is unitary, where there is no opposition coalition.

However, according to Schlager and Blomquist (1996), facing a situation where actors within the same coalition have a conflict of interest, even when these members share the same beliefs, is

possible. This condition may cause the coalition to break and eventually change. Another scenario is when there is a different belief, but the coalition still shares common goals (Hann, 1995). According to Szarka (2010), this condition shows that ACF is a theory that helps identify drivers of forming coalitions and how it affects policy change.

e. Brokers

As previously explained, distinct beliefs led to particular coalitions. As multiple coalitions are formed due to diverse beliefs, it is feasible to identify conflicts of interest among them. Policy brokers must have a role in accommodating each coalition's interests (Christopoulos and Ingold, 2011). The role of policy brokers is to offer feasible compromises across coalitions to lessen the intensity of conflicting interests and ensure the stability of the policy system (Sabatier, 1998, p.133).

f. Entrepreneurs

In addition to the role of brokers in the Advocacy Coalition Framework, it is imperative to include the role of policy entrepreneurs in the Multiple Streams framework. Policy entrepreneurs are driven by self-interest (Christopoulos and Ingold, 2011). According to Christopoulos and Ingold (2011), they played a significant role in attracting the attention of policymakers and exploiting it to their benefit. If policy brokers and entrepreneurs are well-connected to the "centre of power," it is projected to significantly impact policy change and policy output (Christopoulos and Ingold, 2011).

3.2.2 ACF Application

The ACF as a framework helped define the thinking process systematically. In this research, ACF is relevant as it examines collaboration between stakeholders that are defined by their beliefs. After the researcher has identified the stakeholder, the next step is to identify their belief. Beliefs can be represented as the interests of stakeholders, which is one of the main objectives of this research. In this research, the range of beliefs across stakeholders is clustered into a coalition based on energy trilemma. Then, the coalition leads to a condition with a winner and a loser. Those determined as winners will take a role as the primary actor that will influence the policy process and benefit the most. However, despite winners and losers, different coalitions' roles are crucial as each stakeholder has their contribution and concerns in the RE development process. As the existing coalition type is collaborative, stakeholders must be actively involved and express their needs to ensure that all stakeholders' needs are catered to while supporting each other.

Based on the information regarding the Central Java government's initiatives to be the first solar province in Indonesia, the initiative may be constructed based on the solid intention of policy entrepreneurs, which is the non-governmental organization, IESR. However, West Java lacks the

presence of policy entrepreneurs, which results in less considerable progress compared to East Java in increasing the percentage of renewable energy share in the energy mix. Instead, West Java's Energy and Mineral Resources Agency was leading in establishing projects and engaging with multi-level stakeholders such as the public, universities, and business entities.

CHAPTER 4 Research Design

4.1 Research Strategy

4.1.1 Research Unit

For this research, the units selected are stakeholders engaged in the renewable energy development process in Central Java and West Java, ranging from state to non-state stakeholders, such as provincial government, education and research agency, business entities, and non-governmental organizations. Detailed information on the stakeholders can be found in Appendix D. The involved stakeholders are identified through process tracing and further explained in section **4.2.**

4.1.2 Research Boundary and Limitations

The research boundaries were determined to ensure that the research objectives could be accomplished within the timeframe the University of Twente gave of six months. The research boundaries for this research were the directly involved stakeholders in the renewable energy sector in Central Java and West Java. As renewable energy varies from one area to the other, this research focused on two of the most considerable renewable energy potential in both provinces, which are geothermal and solar energy.

4.2 Data Gathering and Analysis

The researcher used process tracing and interview for the data gathering phase. After the data is acquired, the data analysis process includes analysing the content of the interview and social network analysis, as seen in **4.2.3**.

Table 1 Data Source and Gathering Method

SUB-RESEARCH QUESTION	VARIABLES	SOURCES OF DATA	GATHERING METHOD	INTERVIEW QUESTION	ANALYSIS METHOD
Who are the stakeholders involved in the renewable energy development efforts in West Java and Central Java?	• Stakeholders that are involved • Stakeholders' role	• Grey literature • Governments' websites • Publicly accessible articles	Process tracing	-	Qualitative: Identifying stakeholders using process tracing
What are the beliefs of each stakeholder?	Stakeholders' beliefs	• Stakeholders involved identified from process tracing	Semi-structured Interview	1. What is your (organization) interest in renewable energy deployment (in your respective provinces)? 2. Based on the energy trilemma graph below, there are three aspects of energy governance which consists of economic (e.g., energy affordability/mitigating energy poverty), politics (e.g., energy security), and environment (e.g., sustainability in	Qualitative-quantitative: Analysing stakeholders' beliefs by descriptive statistics from analysing the content of the Interview

				general and mitigating carbon emissions in particular) (Setyowati, 2020). Which aspect is your organization most related to according to your interest? 3. Based on the graph of the construction process of the Local Energy Plan below, what is your (organization's) role in the construction process of the local energy plan?	
What kind of coalition is formed from the presence of these stakeholders based on their beliefs?	• Stakeholders' relation with each other • Coalition among stakeholders • Conflict among coalition	• Stakeholders involved identified from process tracing	Semi-structured Interview	4. Who are stakeholders that work closely with your organization regarding RE development (in your respective province)? 5. Who are stakeholders that you have agreement and disagreement with during activity regarding RE development (in your respective province)?	Qualitative-quantitative: Analysing the relationship between stakeholders and identifying the stakeholder who has the role of mediators by calculating betweenness centrality and who has the vital role by calculating degree centrality. Density by groups is used to identify interaction across coalitions.

What barriers to engaging with stakeholders among coalitions hinder the RE development process (specifically in West Java and Central Java)?	Boundaries and challenges in stakeholder engagement	• Stakeholders involved identified from process tracing	Semi-structured Interview	6. What is your opinion on the targets stated in the local energy plan? Is it sufficient, or is it not ambitious enough? 7. What is your opinion on the progress in achieving the target of the local energy plan? 8. From your perspective, what are the current barriers to engaging with those stakeholders in developing RE?	Qualitative: Analysing existing boundaries and challenges in stakeholder engagement among identified stakeholders by analysing Interview

4.2.1 Process Tracing

Process tracing is a method for providing an analytical framework for past events (Falleti, 2006). The researcher used the process-tracing method to collect information regarding involved stakeholders. This information is required to answer SRQ 1. This method started with identifying the period of the research, which was 2017-2022, based on the validation date of the national energy plan and the period in which the research was conducted.

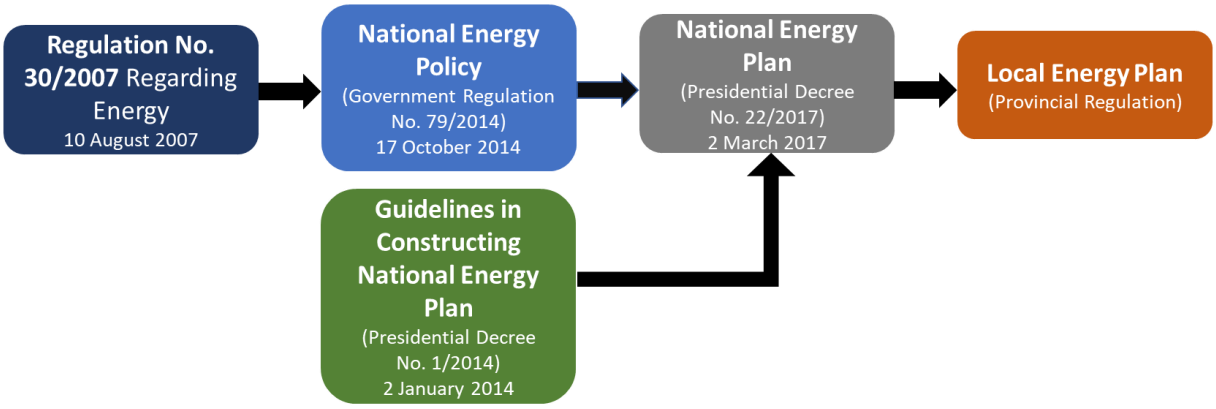

Figure 5 Process of Constructing Local Energy Plan

The process of renewable energy development began when the Central Government, in collaboration with the Indonesia House of Representatives, mandated the development of a clear and measurable National Energy Policy (in Indonesian: *Kebijakan Energi Nasional*) to serve as a guideline for managing national energy following the principles of justice, sustainability, and environmental protection to achieve energy independence and national energy security. Additionally, Law number 30 of 2007 mandates developing a national energy plan and a local energy plan until 2050 to assist in implementing the national energy policy. The national energy plan is evaluated every five years for strategic environmental change. The current timeframe covered by the national energy plan is 2018-2023. However, according to Article 17 of Law No. 30 of 2007 on Energy, "Provincial general energy plans shall be stipulated no later than one year after the national energy plan is proposed." Given that the national energy plan was validated in March 2017, it is apparent that the deadline for local governments to develop local energy plans is March 2018.

The main stakeholders involved in the drafting process of the local energy plan were the Energy and Mineral Resources Agency of their respective provinces and the National Energy Council as a facilitator. However, according to Central Java and West Java's Local Energy Plan documents, different stakeholders, ranging from commercial companies, industries, and the public, are indirectly involved in developing the national and local energy plans.

Besides the local energy plan document, the researcher also gathered the stakeholders' information through government documents, media articles, and publicly accessed documents

documenting the above process. The identified stakeholders were those who participated closely from the beginning of the writing period for the local energy plan to actively contribute to achieving the target written in the local energy plan, as seen in Appendix D.

4.2.2 Interview

The second method of data collection was a semi-structured interview. A semi-structured interview was deemed the most appropriate strategy since the size of the research unit precludes the collection of accurate data through surveys. Semi-structured interviews were more adaptable and could yield more detailed data, which is beneficial for comprehending stakeholders' viewpoints. The interviews are recorded and later transcribed for analysis if the interviewee agrees. All interviewees must sign an informed consent form before the interview session if willing to participate in the research voluntarily. This method was used to answer SRQs 2, 3, and 4 as it gathers variables of stakeholders' relations, coalitions, beliefs, and current boundaries and challenges in stakeholder engagement. Each interview session took 30-60 minutes as different respondents gave various answers to the question. There were eleven interviewees in total, as seen in Appendix D.

4.2.3 Data Analysis

This research used qualitative and quantitative analysis to understand the current condition of stakeholder engagement in the RE development process in Central Java and West Java. The first method was analysing the content of the interviews. This method is qualitative analysis. The researchers analysed the interviewee's statements from the interview output to answer the research question. For SRQ 2 and SRQ 4, the analysis method introduced a quantitative element using descriptive statistics. The frequency of specific words (e.g., economy, profit, sustainability, environment) said by interviewees was transcribed as their stakes or intention.

The second method was quantitative analysis using social network analysis (SNA). SNA was performed in this research and analysed at the actor, whole network, and group levels. The researcher used degree and betweenness centrality at the actor level, density and degree centralization at the whole-network level, and density by group at the group level. The researcher used the previously mentioned analysis to answer the SRQ3 regarding coalition. This method is used to identify the relation between coalitions. The data used for identifying coalition was from interview question three regarding which aspect of energy trilemma resembles their organization the most. The stakeholders are categorized into three types of actor groups (coalition) as mentioned, which consist of:

1. Energy Security
2. Energy Equity
3. Sustainability

The researcher then examined the values of degree centrality and betweenness centrality. Degree centrality is defined as an actor's number of ties, commonly distinguished into the corresponding bond in the form of ties which includes incoming (in-degree) and outgoing (out-degree) (Hanneman and Riddle, 2005). The goal of degree centrality was to determine which stakeholder had the most influence in the network. The more critical the stakeholder, the higher the degree value. In comparison, betweenness centrality determined which stakeholder took on the brokerage position because they have relationships with most of the network's stakeholders. Betweenness centrality is an organization's chance to be on the shortest path between any two organizations in the network (Fliervoet et al., 2016). The data utilized to determine stakeholder relationships came from interview question four, which asked which stakeholders collaborate closely with their company on RE development.

These two pieces of information combined then produced a sociogram. The researcher used a sociogram to show how each stakeholder connects by illustrating it using ties to represent connections and nodes to represent stakeholders. The sociogram presented the networks among stakeholders related to renewable energy development in Central Java and West Java. The colours of the nodes showed the different coalitions based on the stakeholder's beliefs data acquired from interview question three. In addition to node colours, the degree centrality is used to assign node sizes proportionally. Based on the information acquired from the semi-structured interviews, the information regarding stakeholders' relations in Central Java and West Java is identified, as seen in Appendix E.

The decisive step is to compute density. The researcher calculated density by dividing the number of ties in the network by the maximum number of ties possible (Borgatti et al., 2013). The researcher used density per group and displayed the number of ties within the actor group. Density by group is the proportion of the actual number of ties in a cross-table to the maximum number of ties within and between groups (Borgatti et al., 2013). The features demonstrated the level of interaction across the coalition. With this information, the researcher may determine which coalition collaborated with others and how the collaboration impacted the RE development process.

4.3 Operationalization

The energy trilemma is one of the main challenges of energy governance (Gunningham, 2013). According to Setyowati (2020), the energy trilemma consists of energy equity (e.g., ensuring access to energy for everyone to reduce energy poverty), energy security (e.g., ensuring the supply of energy to attain energy security through providing affordable and reliable energy sources), and sustainability (e.g., considering sustainability aspect in development processes and environmentally friendly).

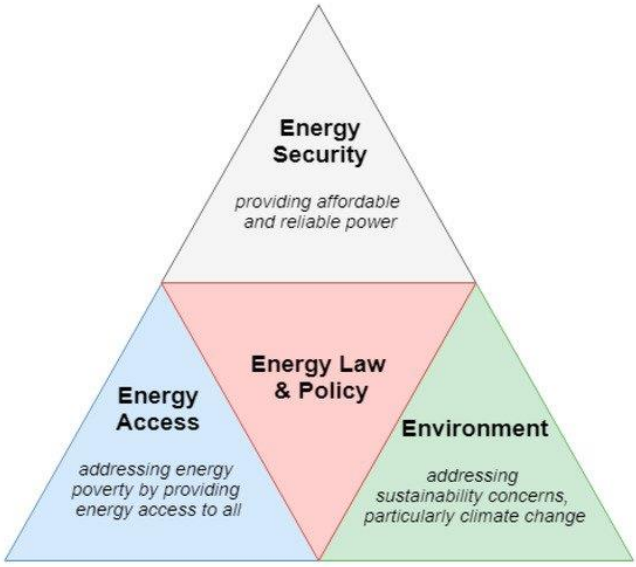

Figure 6 Energy Policy Triangle (Setyowati, 2020)

The primary variable of this research is identifying stakeholders' beliefs and how they created coalitions. The coalitions eventually affected the policy-making process in Central Java and West Java. The energy trilemma becomes the basis for identifying the beliefs of the stakeholders. Creating a local energy plan involved various stakeholders, from industries to the public. This research helps identify stakeholders' beliefs and how they reflect in the energy trilemma angles. The beliefs also reflected the possible coalition among stakeholders as they lean toward one aspect of the energy trilemma: economic, political, or environment. By acknowledging possible coalitions, this research helps reduce future conflicts of interest among coalitions and eventually accelerate the process of RE development across Indonesia.

4.4 Ethics

All research that involves people as subjects or participants, whether via surveys, interviews, or the use of potentially sensitive data, must adhere to the Behavioural, Management, and Social Sciences (BMS) Faculty's ethical policy. As a result, consent forms for individuals involved, such as interviewees, should be created before data collection. Furthermore, the consent form clarified the interviewee's privacy and data confidentiality issues. If interviewees choose to remain confidential, they may write anonymously. They can also dismiss themselves when they no longer want to participate in the research. Supervisors and the ethics committee should examine and approve the research plan for at least three weeks before completing the online application form, including the data gathering procedure. Additionally, data should be maintained securely in compliance with BMS Data Lab Procedures.

CHAPTER 5 Findings

5.1 Stakeholders involved and their roles

The local energy plan elaborates on the national energy plan that accounts for potential energy issues at the provincial level. The top-down approach accommodates national-level strategy and development planning policy to the local energy plan. In addition, the bottom-up strategy is also established, incorporating local energy plan considerations into national development planning.

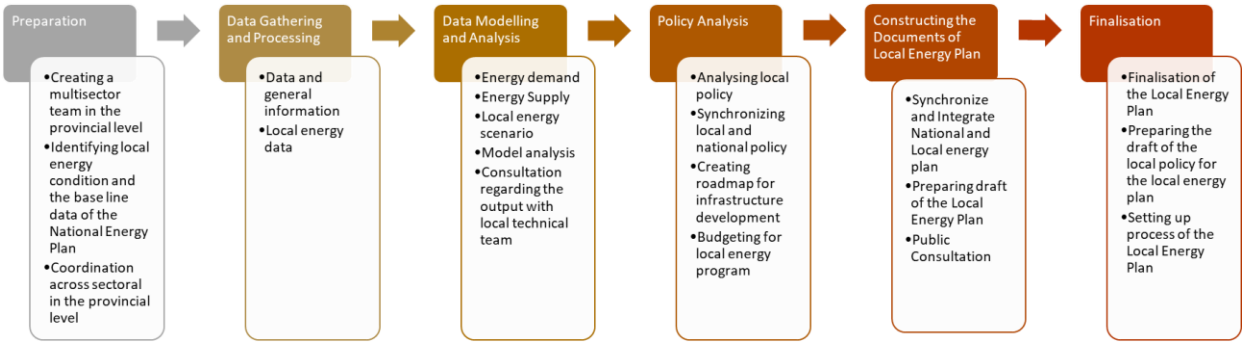

Figure 7 The steps in composing a local energy plan

According to the documents of the Local Energy Plan of both Central Java and West Java, it is stated that the construction process of creating an energy plan involves regional apparatus within the provincial government, educational institutions, research institutes, business entities, and other related parties (Central Java, 2018; West Java, 2019). The graphs above show several steps for constructing a local energy plan, from preparation to finalization. These different steps involved different stakeholders throughout the process.

The first step of composing a local energy plan was the preparation phase. This phase consists of identifying the energy condition of the region, creating a multisectoral team, and multisectoral coordination across regional work units. In this phase, the stakeholders involved were related government agencies such as the Ministry of Energy and Mineral Resources, Ministry of Industry, Ministry of Fisheries, Ministry of Agriculture, and other relevant agencies, which provided the demand data. The various stakeholders with multiple backgrounds and interests participated as the multisectoral team.

The next step is the data gathering and analysing phase. The multisectoral team gathered general information and regional energy data during this phase. Then, the processed data is used to create a model or projection and analysed further. The projected model is used to predict energy needs, energy supply, and future scenarios of regional energy. The model is then presented to the regional technical team for consultation purposes.

Policy analysis is the next step. In this phase, the multisectoral team analysed the regional policy to synchronize the national and regional policy. There was also a discussion regarding the funding for regional energy programs. Next, the multisectoral team composed the documents for the local energy plan. It is crucial to ensure that the local energy plan aligns with the national energy plan. Public participation is also highlighted in this phase as public consultation activity to finalize the local energy plan. In the end, the finalization phase consists of composing the regional policy regarding the local energy plan and the establishment process. A team created by the National Energy Councils and the Ministry of Energy and Mineral Resources facilitated and consulted to ensure the smooth running of this process.

In conclusion, stakeholders involved in constructing local energy plans in both provinces are the Energy and Mineral Resources Agency and National Energy Council as facilitators. However, stakeholders such as non-governmental organisations, power plant developers, the State Electricity Company, and power plant operators contributed by presenting their strategic development plans.

5.1.1 Stakeholders involved in Central Java

In the construction process of the local energy plan of Central Java, several crucial stakeholders are involved (Tempo, 2018). They are the members and general secretary of the National Energy Council as the facilitator to guide the process, the Ministry of Energy and Mineral Resources, the Ministry of Home Affairs to encourage the provincial government, and the Provincial Parliament of Central Java to establish the local energy plan as an official policy of the province.

In constructing the local energy plan, the first step is to create a multisectoral team consisting of members with different expertise. The research and education representative, Karnoto, stated that he had been involved since the first draft of the local energy plan in 2006 (Interviewee 5, Personal Communication, June 2022). Alongside his colleagues and other stakeholders, he contributed to the entire process of constructing Central Java's local energy plan.

In developing renewable energy in Central Java, the Energy and Mineral Resources (EMR) Agency of Central Java also encouraged and facilitated stakeholders to accelerate the utilization and development of renewable energy through various financing schemes and fiscal incentives. As the Central Java government has stated, to achieve the title of Solar Province, the renewable energy projects focus on accelerating the number of solar power infrastructures throughout the province (Interviewee 1, Personal Communication, June 2022). This initiative is possible due to the collaboration with a think-tank organization, the Institute of Essential Services Reforms (IESR). They provided data and information regarding rooftop solar PV's solar potential and execution projects (Interviewee 1, Personal Communication, June 2022). They are also actively engaged in the public

discussion regarding the policy development in Central Java and other supportive stakeholders such as business entities.

The solar PV projects also involved other stakeholders, such as the solar energy developer (Interviewee 1, Personal Communication, June 2022). As business actors, they provided services ranging from planning to utilization. As the initiative of becoming a Solar Province means that solar energy will be converting from off-grid to on-grid systems, the role of the State Electricity Company (in Indonesia: *Perusahaan Listrik Negara* or PLN) is also crucial. The PLN also drive the policy direction as they oversee the national electricity network and are responsible for the national electricity transmission based on the constitutional court decision. The court declared that electricity is a commodity that involves many people's livelihoods. Therefore, PLN holds the highest control to ensure public access to electricity (Interviewee 11, Personal Communication, July 2022).

Central Java has implemented one of the massive NRE programs by installing Rooftop Solar Power Plants in office buildings of provincial government agencies and city and regency governments (Humas EBTKE, 2021). The Energy and Mineral Resources of Central Java Province has also coordinated with the PLN UID (Regional Master Unit, in Indonesian: *Unit Induk Daerah)* in Central Java and the Special Region of Yogyakarta to install KWh Exim (Export-Import) as part of the installation of rooftop solar PV will be easier and faster.

In conclusion, the stakeholders that are actively involved in the effort to develop renewable energy in Central Java at the province level are the provincial Government (Ministry of Energy and Mineral Resources, Ministry of Home Affairs of Republic Indonesia, and the Provincial Parliament of the Central Java), business actors, non-governmental organization, academics, and professional association. However, in the local energy plan construction phase, the process was mainly done by the Energy and Mineral Resources Agency of Central Java, while National Energy Councils became a facilitator.

5.1.2 Stakeholders involved in West Java

West Java's local energy plan was published in 2019 (Interviewee 6, Personal Communication, June 2022). The target stated in the Local Energy Plan is to acquire the optimal energy mix, which includes 17% of renewable energy by 2025 and 20% of renewable energy by 2050. Preparing the Local Energy Plan for West Java was conducted through the facilitation of guidance and consultation from the National Energy Council, the Ministry of Energy and Mineral Resources, and the Development Team for the Preparation of the Local Energy Plan at the Province level.

The local energy plan also states that the governor has the authority to create a non-structural body to facilitate stakeholders' engagement in energy matters. The body members comprise the provincial Government, city or residential Government, district government, academic representative,

professional association, business actors and users, and other relevant stakeholders. According to the statement above, it can be concluded that the actors mentioned are also active stakeholders in West Java's renewable energy development effort. However, as the research focused on the sub-national perspectives, the identified stakeholders are only those actively involved at the province level.

EMR Agency of West Java took the leading role as they are responsible for constructing policies and communicating with other government agencies and stakeholders regarding renewable energy development. Other crucial stakeholders are the PLN and the renewable energy power plant operators. Both stakeholders contributed their future projects and strategic planning data, as stated below.

"*…the contribution (from our company) in preparing the Local Energy Plan was involved during data collection and processing. At this stage, we present a 5–10year work plan both in association forums and other discussions, both facilitated by local and central governments to submit work plans.*" – Interviewee 7

Besides the business actors, other government agencies such as the Director General of New Renewable Energy and Conservancy Energy, Director General of Oil and Gas, Regional Development Agency, and Central Bureau of Statistics also contributed to providing necessary data and information for the preparation process of the local energy plan (Interviewee 6, Personal Communication, June 2022). The data includes energy demand, potential energy resources, populations, and historical parameter data (Interviewee 6, Personal Communication, June 2022).

The Energy and Mineral Resources Agency of West Java also highlights the role of professional associations. They are considered crucial due to their inputs and thoughts throughout the construction process of the Local Energy Plan. According to the representative of the agency, in one of the phases of preparing the documents for the local energy plan, the Indonesia Renewable Energy Society and Association of Regional Oil, Gas, and Renewable Energy Producers are involved as a part of the public consultation (Interviewee 6, Personal Communication, June 2022).

In conclusion, the stakeholders involved in the effort of renewable energy development in West Java at the provincial level consist of provincial government and agencies, business actors and users, and professional associations. However, similar to Central Java, the local energy plan construction process was mainly conducted by the Energy and Mineral Resources Agency of West Java, while National Energy Councils took the role of facilitator.

5.2 Stakeholders' beliefs and coalition

According to the variable operationalization section in 4.3, the energy trilemma became the basis of identifying stakeholders' beliefs to acknowledge their concerns regarding challenges revolving energy

governance process in their respective provinces. Energy trilemmas have three angles: energy equity, security, and sustainability.

5.2.1 Stakeholders' beliefs and coalition in Central Java

According to the Interview, stakeholders in Central Java have various concerns regarding the energy trilemma (Interviewee 1, Interviewee 2, Interviewee 3, Interviewee 4, Interviewee 5, Personal Communication, June 2022). However, as the leading stakeholder in the province, the Energy and Mineral Resources Agency of Central Java has a different viewpoint on said trilemma. They stated that all aspects of the trilemma are equally important. They also claimed that challenges relevant to the trilemmas are being managed parallelly. Their utmost goal is to become a province that achieves energy sovereignty. They utilize their potential through new and renewable or conventional energy, such as fossil-based energy. They have recently inaugurated the new coal power plant located in the northern beach area of Central Java. The power plant is responsible for delivering electricity throughout the island of Java and Bali. Nonetheless, the calculation of the energy mix and the emission production is emphasized in Central Java. Consequently, this condition encourages discussion among the government and policymakers as it worsens Central Java's position in emission production.

As the provinces stated their intention to be the Solar Province, the role of the Institute of Essential Services Reform is crucial in conducting the plans for the initiatives aimed at establishing the Solar Province. They have been associated with the initiative from its development through its most recent implementation and operation. They expressed the belief that consumers have the right to choose to use renewable energy. They also believed it was crucial to explore all possible perspectives on the energy trilemma to achieve sustainable energy governance. They promote the transition to a low-carbon energy system through their four programs: energy transformation, the green economy, access to renewable energy, and sustainable mobility, as well as CASE - Communication Strategy Development for Clean Affordable and Secure Energy for Southeast Asia (IESR, 2022). They do this by advocating for public policy based on data-driven and scientific studies, providing capacity development assistance, and forming strategic alliances with non-governmental actors (Interviewee 2, Personal Communication, June 2022).

Besides the provincial government, the role of PLN (State Electricity Company) is crucial as they are responsible for transmitting electricity on a national scale. Their participation becomes a significant aspect in constructing the strategies for renewable energy utilization as they held one of the most prominent roles in establishing renewable energy development. PLN provided its planning and strategies in the form of the National Electricity Supply Business Plan, which includes information regarding future capacity and exploration plans. Their primary interest is to provide access; however, they acknowledge other angles of the energy trilemma to be parallelly important (Interviewee 11,

Personal Communication, June 2022). In this case, the regional master unit takes the role of PLN instead of the central office as it focuses more on the provincial level (Interviewee 11, Personal Communication, June 2022).

The Central Java government also established a regional state-owned energy company called PT. Jateng Petro Energi (Perseroda). The company was launched through an official province policy in 2020 as its establishment aims to meet Central Java's energy demand. As business entities, they have an aim to acquire profit (Interviewee 3, Personal Communication, June 2022). However, they believe all their activities and programs aim to achieve Central Java's energy security.

Alongside PT. JPEN, the role of renewable energy developer, is also essential. PT. Dua Multi Solusindo has become a company that provides solar PV utilization consultancy, from planning to construction. The director stated that ensuring the supply of energy and attaining energy security should be the primary goal of the province (Interviewee 4, Personal Communication, June 2022). They have always supported the province's efforts and programs regardless of the condition.

In constructing the local energy plan, the Central Java government, through EMR Agency, created a multisectoral team responsible for the drafting process. The team included a representative of a university that provided academic perspectives. They believe that the focus should be shifted to how the province provides energy to the community (Interviewee 5, Personal Communication, June 2022). The environmental aspect would be a mere additional value as the energy potential located in Central Java are primarily renewables.

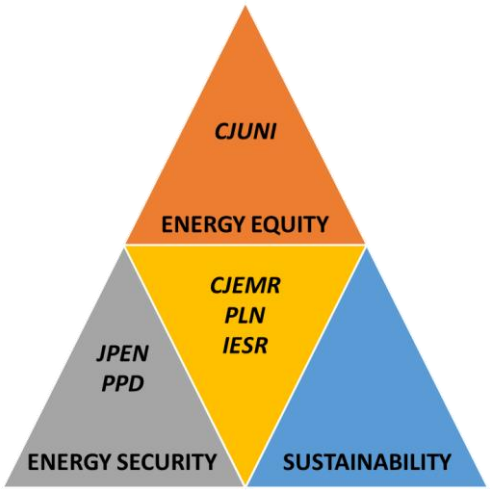

Figure 8 Coalition in Central Java

In Central Java, the EMR Agency of Central Java and IESR identified themselves to all three angles of the energy trilemma. These two stakeholders are collaborating closely to pursue the Solar Province initiative. From the energy equity challenge, they stated that they have a purpose of ensuring energy access for the public (Interviewee 2, Personal Communication, June 2022). They also tried to

diversify the option for energy sources to fulfil the energy demand through programs such as Rooftop Solar PV in every governmental agency's building (Interviewee 2, Personal Communication, June 2022). Policy regarding solar power utilization is also established to achieve the initiative's aims. The coalition between Energy and Mineral Resources Agency and IESR can alter the course of policy in Central Java. The next coalition is between PT. JPEN and PT. Dua Multi Solusindo. Both companies present their support to the provincial government by providing their services. PT. JPEN, a regional state-owned energy company, has a specific department developing RE and PT. Dua Multi Solusindo has been operating as a solar power services company. The relationship between the two coalitions mutually supports each other and has impacted positively ever since the initiative began. By 2019, through various budget sources, both from the government, the private sector, and the public, Rooftop Solar Power Plants have been built, approximately 127 units with a total capacity of around 5,199 kWp (Humas EBTKE, 2020).

5.2.2 Stakeholders' beliefs and coalition in West Java

Similar to Central Java, the West Java provincial government, under the Energy and Mineral Resources Agency of West Java, has the leading role in developing and utilizing renewable energy in West Java. They also provided their viewpoints regarding the energy trilemma as they considered three aspects to correspond to each other (Interviewee 6, Personal Communication, June 2022). Currently, in terms of electricity, West Java is producing more than its demands. However, the sources mainly came from fossil energy-powered power plants. This condition has delayed the development process of RE as the utilization of RE-powered plants will cause an increasing supply with less demand from the public. The oversupply condition could cause another problem, such as grid congestion due to storage and network limitation. One proposed solution would be elevating public electricity consumption (Interviewee 6, Personal Communication, June 2022). By 2022, the electrification ratio of West Java was 99.88% (Interviewee 6, Personal Communication, June 14, 2022). However, due to the accelerating population in West Java, it is a massive challenge for the government to achieve a 100% electrification ratio. Besides, the existence of poverty rates also stunted the process. Regardless, the province initiated a "*Jabar Caang*" program or "Bright West Java" to provide public electricity infrastructure assistance, specifically to remote, outermost, and disadvantaged areas. The province also utilized two approaches regarding RE development: increasing the supply and the amount of RE demands by providing green labelling.

The province needs the participation of renewable energy operators to increase the amount of supply. As one of Indonesia's provinces with enormous geothermal potentials, West Java's geothermal reservoir has been producing electricity since the early 1990s (Interviewee 7, Personal Communication, June 2022). The central government awarded the responsibility through PT.

Pertamina (State-owned Energy Company) in the 1980s. Star Energy Geothermal, a geothermal-powered power plant operator, accounts for 875 MW of electricity production or around 41% of the total capacity for geothermal-powered power plants in Indonesia until the end of 2020 (Interviewee 7, Personal Communication, June 2022). They believe that their focus is mainly on providing energy supply to achieve energy security while also contributing to reducing carbon emissions through cleaner energy sources. Based on their understanding of the energy trilemma, the energy access or energy equity challenge is not their part of the responsibility as they could only sell their electricity production to a single buyer, which is the State Electricity Company (PLN) (Interviewee 7, Personal Communication, June 2022).

Similar to Central Java's condition, PLN is the only stakeholder permitted to distribute electricity due to the constitutional court decision. In this case, they stated that their main interest is to provide energy access throughout Indonesia. However, the effort to diversify energy sources is also their concern as the demand for transition is coming from the government and the business side (Interviewee 11, Personal Communication, July 2022).

The provincial government also mentioned the role of professional associations in developing RE. The association provided inputs and suggestions within the discussion among stakeholders regarding program and policy development in West Java. However, ADPMET's representative stated that they were only involved at the end of the construction process of the local energy plan. Currently, they also raise awareness of the energy transition process's needs through campaigns and image building (Interviewee 10, Personal Communication, August 2022).

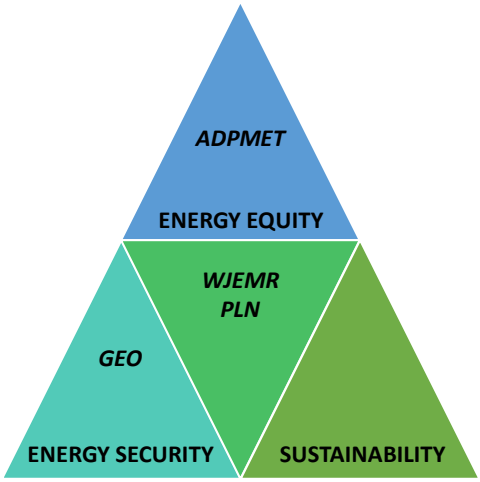

Figure 9 Coalition in West Java

In West Java, the provincial government under the Energy and Mineral Resources Agency of West Java expressed concern about three aspects of the energy trilemma. They regarded energy trilemma on a similar level. By now, West Java has encountered the problem of oversupply of electricity as the electricity produced from various coal-powered power plants is in West Java. Due to

the current poverty rate and exponential population growth, the provincial government has difficulties enhancing the electrification ratio. To comply with the escalating demand and transition to a more sustainable energy source, the provincial government tried to approach from supply and demand perspectives (Interviewee 6, Personal Communication, June 2022). From the supply side, Star Energy Geothermal and other renewable sourced Power Plants operators' role is crucial in providing renewable energy. They expressed interest in providing cleaner, more sustainable, environmentally friendly energy. PLN's role in distributing electricity showed that their main interest is providing energy access nationwide. However, due to the oversupply condition in West Java, PLN decided to distribute the excess electricity across Java Island. As West Java is a part of the province that produces oil and gas, it joined the ADPMET. This association is campaigning for the importance of utilising the profits coming from oil and gas production for developing RE in their respective areas. They highlight the essentiality of growing energy access for the public and the economy (Interviewee 10, Personal Communication, August 2022).

5.3 Stakeholders' relation

5.3.1 Stakeholders' relation in Central Java

The relationship among stakeholders in Central Java is relatively supportive of each other to achieve the province's energy mix target. The highlight of the province's effort in escalating the number of RE utilization is the Solar Province initiatives which are possible due to the support and close cooperation with IESR. Most of the province's programs in the initiative have always been under IESR's supervision and input (Interviewee 1, Personal Communication, June 21, 2022). IESR actively creates forums or seminars to educate the public regarding the initiatives. They also vigorously campaign the initiatives through different opportunities such as competition and public discussion. Other stakeholders supported the provincial government, such as renewable energy developers and the regional state-owned energy company. They are responsible for constructing more renewable energy infrastructure and providing more renewable energy-sourced electricity supply. However, in the forum discussion, developers are mainly represented by the profession association, consisting of multilevel and multisectoral individuals representing different sides and roles in renewable energy development.

"Cannot work well together with this PLN. If we look at several policies, such as the rooftop policy, they have been echoed, even the president himself said that, right. However, there are several regulations from PLN. The rules for implementing them are contrary to the national policies that have been made. On the other hand, we want to speed things up as much as possible, but from PLN, there is also an internal note, right, (which is) to limit it. We understand that Indonesia has an energy

surplus because of covid, right? Maybe some industries do not absorb this excess energy. In the end, it is possible that new energy such as solar will also be affected (in development).” – Interviewee 3

However, within the engagement, it is common to witness disagreements that delay the RE development process (Interviewee 2, Interviewee 3, Interviewee 4, 2022). Supportive stakeholders such as RE developers and PT. JPEN stated they are having difficulties forming an agreement with the PLN. As stated above, PT. JPEN questioned the PLN's regulation on RE utilization. The PLN decision contradicts the central government's regulation and eventually affected the RE development process in general due to storage limitations provided by the PLN.

IESR also expressed their concern regarding PLN's decision to limit the use of solar power plants in Central Java. They stated that PLN limits 15% of the installed capacity for all sectors that want to install rooftop solar panels. PLN's consideration in determining 15% of installed capacity is the current over-capacity issue resulting in the delayed process of renewable energy penetration, specifically rooftop solar power plants (Interviewee 2, 2022). The National and Local Energy Plan has not accommodated the target of achieving Net Zero Emission 2060 or earlier. IESR also stated that the lack of regional authority in regional budgeting resulted in a lack of other nomenclature for NRE development activities except geothermal building (Interviewee 2, Personal Communication, June 2022). They also recognized that the Local Energy Plan did not explain any information on investment in the NRE sector to the regional private sector, which might delay the acceleration process of RE development.

In addition, public literacy regarding clean energy is also one of the main concerns (Interviewee 1, 2022). The rejection of the construction of geothermal power plants also appears due to community social problems (Interviewee 2, 2022). When the public is aware of climate change and how energy transition contributes to mitigating it, it is possible to see an escalation in renewable energy demand across the provinces. The increasing demand will eventually affect the energy supply chain and the market.

5.3.2 Stakeholders' relation in West Java

Stakeholders' relation among actors in West Java is different compared to Central Java. There is limited participation from non-governmental organizations in constructing strategies and planning to develop RE. However, the leading stakeholder, the Energy and Mineral Resources Agency of West Java, is actively coordinating with the Provincial Government of West Java in establishing programs and collaborating with external parties to enhance the number of REs within the energy mix. For instance, the government is collaborating with a UK university to lower carbon emissions in the

transportation sector by converting to electric vehicles. As a result, the Government of West Java is willing to acquire financial support from the state budget and external sources.

The relation of established renewable energy power plant operators such as Star Energy Geothermal within this engagement is to contribute to providing electricity. They are also actively involved in a national forum alongside the central government in establishing more geothermal power plants nationally. However, at the provincial level, they are merely an electricity producer and did not contribute significantly to the discussion among stakeholders except by presenting their future development strategies aligned with the province's projects during the Local Energy Plan construction process.

As a single buyer of all the electricity produced, the PLN role is crucial. They determined the price and amount of production, which affects the development process of RE in general. The Energy and Mineral Resources Agency of West Java is the leading stakeholder, yet the PLN's decision will eventually influence how the market works. Like Central Java, most stakeholders considered their relations with PLN were not completely smooth due to PLN's decision to limit the 15% of installed capacity for all sectors that want to install rooftop solar panels (Interviewee 2, Personal Communication, June 2022).

As for ADPMET, they claimed that as they are still at the beginning of transitioning from an association with a focus on gathering aspirations of oil and gas producer regions, they have only been engaged with stakeholders with the purpose of campaigning and image building (Interviewee 10, Personal Communication, August 2022). For example, they invited several speakers coming from different sectors to an online seminar or an open discussion regarding the importance of energy transition and how funding from the profit of producing oil and gas can help accelerate the transition. However, within the process of RE development in the West Java province itself, ADPMET is not actively involved in the discussion and policy-making processes. They are usually invited at the policy's finalisation to provide inputs and insights (Interviewee 10, Personal Communication, August 2022).

5.4 Social Network Analysis

Based on the information acquired from the semi-structured interview, the information regarding stakeholders' relations in Central Java and West Java is identified, as seen in Appendix E. The data is then used from this information to calculate the degree centrality, as seen in **Table 2** and **Table 3,** and betweenness centrality, as seen in **Figure 11** and **Figure 12**.

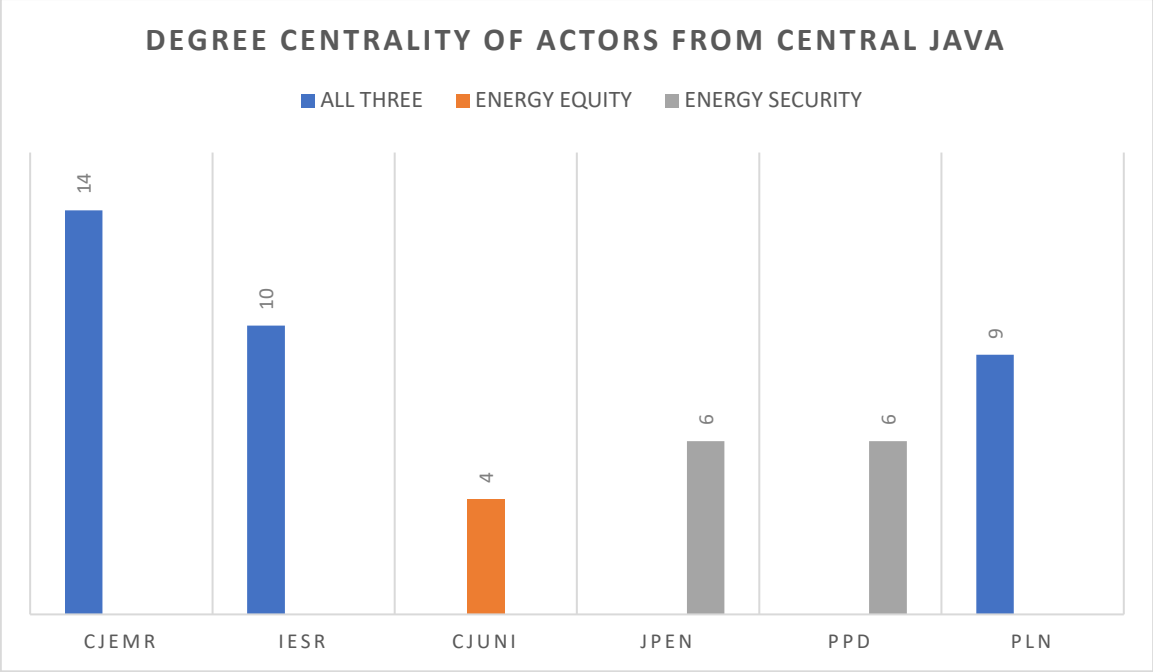

Figure 10 Degree centrality of actors from Central Java

From **Figure 9**, the highest degree centrality in Central Java is CJEMR, with a total of fourteen. In contrast, the lowest degree centrality in Central Java is CJUNI, with a total of four. This value entails CJEMR's role as a central stakeholder in Central Java's RE development process.

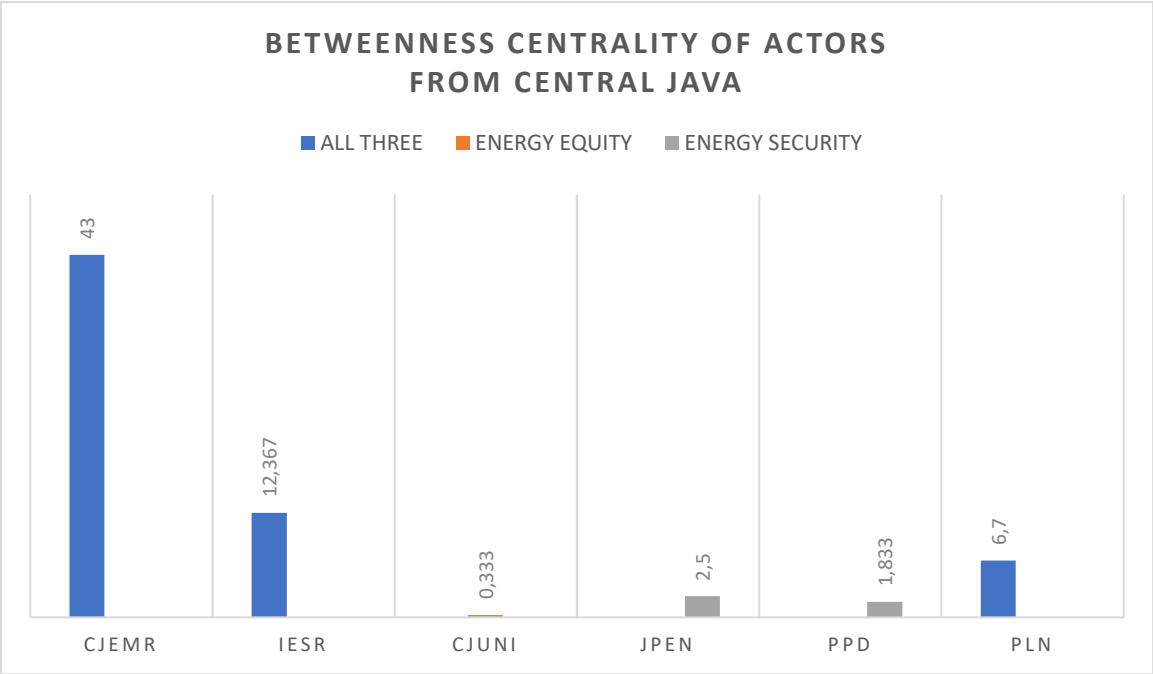

Figure 11 Betweenness centrality of actors from Central Java

From **Figure 10**, the highest betweenness centrality in Central Java is CJEMR, consisting of forty-three. This value implies that CJEMR took the brokerage role in Central Java's RE development process.

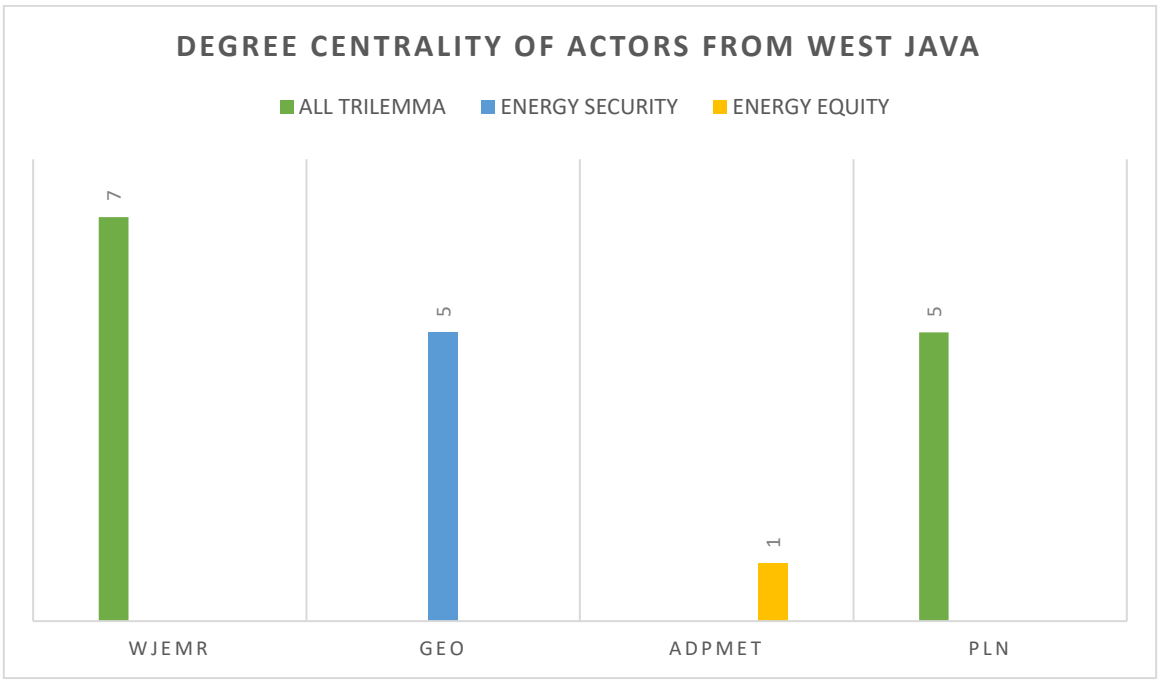

Figure 12 Degree centrality of actors from West Java

From **Figure 12**, the highest degree centrality in West Java is WJEMR, with a total of 7. At the same time, the lowest degree centrality in West Java is ADPMET, with a total of 1. This number shows that WJEMR is the central stakeholder in the network of West Java's RE development process.

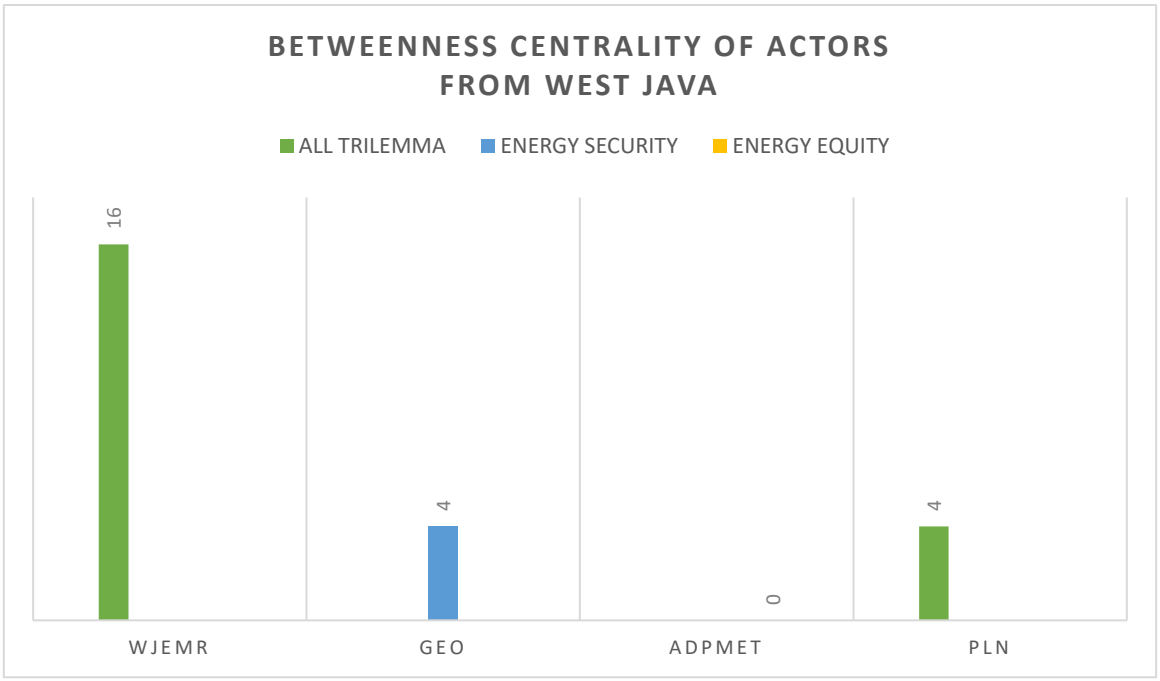

Figure 13 Betweenness Centrality of actors from West Java

As seen in **Figure 13**, the highest betweenness centrality in West Java is WJEMR, with a total of 16. This number signifies that WJEMR became the brokerage in the network of West Java's RE development process.

According to three types of coalitions, the researcher assigned the identified stakeholder to distinct colours, as presented in the sociogram in **Figure 14 and Figure 15.** Aside from node colours, the node sizes also differentiated the stakeholders. The node sizes are proportionally assigned based on the degree centrality value, ranging from 5 to 24. Several stakeholders that interviewees mention was visualised through the sociogram. However, they are not a part of further analysis.

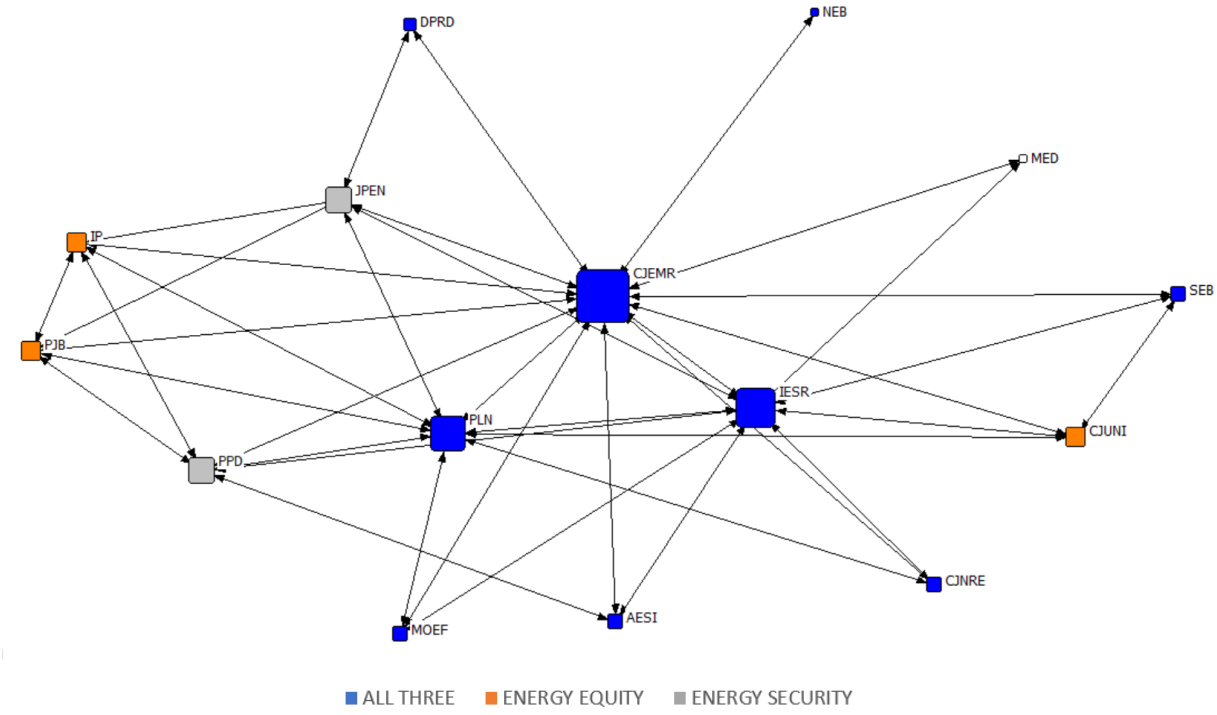

Figure 14 Sociogram of stakeholder relations of Central Java

From calculating degree centralization in UCInet, the researcher acquired the degree centralization value of Central Java's RE development process network. The value is 0,736. A high degree of centralization suggests that in a star-like structure, one or a few actors (where the highest degree of centrality is the same for multiple organizations) are central actors (Gallemore and Munroe, 2013). As the stakeholder with the highest degree centrality in Central Java's RE development process, CJEMR became the centre of the network. This sociogram shows that the network is heading towards a centralized network type.

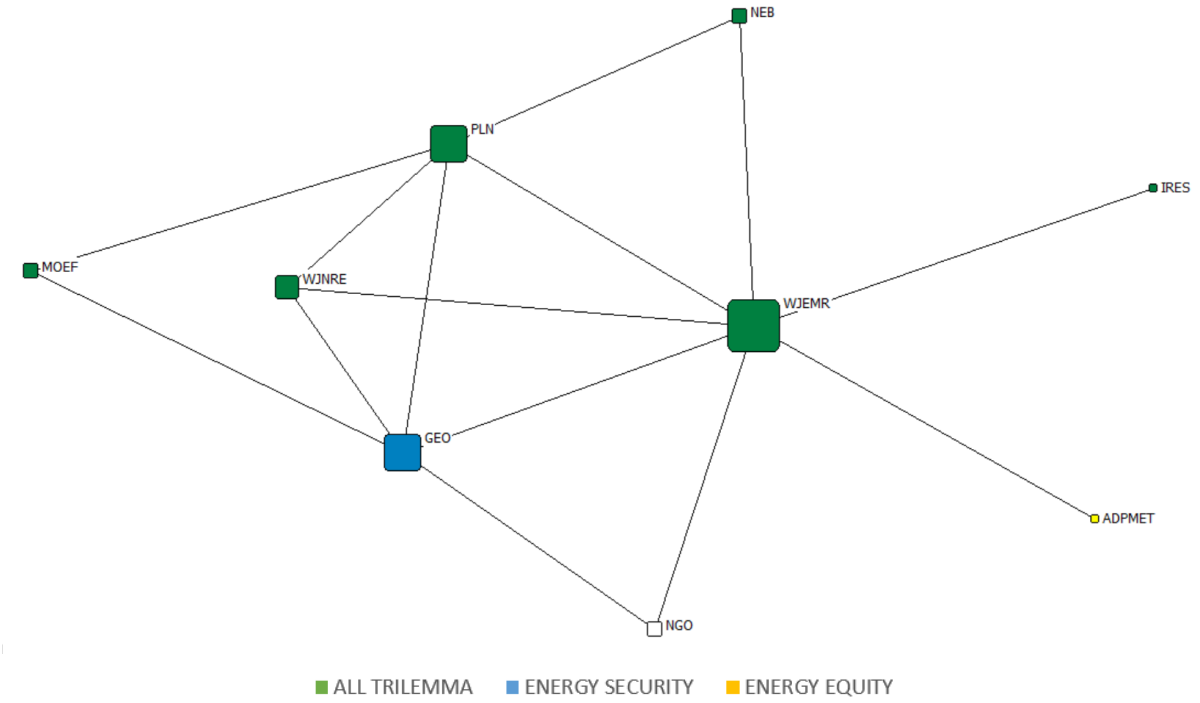

Figure 15 Sociogram of stakeholder relations of West Java

For West Java's RE development process network, the researcher acquired the degree centralization value of 0,625. This value shows that the network that existed in West Java is not as centralized as Central Java's. The value of WJEMR degree centrality illustrates that it is responsible for West Java's decision to develop RE. However, as PLN's number of degree centrality is not entirely different from WJEMR, this also shows that PLN contributes not much different compared to WJEMR.

The density is then estimated by comparing the number of ties to all possible ties. The density signifies the network's connectedness, also known as network closure (Sandstrom and Rova, 2010). The higher the "density by group," the greater the opportunity for collective action among actor-group (Olsson et al., 2004; Bodin and Crona, 2009). However, the high value of network density might result in lower effectivity in the group's collective action due to homogeneity across the network. The overall density of Central Java's actor-networks graph is 0,362, with a total number of ties being seventy-six ties. In comparison, West Java's total number of ties is twenty-eight, with an overall density of 0,389. The researcher presented the number of ties and density across networks below.

Table 2 Number of Ties of Actors from Central Java

NO. OF TIES	ALL THREE	ENERGY EQUITY	ENERGY SECURITY
ALL THREE	30	8	8
ENERGY EQUITY	8	2	4
ENERGY SECURITY	8	4	0

As presented in **Table 4**, it is possible to identify that stakeholders categorized as the coalition concerned with all aspects of energy trilemma in Central Java have the highest ties within the coalition, with a total of thirty ties. This value implies that the relationship within the coalition is intense compared to its relation across the coalition.

Table 3 Density of Coalitions from Central Java

DENSITY	ALL THREE	ENERGY EQUITY	ENERGY SECURITY
ALL THREE	0,417	0,296	**0,444**
ENERGY EQUITY	0,296	0,333	0,667
ENERGY SECURITY	**0,444**	0,667	0

Table 5 shows that the highest density across coalition in Central Java is between 0 and 0,667. The highest density exists between energy equity and energy security, totalling 0,667. However, the stakeholders within the coalition of energy security are not considered in this research as they are not included in constructing local energy plans. The highest density is then awarded to the density within the coalition of all three aspects of the energy trilemma. This number is supported by the intense collaboration between CJEMR and IESR to construct the initiative of Jateng Solar Province and all the programs to support the initiative.

Table 4 Number of Ties of Actors from West Java

NO. OF TIES	ALL	EQUITY	SECURITY	ENVIRONMENT
ALL	14	1	4	1
EQUITY	1	0	0	0
SECURITY	4	0	0	1
ENVIRONMENT	1	0	1	0

As presented in **Table 6**, it is possible to identify that stakeholders categorized as the coalition concerned in all angles of energy trilemma in West Java have the highest ties within the coalition, with a total of 11 ties. This value implies that the interaction among the coalition is intense compared to its relation across the coalition.

Table 5 Density of Coalitions from West Java

DENSITY	ALL	ENERGY EQUITY	ENERGY SECURITY	ENVIRONMENT
ALL	0,467	0,167	**0,667**	0,167
ENERGY EQUITY	0,167	0	0	0
ENERGY SECURITY	**0,667**	0	0	1
ENVIRONMENT	0,167	0	1	0

However, it does not imply that the highest number of ties equals to highest density. **Table 7** shows that West Java's highest density across the coalition is between 0 and 1. The highest density exists in two interactions. The first is interaction across coalitions between energy security and all three aspects of the energy trilemma. This interaction is proven through intense interaction between WJEMR and GEO as geothermal power plant operators. The power plant operator provides future strategies to support the province's plan to accelerate the number of RE utilisation. In return, WJEMR also informs the power plant operator regarding the province's needs and coordinates the province and the operator's plan. The following interaction is between the environment and energy security coalition. However, as this research did not involve the environment coalition directly, the researcher categorized this interaction as non-existent.

In conclusion, Central Java's stakeholder engagement highlights the interaction between CJEMR and IESR as the main initiator of the Jateng Solar Province initiative. This initiative became the centre of Central Java's program to increase the amount of RE within the province. On the other hand, the interaction in West Java happens intensely between WJEMR and the power plant operator due to the supply and demand. There is no initiative in West Java concerning a specific type of RE. However, this condition leads West Java to a more diverse program in accelerating the number of RE development. Through the *Jabar Caang* campaign, the province aims to distribute electricity to the underdeveloped area by utilising small-scale REs such as hydro and solar.

CHAPTER 6 Discussion

6.1 Comparison between Central Java and West Java

The stakeholders involved in Central Java and West Java are similar. In both provinces, the role of central and brokers is taken by the respective province's Energy and Mineral Resources Agency. As matters regarding energy and electricity are still under the government's responsibility, both provinces' agency will be the one who initiates and establishes policy. However, in Central Java, the role of IESR is crucial. They are actively engaging in the discussion alongside Central Java's EMR Agency regarding establishing the initiative of Solar Province. The researcher considered IESR a policy entrepreneur due to its self-interest in escalating the number of solar energy utilization nationally. Their interest managed to alter Central Java's plan for developing RE. Due to the initiative becoming Central Java's main interest, the programs created are catered to achieve this purpose. The utilization of diverse types of solar-generated power became the province's way of attaining the RE targets in the local energy plan. Other stakeholders such as PT. JPEN and PT. Dua Multi Solusindo participates in supporting the process of solar power utilisation as the executor of the project.

On the other side, West Java's EMR Agency collaborates with various stakeholders to achieve the RE targets in their local energy plan. One of the projects established is "*Jabar Caang*." However, this initiative was only a platform of CSR for companies to help enhance the number of ratios of electrification in West Java. Stakeholders involved were not actively discussing the initiatives as the government directly provides the program. On the other hand, West Java's EMR Agency is also establishing more programs to help transition to electric vehicles. This effort is possible due to collaboration with stakeholders outside the scope of West Java, such as universities from the United Kingdom and South Korea and the governments of EU countries.

Regarding other RE utilization types, geothermal is still West Java's leading contributor to the RE energy mix. However, it is difficult to increase the number of geothermal utilization due to complicated permits and the lengthy process of exploration to production. It is crucial to acquire a steady investment for a geothermal project. This condition explains that geothermal projects' authority is usually held at the national level instead of the provincial level.

The next step used Advocacy Coalition Framework to acknowledge stakeholders' beliefs and categorize them into several coalitions. The results show that Central Java and West Java have similar yet different distributions. In Central Java, several stakeholders stated that they acknowledge that all aspect of the energy trilemma is equally concerning. These stakeholders are CJEMR, IESR, and PLN. They are categorized as the same coalition, and it is proven that stakeholders mentioned supporting each other throughout the Jateng Solar Province initiative. As a stakeholder within this coalition has a high number of degree centrality and betweenness centrality, CJEMR took the prominent stakeholder

role. The other two coalitions, energy security and energy equity, took the supporting role in the RE development process and could not significantly alter the course of the process. IESR, as a policy entrepreneur, have an aiming to accelerate the energy transition. They contributed significantly through active participation in the initiatives and helped the province achieve and exceed its renewable energy mix targets in 2020.

West Java also has a variety of coalitions with similarities and differences compared to Central Java. WJEMR, as the governmental agency, became the main stakeholder and took the brokerage role as they acquired the highest value in degree and betweenness centrality. However, the lack of NGO participation as policy entrepreneurs in West Java caused the RE development process to be more diverted and did not revolve under one main initiative like Central Java. The main coalition in the province consists of the main stakeholder, WJEMR, and another crucial stakeholder, PLN. PLN as the stakeholder with the sole responsibility for distributing electricity, caused the role of other coalitions to be limited in supporting the province's program. As the province faced the issue of oversupply, their concern is mainly on transitioning to achieve the renewable energy mix target stated in the local energy plan and helping the frontier area to gain access to electricity. However, PLN's decision to limit the number of solar panels installed only to 15% of the total capacity illustrates that the development of RE is delayed due to technological limitations and reliance on using measurable energy sources such as coal. Currently, RE's role is limited to supporting the energy sources as there are still intermittent issues, specifically in solar energy.

Both Central Java and West Java province lack a sustainability coalition. This condition shows that both provinces consider the environmental aspect their most minor concern in solving energy matters. Their main goals are achieving energy access and ensuring everyone can utilize energy to accommodate their needs. Transitioning to renewable energy is a win-win solution as it provides the strategy to accommodate energy needs and reach frontier regions with no grid facilities while also contributing to lowering emission production. NGOs and think-tank organisation such as IESR helps provide insights and knowledge to the government, which eventually lead to more programs in transitioning to renewable energy. However, more collaboration between primary stakeholders and a sustainable coalition is needed to bring more sustainable consideration in developing strategies for future energy advancement.

In conclusion, Central Java's main stakeholder manages to accommodate insights from stakeholders such as IESR, who are also categorized in the same coalition, to construct a proper strategy to achieve the local energy plan. They also integrated their programs with the Jateng Solar Province Initiatives, which exceeded Central Java's RE utilisation targets in 2020. The remaining stakeholders, such as local business entities, support the province's programs. While in West Java, the

engagement among stakeholders remains a formality. As a central stakeholder, WJEMR took most of the decision-making processes. The role of other coalition only acts as a supporting stakeholder that upholds the province's program and strategies. Most stakeholders are only involved at the end of the finalisation process, which illustrates the lack of involvement during the critical process of constructing the policy itself.

Through ACF, the researcher managed to construct thorough thinking processes in identifying how the stakeholders engaged with each other through a coalition to develop RE in their respective provinces. This framework also helped the researcher acknowledge the lack of environmental coalition in both provinces, which resulted in the lack of sustainable consideration and inputs within the discussion among stakeholders. Using UCInet to conduct SNA, the researcher found quantitative data on stakeholder engagement across the coalition. It also showed that both provincial governments under Energy and Mineral Resources Agency became the central stakeholder who took the brokerage role within the network. This result proves that the government played an essential part in developing RE in both provinces.

6.2 Action plan

From the comparison between Central Java and West Java in the previous section, this section explains more about the barriers in stakeholder engagement that are identified and how to overcome said issues in the future for the remaining provinces which might face the same conditions.

There are several barriers to engaging with stakeholders as the process of RE development involves various actors with different beliefs and coalitions. Both provinces stated that the communication and engagement between stakeholders in their respective provinces are in a good state as all actors collaborate supportively and see disagreement as something likely to happen. However, as both provinces' main stakeholders are the provincial government, other stakeholders simply support the existing programs or strategies. In a formal discussion, the government mainly holds the decision-making process as energy matters are considered issues of common goods.

In Central Java, as IESR is considered a policy entrepreneur, they influenced the government's decision to develop RE. However, they acknowledge that the Central Java government's targets were not ambitious enough due to the lack of nomenclature for other RE development activities. Currently, geothermal is the only RE that has a precise nomenclature. This condition delayed the development process of other REs, such as solar, which became Central Java's primary variable in elevating RE within the energy mix in the target of Central Java's local energy plan.

However, in West Java, the nomenclature issue did not become a problem due to the mature condition of the geothermal sector. The geothermal power plant operator considered that the main issue lies in the monopoly of electricity buyers. They are forced to sell their products according to the

price that PLN sets. This condition caused the market competitiveness to be lacking or even zero. The producers are compelled to make this decision while risking their business model as the lower price resulted in a more extended turning point.

Currently, the electricity price sourced from fossil-based energy (i.e., Coal) is the cheapest option. The inadequacy of public literation in both provinces caused the lack of demand for cleaner energy sources. Public regards cleaner energy as more expensive and prefer to acquire the cheaper ones due to insufficient information regarding the effect of using fossil-based energy in the long term and their economic capacity to access energy.

In developing more RE projects, more stakeholders need to be engaged. Both solar and geothermal energy have their advantage and disadvantage. In geothermal, as most reserves are in a conservation area and protected forest, it is possible to face rejection or protest from the surrounding local community and environmental activist-based NGOs. It is crucial to engage with said stakeholders to ensure the development process has staunch support from every level of society. In solar, IESR stated that the problem relies on the current policy and technology availability. Further engagement with PLN as a highly influential stakeholder is vital to accelerate RE utilisation on a large scale. With the support from the government and PLN and the demand from the public, the development of RE will increase periodically, and the energy trilemma will be solved.

According to the barriers identified above, the researcher proposes an action plan for Central Java, West Java, and the remaining province in Indonesia to accelerate the development process of RE at the sub-national level:

1. Increasing public literacy through interactive and multiplatform approaches involving all stakeholders is essential. This effort will help raise public awareness and subsequently affect the demand for RE-sourced energy. With the increased awareness, there will be less rejection from the public, and the RE development process will face less dismissal.
2. As the regional budgeting is allocated for various purposes, it is crucial to look at more funding possibilities. Engaging with more potential stakeholders such as private business entities, academics, and NGOs makes it possible to gain more investors to develop RE power plants. As more investors come, there will be more RE players in the industry. This condition will help increase competitiveness for RE in the energy market.
3. One of the problems mentioned is the lack of involvement of supporting stakeholders in the policy-making processes. Through frequent discussion with stakeholders such as PLN regarding future strategies of RE development in terms of technologies, strategies, and policies alongside relevant stakeholders to acquire more perspectives and their involvement,

this will help smoothen the process of creating suitable strategies which cater to every stakeholder's interest and inputs.

4. Central Java proved that by establishing initiatives, they could focus on developing certain types of RE to achieve their energy mix targets. This method can be suitable for provinces with significant RE potentials, such as Papua, which is recognized as a province with the most prominent wind potential. In addition, collaborating with supporting stakeholders such as IESR as a think-tank organisation will help construct a proper strategy from brainstorming to executing proposed projects and programs.

CHAPTER 7 Conclusion and Recommendation

7.1 Conclusion

This chapter concludes the answer to sub-research questions, which lead to answering the main research question based on the results and discussion chapter. This chapter also provides future research and policy recommendations.

This research aims to identify the barriers to stakeholder engagement in the sub-national level in RE development processes. Using ACF, the researcher managed to identify stakeholders' beliefs and categorize them into several coalitions based on their interest in the energy trilemma. The engagement between these coalitions showed that one coalition took the leading role compared to the rest. The researcher also managed to identify how each coalition engaged with each other and how it affected the RE development process.

From the SRQ1, the researcher identified stakeholders in the RE development process in Central Java and West Java. Stakeholders participating in the renewable energy development process in Central Java and West Java are similar. They consist of the provincial government, business actors, non-governmental organisations, academics, and professional associations. Throughout the drafting process of the Local Energy Plan, both provinces also established a multisectoral team supervised by National Energy Council. Both provinces involved relevant stakeholders such as associations and power plant operators in the public consultation phase to review their respective local energy plan drafts.

In Central Java, the role of IESR is crucial. They are closely collaborating with the provincial government as they established Central Java's initiative of being a Solar Province. They accommodate the province's targets through a series of strategies and projects. IESR is also involved closely in policy development. Another supporting stakeholder such as PT. JPEN and PT. Dua Multi Solusindo are actively helping in projects related to RE development. In West Java, the leading role is mainly held by the provincial government. The government conducts most programs and projects. Other stakeholders such as power plant operators are contributing to producing energy and sharing their plans regarding field development. As West Java is an oil and gas producer, they become a part of ADPMET, an association of oil and gas producer regions aiming to use their profits from the oil and gas production to invest in RE utilisation in their respective province. Both provinces engaged with PLN due to its responsibility to distribute electricity nationwide.

From the SRQ2 and SRQ3, the researcher categorised stakeholders into several coalitions based on their beliefs and interest in energy trilemma. In Central Java, there are three coalitions that consist of all three aspects of the energy trilemma (CJEMR, IESR, PLN), energy equity (CJUNI), and energy security (JPEN, PPD). While in West Java, there are four coalitions which are three aspects of

the energy trilemma (WJEMR, PLN), energy equity (ADPMET), and energy security (GEO). The last coalition is the environment. However, the researcher did not engage further with said coalition due to its lack of participants in the RE development process in West Java.

SRQ4 provided information on what kind of barriers these coalitions faced that hindered the RE development process in their respective provinces. Both provinces stated that they considered the engagement within their province to be good. However, the lack of participation in decision-making creates an environment where supporting stakeholders are merely there as "support" and not actively engaged in the critical discussion. Besides that, the lack of public literacy and awareness caused much rejection from the public. PLN's decision to limit the amount of RE power plants installed also considered delaying the process of RE utilisation in both Central Java and West Java.

From all the SRQs, it is possible to answer the main research question*: 'What are the barriers to stakeholder engagement in developing renewable energy at the sub-national level to support Indonesia's national targets?'* As most provinces are currently in the same condition as Central Java and West Java, they face the same challenges. Lack of involvement in the policy-making processes, public rejection, and relying solely on PLN's decision to develop sufficient technology to utilise more RE-sourced energy became the significant barriers to developing RE. The researcher then proposed an action plan which aimed to solve these issues. The action plan includes increasing public awareness, engaging with more potential stakeholders, creating an annual discussion forum for all stakeholders, and establishing an initiative.

This research contributed to the ACF theory by providing answers on how coalitions engaged with each other and how several barriers built up due to conflicting interests among said coalitions. While for the stakeholder theory, this research contributes to the idea of how crucial it is to consider every stakeholder's interest to create a supportive environment to achieve common targets. The researcher acquired each stakeholder's perspectives on the RE development process in their respective province and how their interest affects engagement among themselves.

In a previous study, Lindberg and Kammermann (2021) stated that in energy transition, the existing coalition asked for not only targeted RE percentage within the energy mix and targeted RE policies, but also a suitable market for RE to develop. This study also highlighted the importance of creating market competitiveness for RE development to thrive, as stated by the Power Plant Operators. The lack of price competitiveness also caused RE producers to lower their value to gain consumers, resulting in a longer overturn for developers to acquire profits.

Lindberg and Kammermann (2021) also stated that the EU currently faces an oversupply of generating capacity issues which have caused financial instability within the energy sector. Similar to West Java's condition, this condition made RE development's investment climate to be unattractive.

However, in the EU, the 'RE industry' coalition strongly believes in the markets. This belief is reflected in these actors' efforts to change the market rules to create a more suitable market for renewables to develop. On the other hand, Central Java and West Java's main stakeholders are the provincial government. As the policy and decision-making process are considered more rigid, it is more difficult to alter market conditions. Supporting stakeholders are regarded as 'followers' with insignificant effects in the policy-making process.

7.2 Recommendation

7.2.1 Recommendation for future study

During the data gathering process, several interviewees stated the involvement of broader stakeholders within the RE development process. For future study, it is crucial to engage with more relevant stakeholders such as the National Energy Council which took the role of facilitator in constructing the Local Energy Plan in both provinces to acquire insights regarding each province's performances that illustrate their strengths and weaknesses. It is essential to approach other stakeholders mentioned by the interviewee to analyse further their involvement, such as the Directorate General of New and Renewable Energy and Energy Conservancy, Ministry of Environment and Forestry, more business entities, and relevant non-governmental organisations.

As this research used mainly qualitative analysis, it is essential to acquire more quantitative data. One of the challenges stated by stakeholders is the lack of literacy among the public, which caused rejection and low demand for RE-sourced energy. By collecting data on public awareness and literacy about RE through a survey, it is feasible to produce recommendations to increase the number of public awareness about the RE development process in their province based on the level of literacy in that area.

7.2.2 Recommendation for future policy

According to IESR, the delay in RE utilization in Central Java was caused by a lack of nomenclature for the RE development process. To promote RE utilization across Indonesia, the government must establish precise nomenclature for all types of RE development activities. Geothermal is now the only RE having a legitimate nomenclature. Aside from that, it is critical to develop regulations that obligate multisector to reflect more on sustainability and environmental problems. This obligation will help attract more investors as the global investment climate shifts toward a green economy. The lack of an environmental coalition is also highlighted in this study. Establishing a safe environment for an environmental-focused organisation to participate in the decision-making and policy-making processes is crucial to ensure that environmental consideration is included.

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Appendix

A. Research Timeline

No	Activities		2022																																			
			February				March				April				May					June				July				August										
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4	5						
1	RESEARCH PROPOSAL	Discuss with Supervisor																																				
2		Plan and Develop Research Ideas																																				
3		Find a theory to explain dependent variables																																				
4		Formulate Research Questions																																				
5		Determine scope of research																																				
6		Operationalize variables																																				
7		Identify method																																				
8		Write Research Proposal																																				
9		Submit Research Proposal (DRAFT)																																				
10		Revision of Research Proposal (DRAFT)																																				
11		Submit Research Proposal (FINAL)																																				
12	THESIS	Learn more about method																																				
13		Submit Ethics form (for data gathering)																																				
14		Data gathering																																				
15		Preliminary data analysis																																				
16		Data analysis																																				
17		Drafting thesis																																				
18		Create presentation																																				
19		Submit Thesis (DRAFT)																																				
20		Revision of Thesis (DRAFT)																																				
21		Submit Thesis (FINAL)																																				
22		Greenlight Meeting																																				
23		Presentation rehearsal																																				
24		Presentation and Colloquium																																				

LEGENDS	
	MEETING WITH SUPERVISOR
	RESEARCH PROPOSAL PROGRESS
	THESIS PROGRESS
	DEADLINES

B. Interviewee Consent Form

Consent Form for

"IDENTIFYING BARRIERS OF STAKEHOLDER ENGAGEMENT IN ACCELERATING RENEWABLE ENERGY IN INDONESIA BASED ON A COMPARATIVE STUDY OF WEST JAVA AND CENTRAL JAVA"

YOU WILL BE GIVEN A COPY OF THIS INFORMED CONSENT FORM

Please tick the appropriate boxes	**Yes**	**No**
Taking part in the study		
I have read and understood the study information dated xx/05/2022, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	○	○
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	○	○
I understand that taking part in the study involves audio recording using a recording device and later will be transcribed as text using software for further analysis in this research. During the Interview, some highlight points may be written in the interviewer's notes. After the research, precisely after the master's program has finished, the information will be eliminated as it no longer has any purposes.	○	○
Use of the information in the study		
I understand that information I provide will be used for research regarding stakeholder collaboration to answer this research question '*What are the barriers to stakeholder engagement in developing renewable energy at the sub-national level to support Indonesia's national targets*' The result will be in the form of a master thesis in which the researcher aims to describe the barriers to stakeholder engagement in Central Java and West Java through an analysis of the most relevant stakeholders' beliefs.	○	○
I understand that personal information collected about me that can identify me, such as [e.g., my name or where I live], will not be shared beyond the study.	○	○

I agree that my information can be quoted in research outputs.	○	○
I agree that my organization's name can be used for quotes.	○	○

Consent to be Audio/video Recorded

I agree to be audio/video recorded.	○	○

Future use and reuse of the information by others

I give permission for the Interview that I provide to be archived in [*name of data repository*] so it can be used for future research and learning. The research output can be used by everyone within the scope of University of Twente as it will only be accessible through University of Twente Library. The information will not be provided to third parties and will not be distributed beyond academic purposes.	○	○

Signatures

_____	_____	_____
Name of participant	Signature	Date

☐

For participants unable to sign their name, mark the box instead of sign

I have communicated the consent form to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

Widyatri Pusparini	_____	1 June 2022
Researcher name [printed]	Signature	Date

Study contact details for further information:

Widyatri Pusparini widyatripusparini@student.utwente.nl

Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the secretary of the Ethics Committee/domain Humanities & Social Sciences of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee-hss@utwente.nl

C. Interview Guidelines

IDENTIFYING BARRIERS OF STAKEHOLDER ENGAGEMENT IN ACCELERATING RENEWABLE ENERGY IN INDONESIA BASED ON A COMPARATIVE STUDY OF WEST JAVA AND CENTRAL JAVA

Semi-structured Interview is one of the data gathering method for this research. The Interview will take around 30-45 minutes per session. Prior to the Interview, interviewee will receive informed consent form and summary of the research proposal. If the interviewee agrees to participate in the research and being recorded through the interview session, they should sign the consent form and send it back before the session.

INTERVIEW DATA

Interview Date :

Time (start-end) :

Platform : Microsoft Teams/Zoom/Google Meeting

INTERVIEWEE DATA

Name :

Organization :

Position/Title :

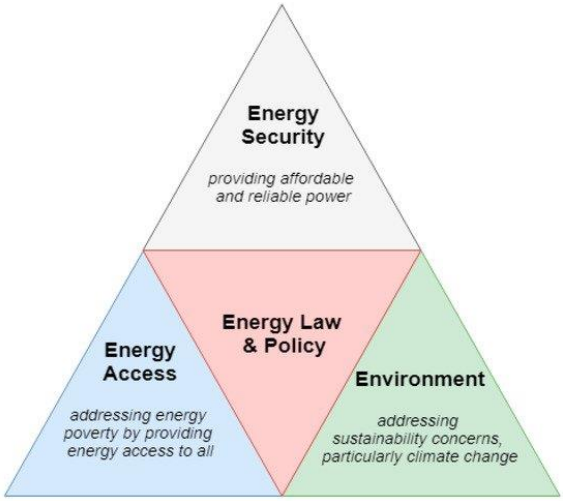
INTRODUCTION

1. Greet the candidate and introduce myself with my full name and title
2. Introduce the thesis topic in short of giving an overview of the research
3. Remind the interviewee that the session will be recorded (audio and video), and the interviewee must hand in the signed informed consent form to proceed with the session

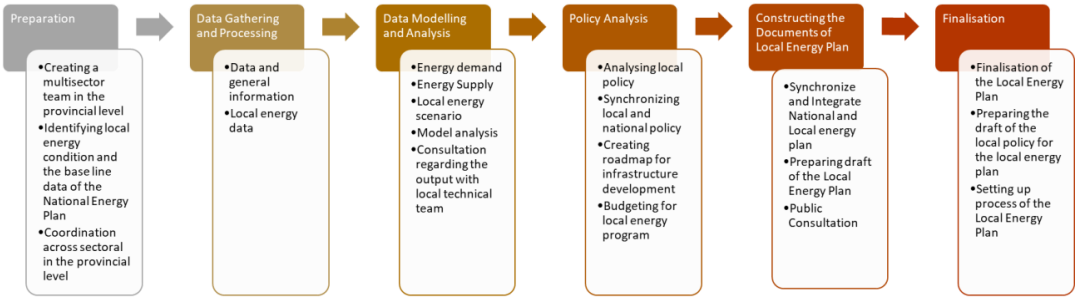
MAIN SESSION

1. Can you introduce yourself and what is your position in the organization?
2. What is your (organization) interest in renewable energy development (in your respective provinces)?
3. Based on the energy trilemma graph below, there are three aspects of energy governance which consists of energy equity (e.g., energy affordability/mitigating energy poverty), politics (e.g., energy security), and sustainability (e.g., sustainability in general and

mitigating carbon emissions in particular) (Setyowati, 2020). Which aspect is your organization most related to regarding your previously mentioned interest?



4. Based on the graph below, what is your (organization's) role in constructing a local energy plan?



5. Who are stakeholders that work closely with your organization regarding RE development (in your respective province)?
6. Who are stakeholders that you have agreement and disagreement with during activity regarding RE development (in your respective province)?
7. What is your opinion on the targets stated in the local energy plan? Is it sufficient, or is it not ambitious enough?
8. What is your opinion on the progress in achieving the target of the local energy plan?
9. From your perspective, what are the current barriers to engaging with ~~those~~ stakeholders in developing RE?

CLOSING

1. Ask the interviewee whether there is a further question regarding the research
2. Inform the interviewee regarding how the data will be utilized, analysed, and stored

3. End the session by thanking the interviewee for their participation

D. Stakeholder List

Organisation	Position	Interview Date	Code
Energy and Mineral Resources Agency of Central Java	Head of Agency	21 June 2022	Interviewee 1
Institute of Essential Services Reform (IESR)	Program Officer-Sustainable Energy Access	Answered through e-mail	Interviewee 2
PT. Jateng Petro Energi (Perseroda)	Director of Business Development	24 June 2022	Interviewee 3
PT. Dua Multi Solusindo	Director	22 June 2022	Interviewee 4
Diponegoro Univerisity	Head of Lecturer of the Electrical Engineering Department Faculty of Engineering	8 June 2022	Interviewee 5
Energy and Mineral Resources Agency of West Java	First Electrical Inspector	14 June 2022	Interviewee 6
Star Energy Geothermal	Team Manager of Community Engagement for 3 Site in West Java (Darajat, Salak, Wayang Windu)	8 June 2022	Interviewee 7

Star Energy Geothermal – Darajat Site	Coordinator for Community Engagement under department of Policy Government and Public Affair in Darajat Site	3 June 2022	Interviewee 8
Geothermal Power Plant Operator	Coordinator for Community Engagement	9 June 2022	Interviewee 9
Asosiasi Daerah Penghasil Migas dan Energi Terbarukan (ADPMET)	General Secretary	11 August 2022	Interviewee 10
PT. Perusahaan Listrik Negara (PLN)	Assistant Engineer Energy Hydro at NRE Planning and Engineering Division	1 July 2022	Interviewee 11

E. Stakeholder Relation Data

- CENTRAL JAVA

	CJEMR	**PLN**	**CJUNI**	**IESR**	CJNRE	MOEF	NEB	**PPD**	DPRD	AESI	**JPEN**	DEM	PJB	IP	MED
CJEMR		1	1	1	1	1	1	1	1	1	1	1	1	1	1
PLN	1		1	1	1	1	0	1	0	0	1	0	1	1	0
CJUNI	1	1		1	0	0	0	0	0	0	0	1	0	0	0
IESR	1	1	1		1	1	0	1	0	1	1	1	0	0	1
CJNRE	1	1	0	1		0	0	0	0	0	0	0	0	0	0
MOEF	1	1	0	1	0		0	0	0	0	0	0	0	0	0
NEB	1	0	0	0	0	0		0	0	0	0	0	0	0	0
PPD	1	1	0	1	0	0	0		0	1	0	0	1	1	0
DPRD	1	0	0	0	0	0	0	0		0	1	0	0	0	0
AESI	1	0	0	1	0	0	0	1	0		0	0	0	0	0
JPEN	1	1	0	1	0	0	0	0	1	0		0	1	1	0
DEM	1	0	1	1	0	0	0	0	0	0	0		0	0	0
PJB	0	1	0	0	0	0	0	1	0	0	0	0		1	0
IP	0	1	0	0	0	0	0	1	0	0	0	0	1		0
MED	1	0	0	0	0	0	0	0	0	0	0	0	0	0	

- WEST JAVA

	WJEMR	**GEO**	**PLN**	NGO	WJNRE	MOEF	ADPMET	IRES	NEB
WJEMR		1	1	1	1	0	1	1	1
GEO	1		1	1	1	1	0	0	0
PLN	1	1		0	1	1	0	0	1
NGO	1	1	0		0	0	0	0	0
WJNRE	1	1	1	0		0	0	0	0
MOEF	0	1	1	0	0		0	0	0
ADPMET	1	0	0	0	0	0		0	0
IRES	1	0	0	0	0	0	0		0
NEB	1	0	1	0	0	0	0	0	