Energy Transition in face of the Trilemma:

Examining Institutional Arrangement In Indonesia's Electricity Sector A Case Study of West Java Province

Tania Benita
S3353540

Environmental and
Infrastructure Planning
Faculty of Spatial Sciences
University of Groningen (RUG)

Supervisor:
dr.F.M.G. (Ferry) Van Kann

Preface

Uncertainties will always be our constant companions. However, we keep our life rolling through various processes despite all the uncertainties ahead. Working on this thesis is one of mine. I praise gratitude to the presence of Allaah SWT for His blessings and grace so I can finish the final assignment entitled "Energy Transition in the face of The Trilemma: Examining Institutional Arrangement in Indonesia's Electricity Sector. A Case Study of West Java Province". This thesis was written to fulfil one of the requirements of Master program in Environmental and Infrastructure Planning, University of Groningen. It is also marked that my period of study in this master program will be completed. For this reason, I would like to thank a handful of people who without them this thesis would not be finished in time. First of all, I would like to thank my supervisor Dr Ferry Van Kann who has guided me during my research process with positive responses and helpful feedback. I am glad that he always supports me even sometimes I was not confident with my work. Second, I am thankful for the help of all the interviewees which have responded very well and given meaningful insights for this thesis. Third, I want to thank Luthfi M. Iqbal for helping me to discuss, review, and design beautiful items in this document. I especially express my gratitude to my family and friends for their endless support and motivations. This thesis is not perfect because of several limitations and also not spared from the human lack and error. Despite that, hopefully it can provide benefits to bridge scientific theories and practice. Finally, I do not know what lies in front of me, but I look forward to play my role and contribute to the betterment of society.

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Tania Benita

Abstract

Indonesia's energy challenges are characterised by the increasing energy demand while still suffering from energy poverty. The nation also faces environmental problem from the increasing amount of GHGs. These problems have enforced the nation to change its energy system, particularly the electricity sector, which is mostly covered by conventional sources. Renewable energy (RE) pathway is widely believed to provide overarching energy solution in the future. Trends of bottom-up initiatives provide RE innovation potentials at the local level. However, the centralized mode of governing in the electricity sector still predominantly covers the electricity provision in Indonesia-shown from the national government's project of 35,000 MW. Conflicting 'energy trilemma'-energy security, climate change, and energy poverty-have contributed to the complexity in managing the transition. To address these challenges, various actors are needed to perform different capacities and work together. Managing the transition requires the arrangement of the institution to organize multiple actors with different interests. Despite a growing body of literature in the renewable energy transitions, the study is still limited to address a transition process in developing countries' setting. This study aims to examine the institutional arrangement in the electricity sector, which is affecting the transition to renewable energy in West Java Province, Indonesia. In doing so, we investigate the historical dynamics of the electricity sector, policy-related issues, and the actors' roles and perceptions towards the energy trilemma. Following these, opportunities and barriers to manage the transition are discussed. Finally, this study provides recommendations on what steps should be taken by different actors in the transition arena.

Keywords: Energy trilemma ; Transition; Institution; Indonesia

Abbreviation

A

AMDAL : Analisis Mengenai Dampak Lingkungan (Environmental Impact Assesment)

ANIEM : Algemeene Nederlandsche Indische Electriciteit Maatschappij

B

BAPPEDA : Badan Perencanaan Pembangunan Daerah (Regional Planning Agency)

BAPPENAS : Badan Perencanaan Pembangunan Nasional (National Planning Ministry)

BUMD : Badan Usaha Milik Daerah (Local-owned company)

BUMN : Badan Usaha Milik Negara (State-owned company)

C

CAS : Complex adaptive system

D

DEMR : Department of Energy and Mineral Resources

E

EBTKE : Direktorat Energi Baru dan Terbarukan dan Konservasi Energy (Directorate General of New and Renewable Energy and Energy Conservation)

G

GE : Government engagement

GHG : Greenhouse gases

GIZ : Gesellschaft für Internationale Zusammenarbeit (German Development Agency)

GTZ : Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation Agency)

GW : Giga Watt

I

IBEKA : Institut Bisnis dan Ekonomi Kerakyatan (People Centred Economic and Business Institute)

IEA : International Energy Agency

IPP : Independent power producers

IT : Information and technology

J

JICA : Japan International Cooperation Agency

Jokowi : Joko Widodo (current president of Indonesia)

K

KEN : Kebijakan Energi Nasional (National Energy Policy)

KPSBU : Koperasi Peternakan Sapi Bandung Utara (North Bandung Breeders Cooperative)

KOICA : Korea International Cooperation Agency

kVA : Kilovolt-ampere

kWh : Kilo Watt hour

M

MEMR : Ministry of Energy and Mineral Resources

MW : Mega Watt

N

NAMA : Nationally Appropriate Mitigation Actions

NGO : Non-governmental organisation

NIEM : Nederlandsche Indische Electriciteit Maatschappij

NIGM : Nederlandsche Indische Gas Maatschappij

NRE : New and renewable energy

O

OECD : Organisation for Economic Cooperation and Development

P

PIT : Program Indonesia Terang (Indonesia Bright Program)

PLN : Perusahaan Listrik Nasional (electricity state-owned company)

PLTA : Pembangit Listrik Tenaga Air (hydropower plant)

PLTB : Pembangkit Listrik Tenaga Bayu (wind power plant)

PLTMh : Pembangkit Listrik Tenaga Mikrohidro (micro hydropower plant)

PLTS : Pembangkit Listrik Tenaga Surya (solar power plant)

PV : Photovoltaic

R

RAD-GRK : Rencana Aksi Daerah Gas Rumah Kaca (Local Action Plan for Reducing Green House Gases)

RAN-GRK : Rencana Aksi Nasional Gas Rumah Kaca (National Action Plan for Reducing Green House Gases)

RE : Renewable energy

RIKEN : Rencana Induk Kebijakan Energi Nasional (Central Guidance of National Energy Policy)

RPJMD : Rencana Pembangunan Jangka Menengah Daerah (Medium-term Development Plan of West Java Province)

RTRW : Rencana Tata Ruang Wilayah (Spatial Plan)

RUED : Rencana Umum Energi Daerah (Regional Energy Plan)

RUEN : Rencana Umum Energi Nasional (National Energy Plan)

RUPTL : Rencana Umum Penyediaan Tenaga Listrik (National Electricity Plan)

S

SBY : Susilo Bambang Yudhoyono (the 6th president of Indonesia)

SD : Sustainable development

U

UNDP : United Nation Development Programme

Other

4T : Terpencil, tertinggal, terdepan, dan terluar (remote, underdeveloped, front and border areas)

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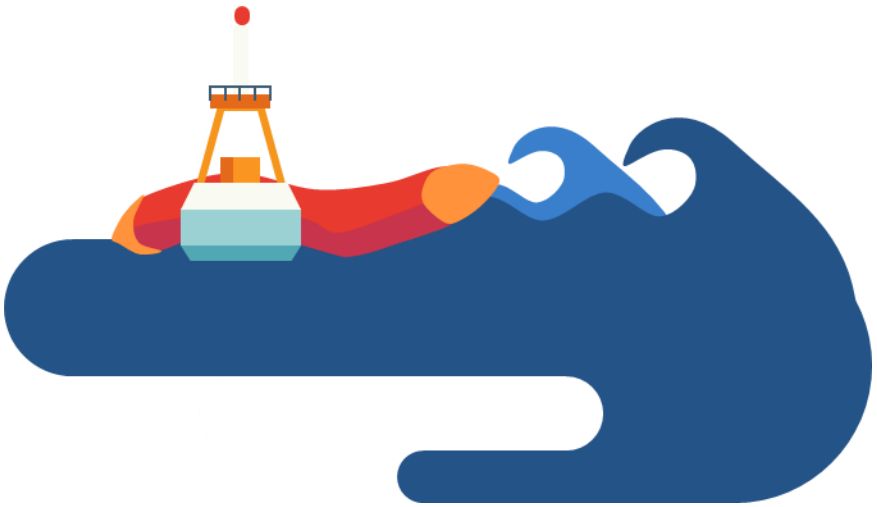
Introduction



1. Introduction

This chapter provides an introduction to the topic of this study. First, the background is described, followed by the relevance and the problem explanation to find the institutional arrangement. The next sections discuss the objectives, research question, and structure of the research report.

1.1. Background

Industrialisation and massive population growth have increasingly emerged in developing countries like Indonesia. These factors contribute to the emission of greenhouse gases (GHG), and also result in environmental degradation, health problems, and decreased agricultural production (Jupesta, et al., 2011). Still today, fossil fuels are significant resources of the nation's energy supply. The fossil fuel consumption is 61.7% of the total energy consumption (DJK, 2017). In 2017, coal is accounted for 148.3 TWh compared to the 12.8 TWh of renewable energy (including geothermal) in the electricity generation (PLN, 2017). Considering the importance to reduce emissions, the government enacted an energy diversification policy. One of the strategies is to increase the share of renewable energy. Nonetheless, the policy seems to be overlapped and conflicted with the recent electricity program of 35,000 MW that is run by the state-owned electricity company (PLN).

The national electricity plan from the current President, Jokowi, requires the 35,000 MW project to finish by 2025. The pro-cons debate has followed since the government passed several regulations to continue the project (Hendro & Sunitiyoso, 2016). Additionally, the project needs recalculation because the production is not progressing as scheduled. The country's lower economic growth than the expected plan has made the condition worse (Mietzner, 2017). Only 19,700 MW will begin to operate in 2019, from the target of 26,000 MW. While struggling to fulfil future demand, about 10.4 million households in the rural and remote places are still living without electricity (ADB, 2016). To address this problem, the national government has targeted to increase the electrification rate from 90.15% to 100% in 2025. A study from Gunningham (2013) argues that the central challenge in this setting as a complex 'energy trilemma' which involves competing-demand for energy security, climate change mitigation, and in particular, energy poverty. These aspects are conflicting in nature because each strategy to solve specific challenge will create externality to the others. Moreover, there are various actors with different roles and perceptions towards what the goals are and consequently, how to achieve those goals. These various actors involved in the energy issue imply the multi-level governance pattern.

The argument presented in this study is centred on the transition towards a renewable energy system as a pathway that can potentially bridge an 'energy trilemma'. Choosing this pathway means a region becomes a determining factor for a successful transition (Meadowcroft, Langhelle, & Ruud, 2012). It is because an energy system will move from a centralised approach and transportable resources, towards a decentralised approach and area-based resources (Narodoslawsky, 2012). Although many RE options can be large-scale and centralised (e.g., geothermal, hydropower, wind park), for fragmented and archipelagic nation like Indonesia, small-scale RE technologies become more relevant to answer its energy challenges (Blum, Wakeling, & Schmidt, 2013). This change has profound impacts on the day to day practice of regional stakeholders which involves predominant practice as the result of past choices, related policy, project implementation, actors' perceptions, and power relations.

The focus of this research is on the government and initiatives in West Java Province. The initial condition shows several initiatives have emerged to develop renewable energy power plant for the community. Self-governance, citizens' leadership, and collective action characterise these initiatives. Importantly, the innovation solutions have the potential to arise in this area. However, the current mode of governing energy, particularly for the electricity sector, is still centralistic and hierarchical. Also, the provincial government who has the responsibility to manage the regional energy system performs limited capacity to facilitate changes. To some extent, the centralised electricity system seems incapable to steer the energy challenges. Here the agenda to shift the system towards renewable energy should be equipped with 'new rules of the games'. The emphasize is on how the range of societal actors can align their agenda in this moment of transition.

Therefore, a framework based on transition theory and institutional theory was incorporated in this study to provide clarity about how the interplay between actors can be managed at the different levels.

1.2. Relevance

Following the previous explanation, transition theory structured the conceptualization of the dynamics of the energy issues in this study. While there are various approaches to transition, we incorporated transition management as an analytical approach to unravel persistent energy problems, which are manifested as the causing factors of anthropogenic climate change (Rotmans & Loorbach, 2008). A transition to renewable energy is recognized as being a crucial theme to tackle arising environmental issues. However, traditional planning and policy approaches are often constrained by local conditions (Kemp, 2010). An energy system is difficult to change, since it includes a multitude of stakeholders in a complex interrelated network, each with its own interests and power to access resources (de Boer & Zuidema, 2015). As Kemp, Loorbach, & Rotmans (2005) state, a transition from conventional sources like fossil fuels to a more sustainable energy cannot be solved using current policies. It needs what they called a restructuration of our societal systems. Most societal system changes focus on long-term strategies to penetrate renewable energy in an institutional system. However, long-term visioning also needs to be equipped with a prescriptive governance model (Loorbach, 2010). This combination does not have a place in a regular policymaking. Long-term visions on energy transition need to be linked with the policymaking process. In this sense, a new mode of institutional arrangement is crucial to influence and guide the process of transition (Rotmans & Loorbach, 2008).

Several studies have emerged in the developed countries, along with the increasing development of renewable energy power plants such as Verbong & van der Vleuten (2004) in the Netherlands; Jacobsson & Lauber (2006) in Germany; Essletzbichler (2012) in the UK; and Lucia & Ericsson (2014) in Sweden. However, investigations in the setting of developing countries remains limited. Meanwhile, many cities in the developing countries have contributed to emit a considerable amount of greenhouse gases (Jupesta, et al., 2011). If we want to achieve the worldwide climate target, developing countries should be involved to transform their energy system without compromising each of the nation's economic concerns. A knowledge gap remains in the institutional arrangement to implement renewable energy, particularly in the developing country like Indonesia. A study from Gunningham (2013) mentions the central challenge in this setting as a complex 'energy trilemma', which involves competing aspects of energy security, climate change mitigation, and in particular, energy poverty. A report from the World Energy Council (WEC) in 2017 shows that Indonesia's trilemma index has improved (from rank 85 in 2016 to 75 in 2017). The country performs better in energy security and sustainability index, but it still lags behind in energy equity. Also, the development of low carbon plants is slower than expected, which eventually remains covered by fossil fuels (WEC, 2017).

Renewable energy technology was framed to be an expensive item in developing countries (Urmee, Harries, & Schlapfer, 2009). However, recent developments and expansions have led to cheaper and more accessible technology. Within the next few years, RE technology is likely to structure most of the world's energy system. Koppenjan & Groenewegen (2005) propose that although the technological and substantive dimension is crucial, the roles and positions of various stakeholders are also crucial to be arranged to make the new system functions. To organise multi-actors as such, we need to reform the institution which governs the society. In this case study, the practice of the multi-actors towards an energy trilemma is examined to acknowledge the barriers and opportunities in the institutional arrangement.

This research elaborates on the empirical evidence of the institutional arrangement in West Java Province, Indonesia. This study focuses on how to manage the transition towards renewable energy, particularly in relation to the local initiatives. It adds insights for managing tensions between competing for demand in energy, environmental causation, and energy poverty (Gunningham, 2013). The focus is on the institutional arrangement in the planning system, including governance, policy, spatial plan, and development plan.

1.3. The struggles: finding an institutional arrangement

The decentralisation era in Indonesia has followed by the emerging trend of citizens' involvement and initiatives at the local level (Holzhacker, Wittek, & Woltjer, 2016). However, the nation's electricity sector is still predominantly ruled by a central mode of government. This condition is illustrated by the government's project of 35,000 MW electricity plan which indicates an ambitious and centralised plan. While the opportunity to change a system depends on the ability of various actors to work together and combine different management styles. However, the different perceptions and roles add complexity to manage the challenges. Every actor has their own agenda and concern that need to be aligned, otherwise it can be conflicted with one another. Changes in the institutional frameworks can be used to rearrange the actions of stakeholders.

Most of the complicated energy challenges occur due to the hardly changing institutional system and path dependency. As previously mentioned, the transition theory is used to help understand the issues, in which we combine it with the perspective from institutional theory to ground the solution in practice. Alexander (2005, p. 210) described that "planning often demands institutional design", as such institutions can be seen as weapons to planning. Institution is an ensemble of norms and rules that construct meanings in the actors' interaction (Healey, 2006). That is why she put institution to play a central role in the governance transformation. The norms and rules are not merely formally conducted by authorised organisations but also include informal structuration. However, the importance of informal institutions is often undermined because it performs invisibly. Since both formal and informal rules influence actors' roles and perceptions, they are needed to deal with a system change. Transition management will require an arrangement of an institution in such a way that could organise multiple actors with different interests. Moreover, possibility to cooperate and coordinate at the different levels would give acknowledgement about what steps could and should be taken by different actors.

This research examined the institutional arrangement in Indonesia with West Java Province as the focus study area. A regional focus was chosen because its crucial role as a main provider of renewable energy resources and to stabilize new energy systems based on location proximity (Narodoslawsky, 2012). In Indonesia, the provincial level is suitable to illustrate the transition occurring at the regional level, since the province is now responsible for managing energy and electricity sector. In-depth, this study also discusses local initiatives which are operating in the province to reflect the innovation at the local level.

1.4. Objectives

This study aims to examine an institutional arrangement in the electricity sector to manage the transition to renewable energy, particularly in West Java Province, Indonesia. The management style and power relation were analysed according to the context of this project. The analysis uncovers the multi-level governance and policy roles in this transition. The key stakeholders are national government (Ministry of Energy and Mineral Resources); national electricity company (PLN); provincial government (West Java Province); NGOs; and the local community (Kasepuhan Ciptagelar).

1.5. Research Question

Primary research question

How does the institutional arrangement in the electricity sector influence renewable energy transition in West Java Province?

Secondary research questions

1. What are the conditions to manage renewable energy transition from the theoretical perspective?
2. How does the historical dynamics of the electricity sector influence the renewable energy transition in Indonesia?
3. Who are the actors in the renewable energy transition in West Java Province?

4. How does the policy related to electricity influence the renewable energy transition in West Java Province?
5. How do the actors in national, provincial, and local level role and perception influence the renewable energy transition in West Java Province?
6. What are the barriers and opportunities to manage the renewable energy transition in West Java Province?

1.6. Structure

Chapter 1 is Introduction section which includes descriptions of research background, relevance, the problem explanation to design the institutional arrangement, objectives, research question, and the structure of this study.

Chapter 2 discusses the Theoretical Framework. This chapter examines the theoretical basis towards a conceptual model of this study. The main theory discussed are transition and institutional theory. In addition, there are also explanations of governance and power relations.

Chapter 3 explains the Methodology of this research. There are three subchapters of research design, data collection, and method of analysis.

Chapter 4 starts to explain the overview of Indonesia's electricity sector. It outlines the historical dynamic of electricity provision in Indonesia. Followed by the explanation of current constellation of electricity governance. Finally, there are several findings to conclude this chapter.

Chapter 5 discusses the primary analysis of Institutional Arrangement. This chapter will be divided on the examination of renewable energy and electricity policy, actors' role and perception, and actors' constellation. To sum up, we explain the barriers and opportunities to managing renewable energy based on previous explanation.

Chapter 6 is Conclusion which gives final remarks on this study. It includes a general conclusion, lessons, recommendations, and reflections from the research process.

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Theoretical Framework

2. Theoretical Framework

This chapter discusses the theoretical basis to establish a conceptual model of this study. It starts with a critical discussion of renewable energy transition, particularly in the electricity sector. After that, it emphasises on three concepts of transition, which are multi-stage, multi-level, and transition management. The next section gives an overview on managing transition to renewable energy in the context of Indonesia's case. In this part, the shift from government to governance, energy trilemma, and power relation are explained. Finally, the relation between concepts were drawn on the conceptual model.

2.1. Renewable energy transition in the electricity sector

2.1.1. Transition to renewable energy

Energy is an integral part of our society. It has supported our daily activities, such as operating infrastructure, reinforcing urban and regional economics, and structuring a significant portion of urban material metabolism (Monstadt, 2007). In other words, we are highly dependent on energy and its derivations. Therefore, every change will influence people's lives in multiscalar dimensions. Every turn will push and pull each other and eventually lead to unpredictable outcomes. Our society has been exploiting conventional energy sources, which have become the cause of environmental degradation. The issue of climate change has shifted the world's view to cleaner energy sources. The transition to renewable energy is one of the discourses to tackle this issue. In this sense, the 'change' is becoming the central question. How could the change occur? Where will the change bring us? How could we manage the change?

Loorbach (2007) defines transition as a non-linear process of social change. It is a complex interaction process between different actors and their institutions, which is affecting the internal and external aspects of the process (Rotmans, Kemp, & Asselt, 2001). Therefore, a process will continuously co-evolve through a trajectory towards a non-linear and uncertain outcome. The concept of a transition is at first discussed in Dutch literature and reports from the Energy Transition Program in 2001 (Rotmans, Kemp, & Asselt, 2001). Eventually, the concept has been widely used and published internationally. Transition can be seen as (i) a structural change wherein societal system operates (van der Brugge, Rotmans, & Loorbach, 2005); (ii) a long-term process for approximately 25-50 years involving co-evolution of technological, cultural, institutional, economic, and societal processes in various scale (Rotmans, Kemp, & Asselt, 2001); and (iii) different developments and events reinforcing each other during the transition process (Rotmans, Kemp, & Asselt, 2001).

Multi-stage, multi-level and transition management are the three fundamental concepts of transition theory (van der Brugge, Rotmans, & Loorbach, 2005). First, multi-stage concept approaches transition based on the view of the speed in change. It consists of pre-development phase, take-off phase, acceleration phase, and stabilisation phase (See Figure 1). In a pre-development phase, an equilibrium takes place wherein the status quo is not changed, but changes occur under the surface. A take-off phase is when the change can move the threshold, therefore, the system begins to shift. Following this is an acceleration phase, where the visible structural changes are shifting rapidly through an accumulation of social, cultural, societal, and institutional. This process is not linear and somewhat dynamic until reaching a stabilisation phase. A stabilisation phase is where the speed of change decreases and achieves a new equilibrium. However, a transition is not always reaching an optimal stabilisation phase because it could be trapped in a lock-in or lock-out situation. Second, multi-level concept divides the functional scale levels at which the transition takes place: niche, regime, and landscape level (Geels & Schot, 2007). Third, transition management explains the activities to organize multi-actor processes at different levels, with the aim of sustainability through the creation of a joint problem perception and a long-term vision (Loorbach, 2010).

The question of interest in this research is how the concept of energy transition is applied to a case of electricity sector in developing countries like Indonesia. The ambition to shift to renewable energy can be seen to be massively encouraged in the electricity sector. It is because the sector is also the one with high-paced development and remarkable surge in demand. Also, the electricity sector contributes to the strategy

of transforming the energy system through different by-products in the power plant projects, such as wind, solar, biogas, micro-hydro, tidal, and geothermal energies.

2.1.2. Electricity sector: shifting to renewable energy

Electricity sector is characterised by high economic value and reliable supply. Verbong and van der Vleuten (2004) address this expectation as a vulnerability paradox, which is caused by the increasing dependency on stable networks. Our society is built upon networks, in spite of the risks of mal-functioning will continue to exist. Traditionally, an electricity sector also exhibits a 'natural monopoly' characteristic in which the product is subjected to the government as a central authority to ensure the provision of public services (Joskow, 1998). However, the emergence of economic liberalization and globalisation has resulted in the changing form of electricity industries. The investment in the electricity generation has widely shifted to private firms or state-owned electricity company. Although it may be considered as a shift, the monopoly character of the electricity sector seems to remain unchanged. Now, the electricity companies are the new mode of monopoly. Joskow (1998) argues that a structural change in an electricity sector occurred to foster the competition and the generating segment of the industry. Until ten years after, the trend is followed by the rise of electricity service industries and diversification of businesses like 'ecopreneurs' (Monstadt, 2007).

Modern economies depend on reliable and affordable electricity since most of the economic activities are using electricity from a simple use of lighting until a heavy one from industries. In 2013, fossil fuels accounted for 81.6% of the energy production worldwide (IEA, 2015). Asia contributed 30% of the global production in the same year, taking over the OECD countries which were at 29.2%. Additionally, energy production in Asia was showing the increasing trends of 5.6% annually compared to OECD with only 2.8%. Implementation of renewable energy in an electricity sector is crucial to impose a radical change given the significant dependencies and the emerging investment trend. In 2016, electricity sector edged ahead of the oil and gas sector to become the largest recipient of energy investment (IEA, 2017). The electricity market is expected to be more attractive in the future considering the development of technologies that rely on electricity like electric vehicles. Thus, the electricity sector becomes more relevant than ever in the energy transition process. Despite the importance, many hurdles await because of a radical change in renewable energy requires both structural and spatial changes (de Boer & Zuidema, 2015).

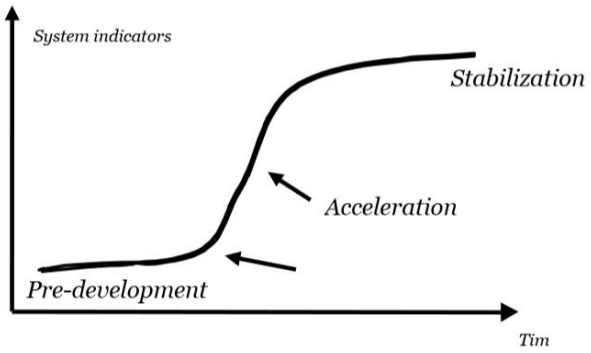
As de Boer and Zuidema (2015) explain that local, regional, and societal interests are becoming more crucial to be taken into account, the (supra) national authority top-down rules alone cannot be adapted to the local context. It means that there is a need to balance the structure of the network from a centralised and top-down fashioned to be more sensitive to local aspects. A spatial setting in the field of renewable energy also becomes apparent due to the required space for the power plants. Renewable energy transition is changing a hidden and a profoundly connected system to be apparent and scattered. Considering these multiple aspects, a shift to a new system will interact in a complex manner. Therefore, using a transition concept may help to nudge a change by working on the multi-stage, multi-level, and transition management.

2.2. Multi-stage, multi-level, and transition management

2.2.1. Multi-stage concept

The process of transition can be explained using an S-curve (See Figure 1), in which the pre-development, acceleration, and stabilisation phases take place. Although in practice it is not as simple as the curve, it gives a simplified illustration about how the process occurs. A slow and stable equilibrium is located at the pre-development phase. It is followed by a period of change between two stable equilibriums. In this period of change—called the acceleration phase—there will be a quick and unstable transformation. A system shift is undergoing irreversible change and re-organising itself towards a new equilibrium. However, when there is an incompatibility during the process, a transition could also experience a period of lock-in or lock-out. Therefore, it will not reach the mature level.

Figure 1. S-curve of transition



Source: van der Brugge et al., 2005

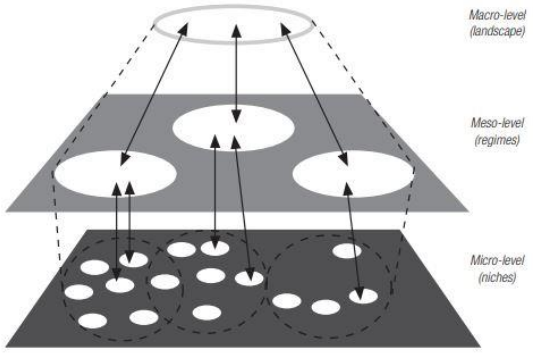
The stage of lock-in or lock-out can be explained by the concept of path dependence, that the structure and function are affected by previous decisions in the past. It is also because materialized infrastructures make it difficult for the system to change. Sorensen (2015) addresses that timing is crucial in the development of public utilities, which can be seen from the institutions that embody previous political logic. Van der Brugge et al. (2005) explain three concepts to acknowledge the transition pattern and stage by recognising causal patterns of (i) temporal dynamics, (ii) success and failure factors, and (iii) governance patterns. The historical analysis in this study makes effort to explain the transition patterns and current stage in Indonesia's electricity sector in two terms: explaining the historical development of electricity institution and examining the success and failure factors following the decisions made in the past.

2.2.2. Multi-level governance

Multi-level framework explains the system change at the landscape, regime, and niche level (Geels and Schot, 2007; Kemp et al., 2007; Van der Brugge et al., 2005). At the landscape level, the system corresponds to slow and broad societal dynamics. This level comprises conglomerates of institutions and organisations, e.g., a nation or federation of states. Meanwhile, the regime-level comprises networks, communities, and organisations. The landscape and niche levels are influenced by the change at the regime level. At the niche level, individuals, organisations, and innovations take place. It comprises variations from conventional practices occur including social practice, environmental movement, or alternative technology (Rotmans, Kemp, & Asselt, 2001).

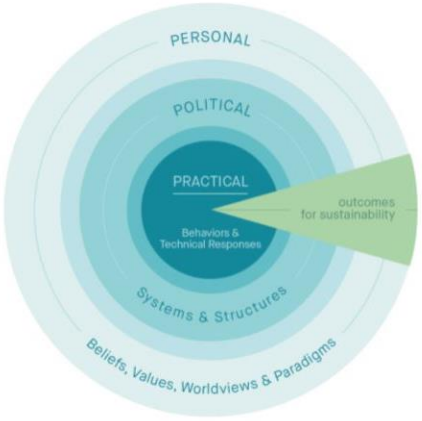
Although there is a division between levels, in real life, relationships between different actors are blurred and they overlapped with each other (Loorbach, 2007). In essence, the multi-level spheres are embedded, incorporated and they influenced each other. Loorbach (2007) refers to Geels (2000) to illustrate the positioning of the analytical level from these spheres. Here the regime level is a dominant structure to influence the other spheres (Figure 2). Another study from O'Brien and Sygna (2013) would seem to suggest a different way to position the spheres. Besides the up and down stages, they illustrate the influence as inside-out and outside-in (Figure 3). It means that the personal sphere or worldviews are wider than the other two. The personal sphere consists of individual and collective beliefs and values that shape the ways of how the systems and structures are viewed (i.e., the political sphere) and influence what types of solutions (e.g., the practical sphere) are considered possible. While the practical sphere is located at the core, where the targets or goals are located. The practical sphere represents both behaviours and technical solutions to climate change. These include behavioural changes, social and technological innovations and institutional and managerial reforms. The political sphere represents the enabling and disabling conditions. It includes the social and ecological systems and structures that shape the conditions for transformations in the practical sphere.

Figure 2. The multi-level spheres



Source: Loorbach (2007)

Figure 3. The three spheres of transformation



Source: O'Brien & Sygna (2013)

The transformations within each of the spheres can facilitate changes in the others, although some interventions are more impactful than others (O'Brien & Sygna, 2013). Their study does not emphasize that the regime or political levels are always dominant. For instance, a hidden intervention at the niche level can immerse and invoke innovative technology. Niche practices have proven to resonate with widespread public concerns rather than mainstream technological solutions that are tied firmly to a particular solution (Seyfang & Smith, 2007). They argue that a niche-based approach requires a mature policy style.

In this study, we arrange the order of the three spheres based on the literatures which we previously mentioned and align those with the context of West Java Province (Table 1). At the landscape level which predominantly influence the macro condition, there are the national government and PLN. They represent changes and interventions through national point of view and central decision-making. While the dominant practice in the regime is represented by the provincial government and large-scale corporations. Although we could also argue that the national government also plays strongly in influencing the decision-making proces at the regime level. Lastly, individual and citizen initiatives, SMEs, NGOs, and research groups are placed at the niche level. They are inducing changes under the thresholds.

Table 1. Multi-level sphere in transition

Multi-level sphere in Transition	*Landscape*	*Regime*	*Niche*
Definition	Societal landscape which forms an exogenous environment	Networks, communities and organisations, also their alignment of activities	Individual actors, alternative technologies, and local practices operate
Influence	Determined by changes in the macroeconomy, politics, population dynamics, natural environment, cultural, and worldviews	Determined by the regimes dominant practices, rules and shared assumptions, social norms, interests, rules and belief systems	Innovation, variations, and may also deviations from status quo, such as new techniques, alternative technologies, and social practices
Actors **(adjusted to the condition in West Java Province, Indonesia)**	The national government, the state-owned company (PLN)	The provincial government, regional-scale PLN, large businesses and private sectors	Individual, citizens initiatives, small medium enterprises (SMEs), research groups

Source: Adapted from Geels and Schot, 2007; Kemp et al., 2007; Van der Brugge et al., 2005

In the field of renewable energy, the constellation of actors based on the time of involvement could be classified into two types:

(i) Incumbent actors which include the stakeholders that involve in energy for a long-time, often resistance to change, inhibit characteristics of formal, traditional, and hierarchical. For instance, national government, regional government, and state-owned company;

(ii) Emerging actors which include stakeholders who rise during the process of transition to renewable energy. They may also influence the emergence of energy service sectors. The organisations' forms and specifications can vary following the diversification of services including small businesses, eco-entrepreneurs, NGOs, and citizens' initiatives. For the analysis in this study, actors are derived from the classification in Table 1, with at least one representative for every sphere is becoming the sources.

2.2.3. Transition management

Transition management is an analytical approach to unravel the persistent problems, such as energy problems (Rotmans & Loorbach, 2008). The term persistent problem is described as a higher degree problem than 'wicked problem' since it is influenced by broader aspects (Rotmans & Loorbach, 2009). Rittel & Webber (1973) come up with the concept of wicked problems as ill-structured problems, highly uncertain physical processes and dealing with complex societal interactions. Energy problems are considered as persistent problems because they are not only highly uncertain in the process, but also involving complex structure and societal institutions change.

Loorbach (2010) classifies governance in the multi-level framework based on the type of management styles namely strategic, tactical, operational, and reflexive styles (See Table 2). These four styles are used further to define the capacities of stakeholders from the multi-level governance framework. Actors' activities in practice are assessed and evaluated in the analysis as the determining factors. The central principle is not all the activities need to be performed by each actor, but all relevant actors need to perform the capacities simultaneously and collaboratively.

a. Strategic planning

Strategic planning is where the development of vision occurs. Vision in a transition is crucial to guide the process because of the long-term dimension of time. This process also includes strategic discussion, long-term goal formulation, collective goal and norm-setting, and long-term anticipation. The activities focus on the institutionalised process and are dealing with the culture of society as a whole. Considering the range of activities, we argue that, in this case, the national government is a predominant actor in shaping the strategic planning.

b. Tactical planning

Tactical planning is a steering activity which relates to a primary structure (regime) of a societal system. This management style is an interest-driven activity. It includes all established patterns and structures such as rules and regulation, institution, organisation and network, infrastructure, and routines. In other words, it is where the daily activities of almost all types of stakeholders take place. It is also related to developing the program, financial and institutional frameworks. At this level alone, the institutional fragmentation has the highest possibility to occur. The pattern of fragmentation can be intra-organisation and inter-organisation. For example, fragmentation occurs when a government sector has limited networking mechanism with other sectors then result in separated decision-making and conflicted projects.

c. Operational activities

These activities have a short-term horizon and are often carried out in the context of innovation projects and programs in business, industry, or civil society. This management style is mainly activated by individual ambitions, entrepreneurial skills, or promising innovations. Operational activities also include routines of organization for example in implementing projects of renewable energy plants or innovating new technology. The process of innovation is often explained as a random and emergent process, therefore, it rarely influences a change in a wider societal system except by chances.

d. Reflexive activities

Reflexive activities can be found in every management style as it relates to monitoring, assessment, and evaluation of an ongoing process. Also, actors can do a learning process as a form of reflexivity. These activities take place within existing institutions and are socially embedded in society. The evaluation may also come from outside parties like the media and internet. However, the meaning of reflexivity and the range it covers can be too wide. Thus, this activity is prone to be undermined because of its flexibility to be placed in other management styles. Meanwhile, it is crucial to integrate and anticipate unforeseen transition dynamics. It should be underlined that reflexive activities need to be explicitly determined in the process to avoid the indifference of such process.

Table 2. Classification of management styles in the multi-level framework

Type	Focus	Problem Scope	Time Scale	Level of Activities	Activities in practice
Strategic	Culture	Abstract	Long range (30 years)	System	Problem structuring, envisioning, and the establishment of the transition arena
Tactical	Structure	Institution	Mid-range (5-15 years)	Sub-system	Developing coalitions, images, and transition agendas
Operational	Practices	Concrete	Short range (0-5 years)	Concrete	Mobilizing actors, executing projects, and experiments

Reflexive	Evaluating, monitoring, and learning

Source: Loorbach, 2010

Transition management is based on a long-term vision for formulating short-term objectives and evaluating existing policy (Rotmans & Loorbach, 2008). Most countries are focusing on long-term strategies to penetrate renewable energy in each of their nation's systems. However, not all these approaches have been successful (Wüstenhagen, Wolsink, & Bürer, 2007). Small logical steps are needed to be arranged within the long-term horizon to arrive at the desired change. Kemp, Loorbach, and Rotmans (2005) state that the transition from conventional sources like fossil fuels to sustainable energy sources cannot be solved using current policies. It needs what they called as restructuration of societal systems.

Based on previous studies on transition management, several general principles are used in the analysis:

a. Transition concept highlights how over time, a complex interaction between multi-level actors can lead to a nonlinear change in a seemingly stable regime (Loorbach, 2010). Rotmans et al. (2001) call it as a transition path, a process of gradual development. In this sense, tracking historical dynamics will be relevant to understand how change occurs and opportunity to learn from various occasions happened in the past.

b. In transition management, various societal actors (governments, experts, businesses, NGOs, and intermediary organisations) potentially shape formal and informal networks because they have overlapping interests (Loorbach, 2010).

c. Transition management should be seen as a complementary approach to current policy rather than conflicting with long-term strategies enacted by the regime (Rotmans, Kemp, & Asselt, 2001). Also, transition management uses and highlights unspotted opportunities from the institutional arrangement.

Finally, understanding these three aspects—**historical dynamics, multi-level actors, and policy framework**—can help to frame the analysis and unravel opportunities in the institutional arrangement.

2.3. Managing renewable energy transition in Indonesia

2.3.1. Institutional arrangement

Renewable energy provisions, services, and outcomes are influenced by the actors' interaction (Koppenjan & Groenewegen, 2005). Institution is crucial for organising and functioning the instrumental roles that should be fulfilled by these actors to manage a transition. Thus, there is a need to design institutions to induce greater productivity of the actors' actions. Combining transition and institutional perspectives help us to design the framework. We positioned transition theory in the broader concept to understand the dynamics and institutional theory to acknowledge principles in designing the rules of the games which structure actions.

There are two types of institution, formal and informal. Formal institution is the one that state officials produce to manage and rule (Healey, 2006). Meanwhile, an informal institution is shaped by rules, norms, values that are perceived and believed by the members of organisation although it is not officially enacted. In a transition analysis, focuses are often taken on a formal institution, although an informal institution is also played strongly to shape the process. An informal institution can give acknowledgement about actors' perceptions and roles in a real practice, particularly non-state actors who usually do not institutionalise the way they work. Taking this into consideration is important since the seeds of changes are easier to strive in informal settings. In the context of Indonesia, for instance, the government may not be the source of innovation due to the rigid and bureaucratic tradition, while the community in the local scale is more flexible to innovate. In this sense, an independent community act potentially becomes a critical juncture to a robust bottom-up initiative.

Indisputable challenges come from a specific institutional situation that needs "a crack on the power relation and evolve different processes" (Healey, 1996a, p.223). Alexander (2005) supports this statement that 'reflexive consciousness' needs to be considered to prompt the best possible institutional arrangement. Here, an optimal process of decision-making always needs to adapt to the current condition. González and Healey (2005) consider that such a framework could open opportunities to adapt by optimising cultural background and strategic interactions. The multiplicity of issues in a transition illustrate that it is not only influenced by formal state actors but also included a wide range of relevant actors, in which explained by a shift from government to governance.

In relation with the component of transition management, the layer of actors can be seen as the key players and the transition arenas as the institutional sites (Healey, 2006). Alexander (2005) describes three layers of institutional design, namely governance, coordination, and agency. Inspired by these aspects, this study incorporates the interrelated components of multi-level governance, management styles, and power relations between actors (See Figure 6).

2.3.2. From government to governance

The shift from government to governance is widely discussed in international publications, following the rise of new public management, corporate governance, and self-organising network (Marks et al., 1996; Rhodes, 1996; Monstadt, 2007; Jordan, 2008). Governance is a pattern resulted from governing activities, which also include non-state actors such as private parties, citizens initiatives and non-governmental organisation (Kooiman, 1993). Pierre & Peters (2000) explain that governance has been believed to 'cover the whole range of institutions and relationships involved in the process of governing'. Rhodes (1996) argues that governance 'has too many meanings to be useful'. Therefore, he comes with the stipulative definition of governance as 'self-organising, inter-organisational network'.

Marks et al. (1996) explain further that the shift brings out two different views of society-centric and state-centric. A socio-centric point of view is mainly defining the roles in producing and managing public aspect has shifted to the hand of society, private actors and initiatives. This argument is supported by an author like Rhodes (1996) who emphasises 'hollowing out the state' phenomena in the case of the British government. While the next, a state-centric view, is trying to embrace the importance of the government as a key and political actor who can provide accountability in this era of change. For instance, Monstadt (2007) in his study concludes that the discharge of public duties has proven premature and wrong because of the need to ensure equality and accountability in the development process.

Jordan (2008) addresses that the contribution of governance literature is either normative prescription or empirical phenomenon, or some combinations of two. In transition perspective, governance can be seen as the normative orders which are the 'arrival' of long-term formulation and how to manage the on-going process towards the goal (Meadowcroft, 2009). He argues that there is still considerable ambiguity about the desired transition's character. Here instititutional perspective helps to understand governance through an assessment (empirical) of organizational and structuration of the rules of the games. As Alexander (2005) mentions that institutional perspective aspires to make decision-makers aware of the importance of institution in planning practice. Eventuallu, an energy transition is contextual and empirical phenomenon which needs to include power and politics as shaping factors in its institutional environment.

In developing countries context, the emergence of governance has not been profoundly explained. The idea of 'good governance' which is stipulated by the World Bank is maybe the one that widely applied in the developing countries. The concept is about the exercise of the transnational power to shape its lending policy (Rhodes, 1996). Three strands in good governance are: systemic, political, and administrative. In short, Rhodes (1996, p. 656) explains the concept of good governance 'marries the new public management to the advocacy of liberal democracy'.

In the case of Indonesia, a shifting trend can be explained by the decentralisation of power from the authoritarian centralised to the regional autonomy state. The year 2018 is the 115 birthdays of Regional Autonomy in Indonesia. It was first started in 1903 with the Staatsblaad regulating Decentralisatie-wet. Until it dates under the regulation of Law Number 23 of 2014 on Regional Government. The era of Liberal

Democracy was recalled in the era of Guided Democracy. Thus, the authority has changed from limited autonomy to widespread autonomy. In 1999, the "Decentralization-Boom" is finally exploded under the regulation of Law No. 22 of 1999. Currently, the Local Government's roles are strengthened by the Law No. 32 the Year 2004 on Regional Government.

This decentralisation era was followed by the rise of non-state actors in many sectors like road development, telecommunication, and IT industry (Asian Trends Monitoring, 2005). However, the energy sector has remained centralised. It is mainly because the country wants to stay accountable for exporting natural gas and coal reserves (IEA, 2008). In the electricity sector, PLN (the state-owned electricity company) is required to keep the price well below that the market would strive (Gunningham, 2013). PLN is also in the central control of production, transmission, and distribution of electricity in the whole country. It becomes a problem considering one single national body controls such a large and fragmented area. Also, applying renewable energy which requires land, natural resources, and other local aspects becomes inevitable challenges for this centralised arrangement.

Notwithstanding, the government has made efforts to improve service delivery through the involvement of non-state actors. Since 2009, the government has allowed independent power producers (IPP) to produce electricity and sell it to PLN for distribution. The regulation also allows rural community cooperatives to generate and distribute electricity independently. These schemes are designed to address the energy poverty in rural areas. However, the pressing problems of energy poverty remain a challenge with 10.4 million households are still living without electricity (ADB, 2016). Another challenge is to solve environmental issues of greenhouse gases and to decrease the dependency on oils. To address this challenge, the MEMR sets the target of 23% share of renewable energy in 2025. It seems still far to achieve the target, from the current realisation of 12.52% (MEMR, 2018)

In terms of coordination, energy transition in Indonesia's case indicates the overlapping targets. Consequently, various stakeholders with different objectives involve and shape the transition process, making it complicated to manage. Duit & Galaz (2008) portray this complex system behaviour as complex adaptive system (CAS) properties embedded in the governance system. They argue that the combination of various governances systems can influence the impact of surprises that will happen in the future.

2.3.3. Optimizing governance network in Indonesia's context

Governance, as explained in previous part, is not a fixed entity. Therefore, a combination of various systems which gives impact in the whole transition process. In other words, a network will influence the behaviour of a system. In the context of developing countries like Indonesia, Gunningham (2013) defines three central challenges called the 'energy trilemma': demand of energy security, climate change mitigation, and energy poverty. The last one is specifically happening in developing countries. Given these three contradicting priorities, it is crucial to consider the activities or performed capacities of the actors within the network to address each of them. Considering the different situation with developed countries, the framework used in this study tries to explore a renewable energy transition as an effort to answer these three significant challenges. Therefore, it is important to underline that renewable energy can potentially provide an overarching solution for these three challenges. Without the overarching solution, there are possible externalities occurring between objectives. For example, climate change objective can conflict with energy poverty objective if the solution to energy poverty is diesel power plant. Making the use of small scale RE power plant explicit to address both challenges can potentially ensure the externalities are mitigated and integrate different actors' agenda. Using the multi-level framework of Strategic, Tactical, Operational, and Reflexive, different management styles are classified to ensure how different actors employ their capacities to manage the three trilemmas. As Gunningham (2013) explains, the trilemma cannot be solved entirely but can be managed by overcoming the practical obstacles. Activities and capacities related to overcome the practical obstacles are listed in Table 3.

a. Energy security

Energy security has a context-dependent definition that covers the critical issues in a country, making it deal with different dimensions (Ang, Choong, & Ng, 2015). In Indonesia's case, the availability of resources,

infrastructure, and energy efficiency seems to be the central themes. Gunningham (2013) implies the importance of resources in Indonesia by explaining the shift from an oil exporter to a net importer in 2006. It has been proven that the natural resources could be depleted one day. The nation's transition to alternative resources will be difficult since the electricity network was already built when the oil price is low and plentiful. Thus, the system still depends heavily on the oil resources. He also mentions that the case of energy security is also influenced by the geopolitical factors, as the demand growth may threaten non-OPEC oil supply for the future. Energy security factor is about how the nation could fulfil its demand and sovereign in the upcoming decades. Despite of diversifying the energy resources to reduce the independency towards conventional sources, the nation also needs to plan for increasing demand in the future because of massive population growth.

b. Climate change mitigation

Indonesia is severe to climate change impact considering its archipelagic characteristic (Colenbrander, Gouldson, Sudmant, & Papargyropoulou, 2015). Hughes (2005) also argues that population growth is one of the leading challenges in the future environmental issues. Massive population growth will be the most potent engine in destructing the environment with fewer corrective measures. In Indonesia, we can witness the development of industries, housings, and other urbanised activities due to enormous population. These developments have contributed to emit greenhouse gases (GHGs). Regardless of the growth issues, Indonesia is one of the first developing countries that enacted its commitment to reduce GHG emission (Turner, 2011). This commitment seems to be conflicting with the electricity plan of 35,000 MW that has been projected to use mostly coal and diesel. If this plan continues, it means that fulfilling energy demand will substantially raise emissions. To ensure the GHG reduction target is achieved, the environmental objectives need to be integrated with other objectives and given principle priority (Lafferty & Hovden, 2003). The prioritization is crucial to the environmental objective, so it will not be seen as peripheral to other objectives.

c. Energy poverty

Energy poverty can be defined as a lack of affordable electricity access, clean cooking facilities, or other modern energy services at the households' level (Gunningham, 2013). This condition is typically found in developing countries. Thus, increasing electrification rates in many rural and isolated areas have been a long-term agenda for the government. In Indonesia, this agenda is still challenging to achieve. One of the many reasons is the fragmented geographical location that makes it hard to reach. Moreover, the power project of 35,000 MW cannot be seen as a solution to this problem. If the project is truly aiming to increase the access to electricity, from the current electrification ratio of 90 percent to 97 percent, the development plan shows the contrary (Hendro & Sunitiyoso, 2016). Only 3.5 percent of the project is built in non-electrified areas, while the rest remain centred in Java, Bali, and Sumatera.

Here we argue that energy poverty also means there is a lack of deliberative and democratic process in an energy sector. First, it is indicated by the decision-making which takes place behind 'a closed door'. The local people are not engaged to decide, for instance, whether they want a large geothermal power plant to be built under their community forest or solar rooftops for powering their houses. The government is still central to decide what is best for the community. Second, the local people are not well informed on how to use energy resources wisely and make the existence of energy improving their quality of life. It should be a critical aspect that the decision-makers think through. For a local community who never has access to electricity for their whole life, it should be connected to their needs. To ensure the energy resources as a course of fair accessibility, the decision-makers should establish and maintain intangible social benefits, which includes social opportunities, knowledge and technological development, and energy related jobs (Brugger, 2016). Oftentimes, the decision-makers are too busy to raise the electrification ratio rather than taking steps beyond towards positive impacts. However, these problems should not limit the will to change, instead, as critical considerations to reflect that we are still in the path to answer the real challenges.

Table 3. Management styles to overcome energy trilemma

Transition Management (Loorbach, 2010)	Energy Trilemma (Gunningham, 2013)			
	Activities	Energy security	Climate change	Energy poverty
Strategic	Problem structuring, envisioning, and the establishment of the transition arena	Structuring the target of power projects, developing a procurement plan	Creating the target of GHG reduction	Structuring the target of electrification in the rural and isolated areas
Tactical	Developing coalitions, images, and transition agendas	Creating coalitions of public and private sectors to achieve the target, publication of procurement	Creating coalitions of national, regional, and local government, collaborate with R&D group, developing a strategy to achieve the target	Creating coalitions with local initiatives, structuring strategy to achieve the target
Operational	Mobilizing actors, executing projects, and experiments	Implementing the plan, network structuring	Implementing the plan, research and development	Implementing the project, creating incentives and mechanisms to collaborate, developing a flexible administrative mechanism, facilitating local community
Reflexive	Evaluating, monitoring, and learning	Evaluating and monitoring	Evaluating, monitoring, and learning	Evaluating, monitoring, learning, and adapting to the local condition

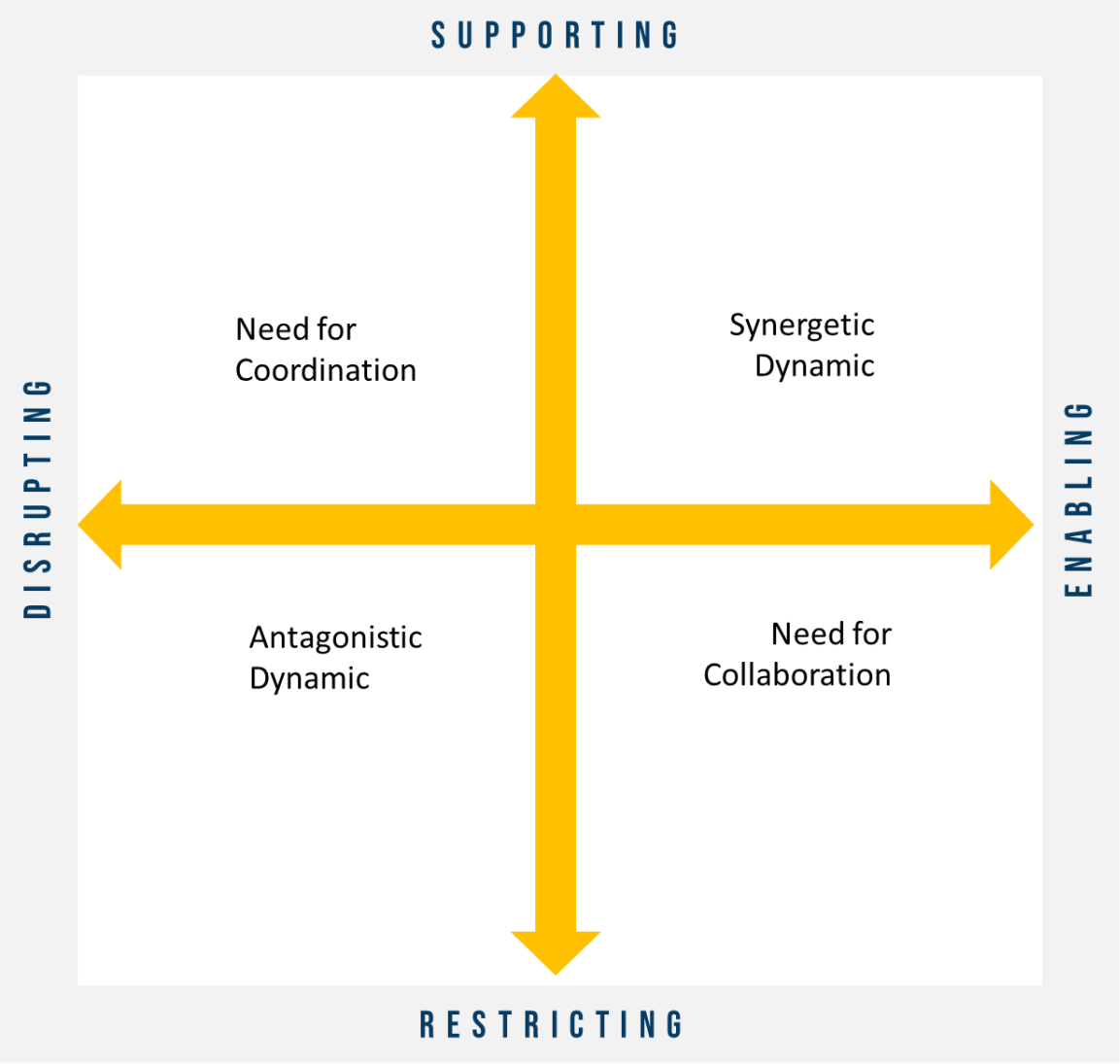
The actors within a network will have different capacities to nudge a transition. It is essential to acknowledge which capacities to buffer and amplify the system when undergoing a disturbance (Duit & Galaz, 2008). When actors are agglomerated in a transition arena, they perpetuate power to ensure their objectives are being met. In this study, these dynamics are explored through the analysis of power relations between actors.

2.3.4. Exploring power relations

Meadowcroft (2009) describes one of the crucial commendations of transition management as to propose an alternative for an established governance framework. He also outlines that this proposition is optimistic to change the dominant regime but neglect the power and political dimension embedded in the transition process. Further, Flyvbjerg (2003) proposes a critical discussion that power tends to attain knowledge and

rationality. Thus, its presence is very close to the actors' daily activities. Avelino (2011) conceptualizes a power framework for an empirical analysis in a transition process. This framework can help to translate power as an abstract idea to apply power in the study of prescriptive transition management. This study focuses on power analysis as a tool to look for an optimal institutional arrangement. How the power dynamics interact in the empirical case can be classified as (i) synergetic dynamics, different types of power that enable and support one another and (ii) antagonistic dynamic, different types of power disrupt and restrict one another (Figure 4).

Figure 4. Power analysis framework



a. Synergetic dynamics

Synergetic relation means the power exercised by one party to enable and support other parties' efforts (Avelino, 2011). We distinguish between two types of synergy: enabling and supporting activities (Table 4). Enabling activities are directly affecting the project by providing starting condition like network structuration and initiate the funding (Bakker, Denters, Vrielink, & Klok, 2012). Direct impacts can be found when an action occurs at the same time and the same place as the activity, thus, they can be causally linked. Supporting activities intervene indirectly by providing facilitation and helping communities to achieve their goals. Indirect impacts occur either later or in a different area of the activity.

In an energy transition, the dynamics can occur in strategic, tactical, and operational activities with different forms. At the strategic level, the dynamics take place in a coalition of forerunners that develop visions. This initiation needs to involve stakeholders with different ways of viewing problems through deliberation and democratic process (Huitema, Lebel, & Meijerink, 2011). In the tactical activities, different parties whose activities overlap in a specific area should collaborate to design the implementation. Here, different parties should recognise that they have different capacities to be able to support the different side of the projects. For instance, the government can help the administrative and permit process and NGOs can contribute in mobilising the community. At the operational level, implementation process should involve local communities. This involvement needs to be facilitated by different parties, while also to ensure the independence of a community to make it sustainable.

b. Antagonistic dynamics

As opposed to synergetic, antagonistic relation implies the conflicting interests among stakeholders. A conflict may result from disrupting or restricting the behaviour of one party (Table 4). An antagonistic relation likely occurs in such a way that one party resists the power exercised by the other actors (Avelino, 2011). At the strategic and tactical level, a decision-making process tends to exclude the affected stakeholders. Therefore, it may be top-down and has limited sensitivity to a local condition. A competitive power could be 'hidden' behind a consensus building. This consensus merely includes government sector or several dominant parties. In the operational activities, a conflict is happening when the government's project overlapped with community activities at the local level. In this sense, an arrangement designed at the higher level seems to disempower other parties at the local level. As opposed to enabling, disrupting activities infuriate the local projects, for example, by making powerplant project that disrupts local renewable initiative. Meanwhile, restricting activities can be seen as indirectly influencing the local communities through administrative or bureaucratic requirements (Bakker, Denters, Vrielink, & Klok, 2012).

Table 4. Difference between power actions

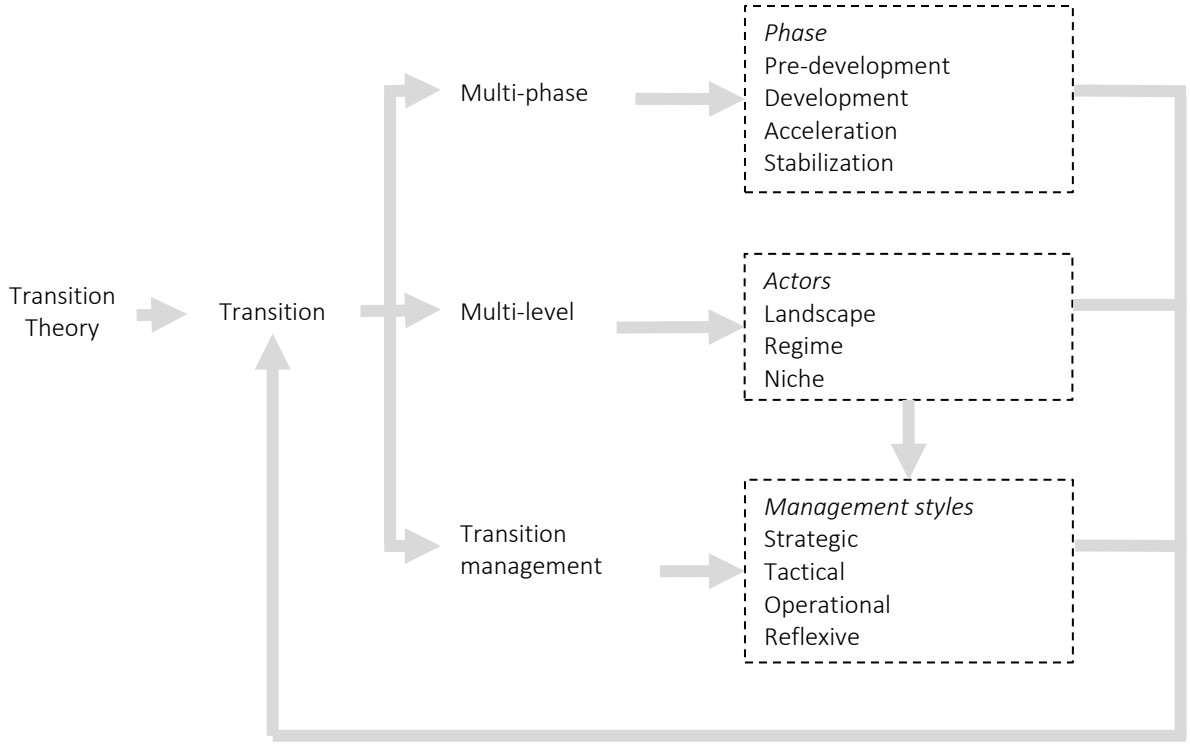
	Enabling-Disrupting	Supporting-Restricting
Approach	Direct	Indirect
Effect	Straightforward	Diffuse
Dominant management style	Strategic	Tactical/operational
Dominant actor	Landscape to regime	Regime to niche

2.4. Conceptual model

In the previous sections several concepts have been reflected on:

- Multi-phase. Analysing the phase of transition can indicate the position of the changing system. Also, it is crucial to define conditions that is prone to the lock-in and lock-out situations.
- Multi-level governance. This study incorporates the stakeholders based on the landscape, regime, and niche framework (Table 1).
- Transition management. The activities in practice reflected from the framework of strategic, tactical, operational, and reflexive (Table 2). This framework is used in this study to assess the policy frameworks and actors' management styles to answer the energy trilemma (Table 3).
- Power relations are analysed based on the power actions between actors. After that, the barriers and opportunities from multi-level governance and policies are grouped based on the analysis. Barriers can be found when the activities perform antagonistic dynamics while opportunities can be found when the activities perform synergetic dynamics.

Figure 5. Transition concept

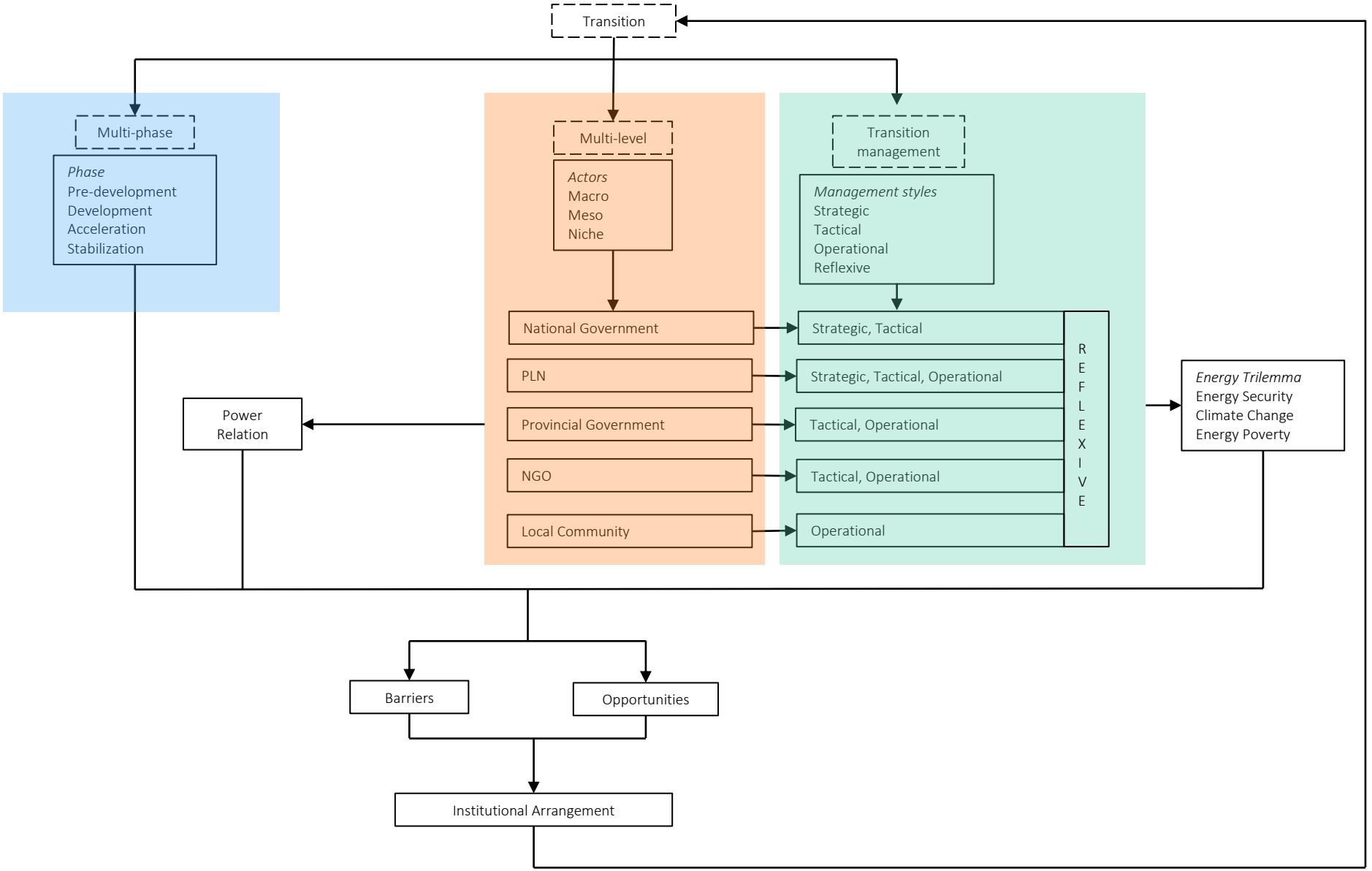


Transition theory is used as an underlying theory in this study (See Figure 3). What is crucial in a transition is that it is not enough to work only on a long-term vision (the end in mind), because we need short term goals to create the path towards the vision. In a practical view, the products of an institutional design (plans, programs, or projects) need to be connected to the transition goals. The transition concept helps us to specify what to consider in achieving the goals, which consist of the following: multiphase, multilevel, and transition management. Multi-phase concept explains the dynamics of a transition process. Multi-level actors are dependent variable to the four management styles (strategic, tactical, operational, and reflexive). The actors—national, provincial, and local—are framed in the three classifications of landscape, regime, and niche. Each of the actors possesses different management styles. At the landscape and regime level, the authority enacts policies to arrange the actors' rights and responsibilities. The actors' management styles and the policy they produced are affecting the overall capacity to nudge a transition. Eventually, the power relationship is examined using the synergetic and antagonistic dynamic framework.

The conceptual model of this research is shown in Figure 6. This research focuses on the institutional arrangement to manage the transition to renewable energy. Therefore, the primary research question is:

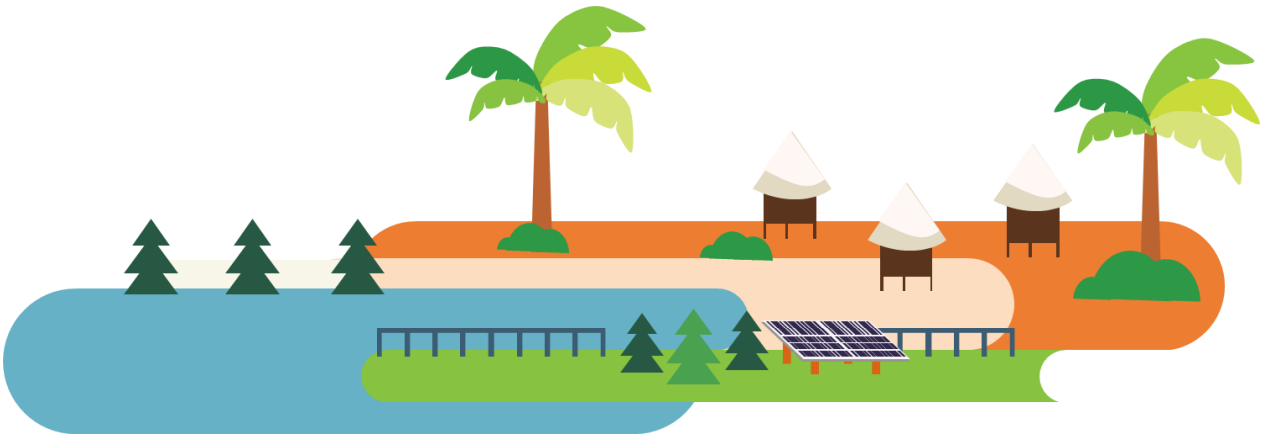
How does the institutional arrangement in Indonesia's electricity sector influence the renewable energy transition?

Figure 6. Conceptual model



/03

Methodology



3. Methodology

Research methodology consists of the type of (case) study, the logic of research design, data collection techniques, approaches to data analysis, interpretation and reporting (Yin, 2003). This chapter explains the methods use in this research, applied to a case study in West Java Province. The sections outline the research strategy, data collection technique, and method of analysis. The aim is to explain the relationship between the research questions and the steps taken to answer the questions. In the end, the analysis framework is drawn to explain how the research is conducted.

3.1. Research design

To answer the research question (*how does the institutional arrangement in the electricity sector influence renewable energy transition in West Java Province?)* this study will focus on the relationship of different stakeholders from different levels that shape the electricity sector in West Java Province, Indonesia. The nature of the question is to explain the how and why, which appropriates to use a qualitative research design.

This research uses a single case study framework to organise the data collection. To use a case study protocol, Yin (2003) mentions three significant boundaries for defining the units of analyses: the spatial boundary, theoretical scope, and timeframe. Since the energy problems are complex, conducting in-depth case-study is helpful to be close to real-life situations (Flyvbjerg, 2006). A single case study is preferred since it generates deeper knowledge on the contextual aspect to analyse the issue of energy. The research question focuses to examine the institutional arrangement, in which more relevant to acquire subjective meanings by interviewing actors in specific transition arena. The theoretical scope is defined based on the literature study which are transition theory, governance, institution, and power relations (explained in Chapter 2). The conceptual model (Figure 6) is used as a lens to develop the research method. The spatial boundary of this case study is specified on the initiatives located in West Java Province, Indonesia.

Indonesia as a national context

Indonesia represents a compelling case for an energy transition in a developing country context, given its population development, economy, resources, and mitigation commitment (Gunningham, 2013). In this country, the energy sector is dominated by state actors. The Ministry of Energy and Mineral Resources is the main energy coordinator and also the regulator of renewable energy provision in Indonesia. There is also the National Energy Council which is led directly by the president (DEN, 2012), which consists of seven ministries and eight other stakeholders (experts, industry, environment, and consumer representatives). At the national level, the awareness of a systemic transformation for reducing GHG and increasing the share of renewable energy is shown in several policies and programs. Opportunity for a transition is also supported by the availability of land and abundant resources in this archipelagic nation. However, the ambition of reducing GHG seems to be conflicted with the aim to increase electrification rates. Accordingly, Indonesia still needs to find the institutional arrangement in which different objectives can be addressed collaboratively.

Flyvbjerg (2006) underlines that a case study is appropriate to produce a context-dependent knowledge, but it depends on how the researcher chooses the case. In this study, criteria are conducted to narrow down the selection to the most relevant case study. The location will be in the provincial boundary since Indonesia's authority on energy is currently under the provincial government's authority. The primary research question is aiming to address the institutional arrangement. The first criterion is related to 'institutional thickness' which implies a location that has both many organisations and actors as well as the culture of collaboration (Amin & Thrift, 1995). They argue that this kind of situation is more responsive and adaptive. Also, it could create an environment where community and government agencies can interact and collaborate simultaneously. Moreover, considering the barriers to implement renewable energy is also part of this study's goals. We tried to evaluate the condition that blocks the way in implementing RE, so the province needs to have unsolved problems and future challenges which are indicated by electrification rate and unelectrified villages. The last one includes available resources to harness energy and the government's

strategy to implement the RE projects as opportunities. These five criteria and each relevancies with the chosen area were presented in Table 5.

Table 5. Case selection criteria

Selection criteria	West Java Province
Organisations and actors in RE	The organisations agglomerate in this province, which includes different type of state and non-state actor. There are government, NGO, businesses, and community that has their projects on RE.
Culture of collaboration	Sundanese culture in West Java Province has contributed to the culture of collaboration. The practice of 'rereongan wargi sadaya' or community participation and collaboration remain strong in rural areas.
Electrification rate and unelectrified villages	The electrification rate is 94.27% (DJK, 2016). In 2017, 1300 villages are still unelectrified (DJK, 2017).
Available resources	Micro-hydro for about 5.6 MW, photovoltaic 4.8 kWh/m3/day, wind power in Southern coast 4m/second, bioenergy from cattle up to 300,000 m3/ day, and bioenergy from waste 20,000 m3/ day (DEMR, 2017)
Renewable energy strategy is planned or already implemented	RE projects are listed in the plan and policy. Several projects on bioenergy, wind, and PV have been implemented. In 2017, West Java Provincial Government awarded Sustainable Energy Award 2017 in the category of 'Actively Encourage Renewable Energy Development' (MEMR., 2017).

West Java Province as a case study

Located in the Island of Java, West Java Province is the most populous of Indonesia's province (Figure 7). West Java Province becomes a suitable case study because of what Amin and Thrift (1995) refer as 'institutional thickness'. Several initiatives and independent researchers in the field of renewable energy take place in this province. West Java Province has a complete constellation of actors that has showed indication to transforming the energy system. The practice of 'rereongan wargi sadaya' or community participation signifies the potential of collaboration between actors. In 2017, West Java Provincial Government awarded Sustainable Energy Award 2017 in the category of 'Actively Encourage Renewable Energy Development' (MEMR., 2017).

> "West Java can be seen as a pioneer. For example, in completing the GHG plan that time. RUED is already in finishing part compared to other provinces." (YU)

In this sense, West Java Province is one of the foremost in planning the transition towards renewable energy system. Despite the potentials, the province's electrification ratio is 94.27%, which shows that 714,758 households do not have access to electricity (DJK, 2016). The latest report in 2017 listed 1300 villages are still unelectrified (DJK, 2017). Moreover, the province is also facing the challenge of the future demand with the population is projected to increase to 53 million in 2025 from 43 million in 2015 (DEMR, 2017). Nonetheless, there is a promising opportunity for enhancing RE implementation in this region. Located in the ring of fire, West Java Province has benefited with plenty of natural resources such as the rivers, wind power in Southern coast, bioenergy from cattle and waste, and plenty of natural sunlight throughout the year (DEMR, 2017).

Figure 7. West Java Province's Map

Source: Badan Informasi Geospasial (2015)

3.2. Data collection

As we have seen in the previous chapter, this study focuses on four main stakeholders: national government; national electricity company (a state-owned company); provincial government; and NGOs/local initiatives. The selection of stakeholders is based on the consideration of three levels from multi-level governance in the landscape, regime, and niche level (See Conceptual Model in Figure 6). Table 6 explains all interviewees that have contributed to this study.

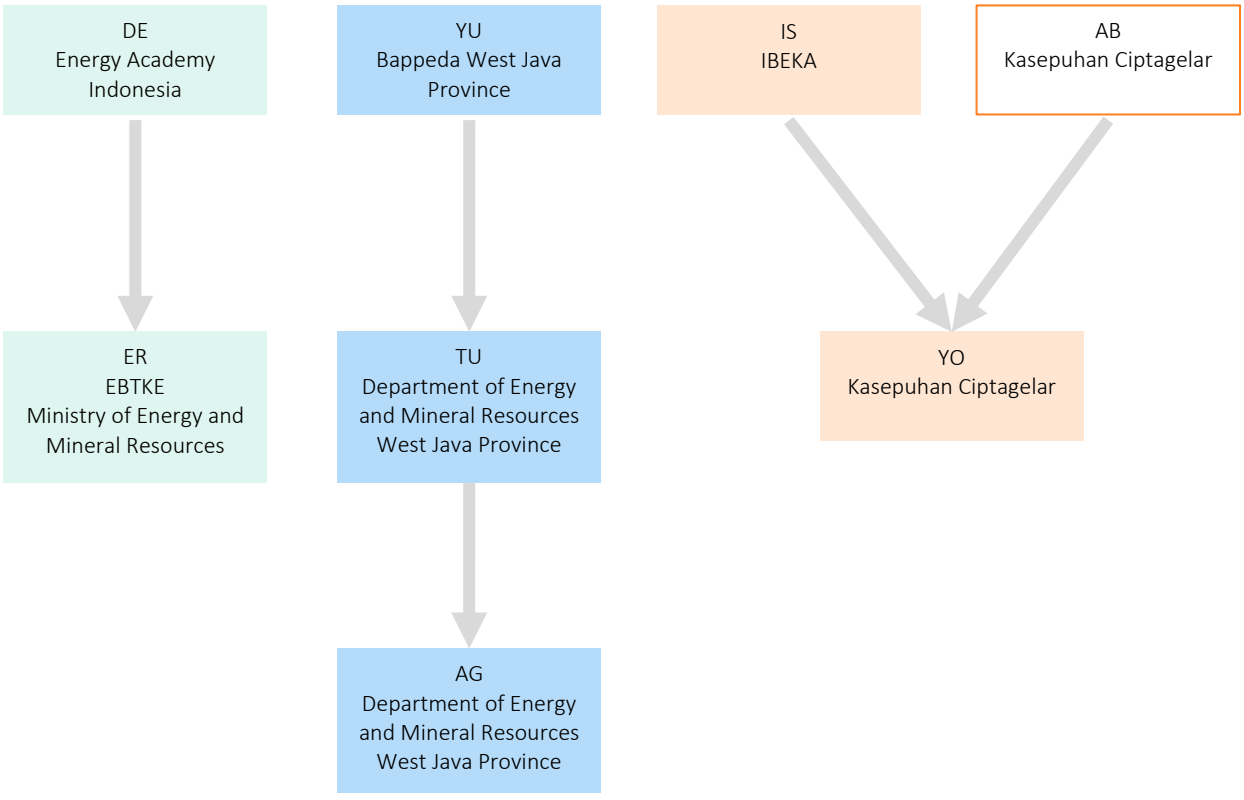
Table 6. List of stakeholders

Stakeholders	Information	Codename	Interview date	Retrieval
National government	The Directorate-General of New Renewable Energy and Energy Conservation, Ministry of Energy and Mineral Resources	ER	25-04-2018	WhatsApp
National electricity company	PT. PLN Persero	Retrieved from RUPTL	April-July 2018	Documents and policy
Provincial Government	Department of Energy and Mineral Resources West Java Province	AG TU	20-03-2018 19-03-2018	Interview in Bappeda office, Bandung, West Java

	Regional Development Planning Board, West Java Province (Bappeda Provinsi Jawa Barat)	YU	19-03-2018	Interview in Bappeda office, Bandung, West Java
NGOs	IBEKA (NGO or not-for-profit People Centered Economic and Business Institute focus on off-grid micro-hydro); Palanggaran, West Java	IS	11-02-2018	WhatsApp call
Local Initiatives	Kasepuhan Ciptagelar, Banten Kidul, West Java.	YO AB (retrieved from a documentary)	11-04-2018	WhatsApp call
Other	Energy Academy Indonesia (Ekadin)	DE	13-02-2018	Interview in Groningen

The interview was started with the Energy Academy Indonesia to gather contact with other stakeholders and recommendation to relevant actors. This approach is known as a snowballing sampling (Noy, 2008). Several advantages of conducting a snowballing approach as she mentioned are generating a unique knowledge which is characterised by emergent, political, and interactional. Energy Academy Indonesia is a research and study platform for energy in Indonesia. The interviewee provides insight regarding the overview of the history and current trend of Indonesia's electricity sector. Other lines of snowballing sampling also applied to retrieve the different type of stakeholders (Figure 8). Based on the recommendation, the stakeholders were filtered. After that, the selected stakeholders were contacted via email or WhatsApp to make an appointment for an interview.

Figure 8. Snowballing process



The process of data collection is conducted through semi-structured interviews. It combines the list of questions with the topical trajectories based on the three energy issues. Rather than a strict list of questions, we developed an interview guide (Appendix 5) to allow the interviewees elaborate on their answers. Stakeholders from the list also provide the documents required for the analysis, while confirming how they perceive the policies. The interviews were conducted directly or via WhatsApp call and recorded with the interviewee's knowledge. The research process took place from December 2017 to May 2018 (Table 7).

Table 7. The framework of data collection and analysis

Question	Which Information	Moment of retrieval	Source	Method of retrieval	Documentation Method	Method of Analysis
What are the conditions to manage renewable energy transition from the theoretical perspective?	Theoretical foundation from existing literature (book, articles from scientific journals)	Dec 2017	Literature on transition management to renewable energy, governance, institution, and power relation	Literature study	Developing a theoretical framework	Identify conditions for research questions
How does the historical dynamics of the electricity project influence the renewable energy transition in Indonesia?	Information from literature (report, articles from scientific journals)	January 2018	Literature and report from previous electricity project	Literature study and semi-structured interview	Note from interviews. Writing in narratives and develop timeframe (using tables and figures)	Content analysis
How do the actors' in national, provincial, and local level role and perception influence the renewable energy transition?	Information on the role and perception from interviews with national government, the provincial government, PLN, NGOs and local initiatives.	February-March, 2018	Interviews with stakeholders and experts	Semi-structured interview	Note from interviews	Content analysis

How does the policy related to electricity influence the renewable energy transition in Indonesia?	Information from the current policies	February 2018	Policies (i.e. National law, ministry enactment, national electricity plan, and provincial plan)	Literature study.	Writing and structuring the interconnection and gap between policies	Content analysis and examining the policy
What are the barriers to manage the renewable energy transition in Indonesia?	Analyse the barriers from the institutional arrangement.	March-May, 2018	Interviews with stakeholders and experts	Semi-structured interview	Transcript and note from interviews	Content analysis

3.3. Method of analysis

3.3.1. Data analysis

This research investigates a phenomenon of the nation's electricity sector within the context (institutional arena) in different levels: the national government as the primary policy maker, the state-owned electricity company, the provincial government, and local inititatives) of West Java Province. It focuses on qualitative analysis to gather different perspectives from multiple actors. Clifford et al. (2010) propose that qualitative research is suitable to explore the subjective meanings from different stakeholders through the process of interview or observation. In specific, this research used the following steps for analysis:

1. Determine the criteria and indicators.
   These criteria are derived from the literature review of some experts in previous studies. After that, the criteria are translated back into sub-criteria as conditions to manage the transition. The opinion of some experts is then selected by considering the equality between criteria and subcriteria with the condition in Indonesia. Then the criteria obtained are translated into sub-criteria that describe the conditions that need to be identified. To be able to analyse the condition of the criteria, the required indicators used as a reference for researchers. Indicators and benchmarks are derived from literature studies.
2. Analyse the conditions that affect the transition to renewable energy in the electricity project.
   The analysis is conducted with the aim of knowing the condition of each criterion that influences the transition to renewable energy. Based on the results of literature review, there are criteria to frame the condition from the field of study. To assess the data with benchmark condition, the researcher performs coding analysis on both primary and secondary data obtained from this research.
3. Determine the factors that hinder and promote the transition management to renewable energy.
   This step is to acknowledge the condition of each sub-criterion that can be barriers and opportunities to implement renewable energy. From the results of coding, factors for the institutional arrangement are retrieved. The factors can be a potential or inhibit the readiness of the region to manage the transition. A factor is said to be an obstacle if it is not sufficient to address predetermined indicators. The examination of barriers and opportunities here is interpreted to be

two things, namely the problems and potentials mentioned by the actors as well as the ones interpreted by the author based on the interview and document analysis.

Three methods will be used for collecting data in this study: literature research, semi-structured interviews, and content analysis. The interviews were classified and analysed through the codes (See Table 8). Coding is a method for data reduction to help the researcher in analysing the interview by classifying it in a specific key theme or as a form of organising the data (Hay, 2010). The classification is referring to the transition management part which was described in Chapter 2. The answers from interviewee were marked with the codes an then classified based on the managements styles for each type of stakeholder. For instance, one of the questions for the NGO was: what are the approaches to develop connection and trust from the community? This quetion was classified in the tactical management style and then added to the corresponding general activity (A2). After that, the additional questions from the three energy issues were asked and coded accordingly. Finally, the answers were combined to explain each subquestion. To write down the result, we used a table to sum up the management styles and the evaluation. In this way, the analysis is not only checking if the criteria are fulfilled but also describing the challenge for each of them.

Table 8. Coding guide

Management style	Indicator	Criteria	Code
Strategic	General activities	Problem structuring, envisioning, and the establishment of the transition arena	A1
	Energy security	Structuring the target of power projects, developing a procurement plan	B1
	Climate change	Creating the target of GHG reduction	C1
	Energy poverty	Structuring the target of electrification in the rural and isolated areas	D1
Tactical	General activities	Developing coalitions, images, and transition agendas	A2
	Energy security	Creating coalitions of public and private sectors to achieve the target, publication of procurement	B2
	Climate change	Creating coalitions of national, regional, and local government, collaborate with R&D group, developing a strategy to achieve the target	C2
	Energy poverty	Creating coalitions with local initiatives, structuring strategy to achieve the target	D2
Operational	General activities	Mobilizing actors, executing projects, and experiments	A3
	Energy security	Implementing the plan, network structuring	B3
	Climate change	Implementing the plan, research and development	C3

Management style	Indicator	Criteria	Code
	Energy poverty	Implementing the project, creating incentives and mechanisms to collaborate, developing a flexible administrative mechanism, facilitating local community	D3
Reflexive	General activities	Evaluating, monitoring, and learning	A4
	Energy security	Evaluating and monitoring	B4
	Climate change	Evaluating, monitoring, and learning	C4
	Energy poverty	Evaluating, monitoring, learning, and adapting to the local condition	D4

3.3.2. Policy analysis

Policy analysis was conducted to answer the fifth research question (*How does the policy related to electricity influence the renewable energy transition in West Java Province?*). As mandated by National Action Plan on GHGs and the National Energy Policy, several projects should be taken to promote energy diversification. However, the deployment is still far from the target (Hendro & Sunitiyoso, 2016). Additionally, the translation of energy policy to local regulation often reflects inconsistency which is derived from above. Energy responsibility is now conducted at the provincial level. Therefore, the development plan and spatial plan in the province should enlist the target and the implementation plan for renewable energy. Analysing policy and documents will give acknowledgement about the regime's program following the commitment to address energy challenges. The policies will be summarised first based on the strategies, objectives, programs or projects, and monitoring and evaluation mechanisms in the table. It should includes content relevancy and conformity with the three challenge of energy trilemma. After that, the paragraphs in the table will be classified using the coding guide (Table 8). The following policies and documents used in this study are:

National level

1. Law of the Number 30 the Year 2009 on Electricity
2. Government Regulation Number 79 the Year 2014 on National Energy Policy
3. Presidential Regulation Number 22 the Year 2017 on National Energy Plan (RUEN)
4. National Electricity Plan 2015-2034 (RUKN – draft)
5. Decree of the Minister of Energy and Mineral Resources Number: 2682 K / 21 / MEM / 2008 on the National Electricity Plan 2008-2027
6. Power Supply Plan of PLN 2018-2027 (RUPTL PLN)
7. Presidential Regulation Number 61 the Year 2011 on National Action Plan for Reducing Green House Gases (RAN-GRK)

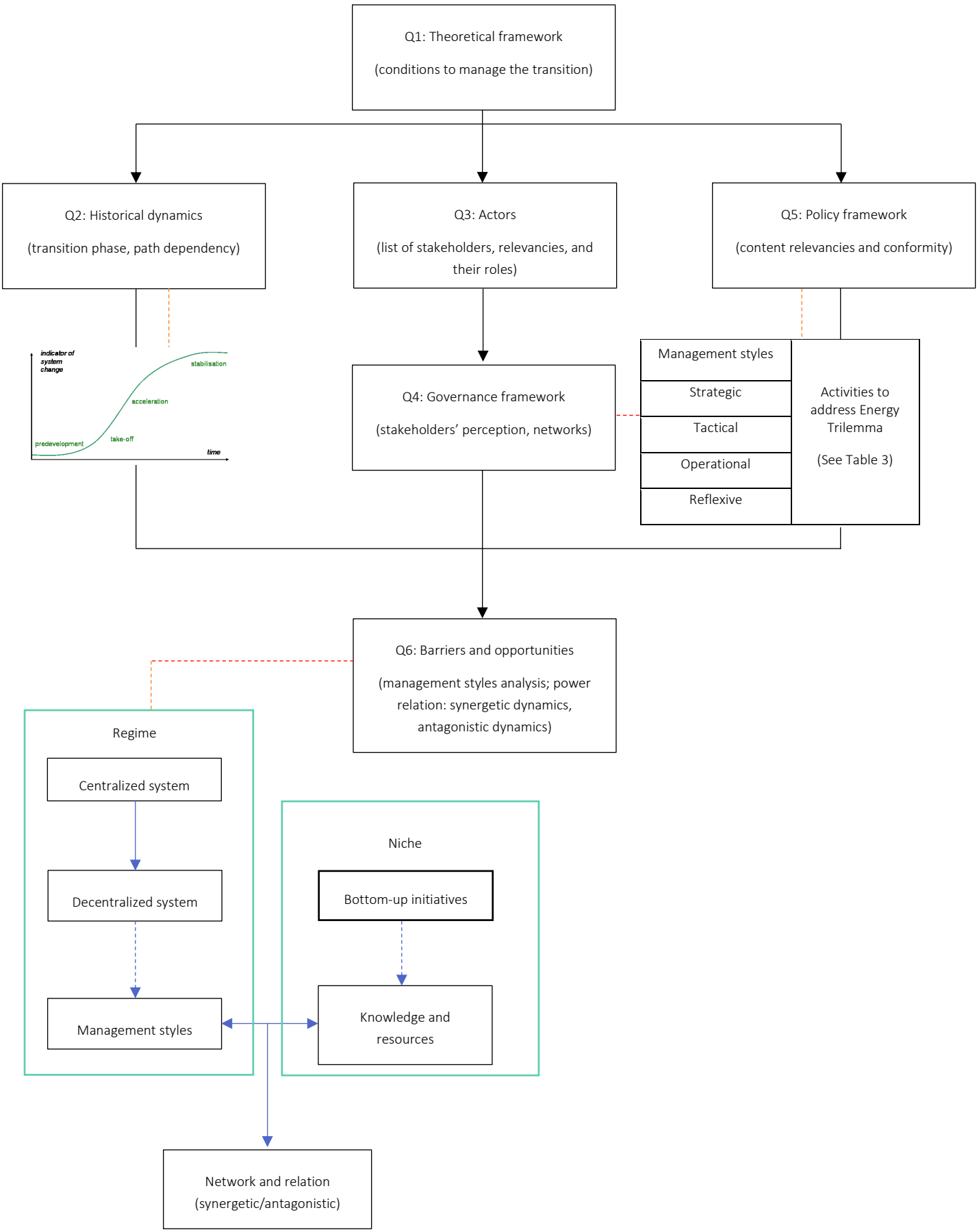
Provincial and local level

8. Medium-term Development Plan of West Java Province 2013-2018 (RPJMD)
9. Spatial Plan of West Java Province 2009-2029 (RTRW)
10. General Plan of Regional Energy (RUED – draft)

11. West Java Governor Regulation Number 56 the Year 2012 on Regional Action Plan for Reducing Greenhouse Gases (RAD GRK)

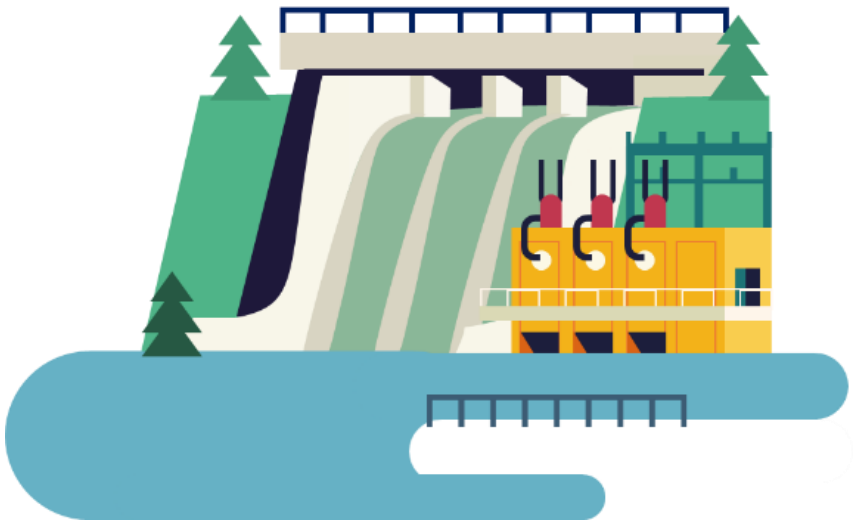
Finally, based on previous explanation on research method combined with the conceptual model (Figure 6), the analysis framework was developed (Figure 9). It includes the step by step taken to analyse the data following the research questions.

Figure 9. Analysis framework



/04

Overview of Indonesia's Electricity Sector



4. Overview of Indonesia's Electricity Project

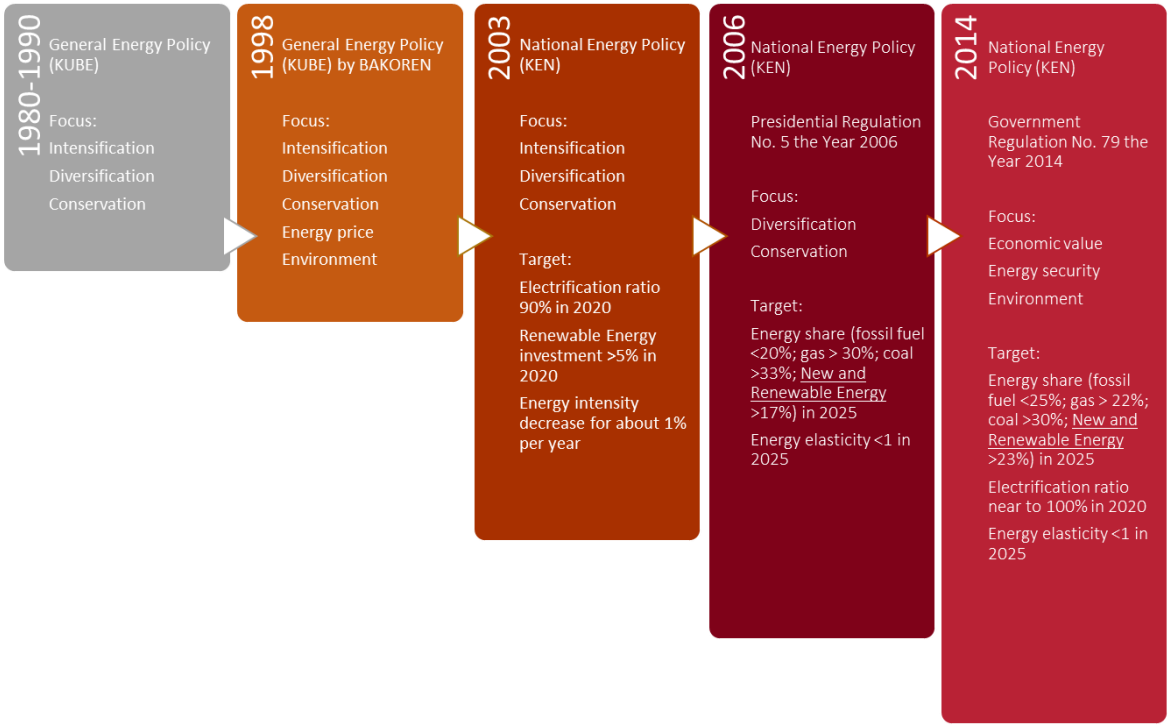
As explained in Chapter 2, analysing the history of electricity system will be beneficial to acknowledge the transformation and current position of Indonesia's electricity sector. This chapter examines the process of reformation in Indonesia's electricity policy since the establishment of the national electricity company (PLN). After that, the electricity governance that structures the transition in Indonesia is explained. This chapter concludes with the findings from the historical perspective and its implication to the current condition.

4.1. Reformation in Indonesia's electricity sector

Transformation of policy

A transition process of an electricity system is a complex process resulted from economic and political conditions. In Indonesia, the reformation of energy and electricity policies were mainly discussed at the beginning of the 1990s (Nugroho, 2004). At the end of the 1990s, monetary and financial crises were hampering Asian countries. This crisis also hit Indonesia in 1998, causing a severe economic and social conflict. Following the dynamics of economic crisis, in the same year, several policies in the energy and electricity sector were enacted. One of them is 'Restructuring of the Electricity Sector Policy' which consists of a group of programs to place a robust foundation for the nation's policy development. It can be seen that the crisis had accelerated the implementation of new reformist policies. Specific to energy there is the Law No. 22 the Year 2001 about Oil and Gas, Law No. 20 the Year 2002 about Electricity, and Law No. 27 the Year 2003 about Geothermal Energy. For national energy policy in general, the policy transformation also started in 1998 to include environmental concern (See Figure 10). Each time the policy was revised, the target towards renewable energy also increase, although the percentage is still moderate.

Figure 10. Transformation of National Energy Policy focus



In 2004, the Constitutional Court called of the Law No. 20 the Year 2002 about Electricity because several parties judged that the law contains the principle of privatisation ('unbundling' ideas) as contrary to the constitution. The Law No. 30 the Year 2009 has replaced the previous one without the unbundling system which means the electricity business is not separated from national companies. PLN has granted the priority to do the electricity business. Furthermore, under Law No. 30 the Year 2009, electricity tariffs are designed to be varied throughout the country. As a result, since 2013 the electricity subsidy has stabilised due to the average cost of electricity supply (See Table 9). It can be seen the amount of subsidy can be pushed under 100 trillion rupiah.

Table 9. Transformation of average cost, average tariff, and subsidy

Year	Average Cost (IDR/kWh)	Average Tariff (IDR/kWh)	Subsidy (IDR Trillion)
2011	1,351	714	93.2
2012	1,374	728	103.3
2013	1,399	818	101.2
2014	1,420	940	99.3
2015	1,300	1,035	56.6
2016	1,265	991	60.4

Source: PLN Statistics 2016, PwC Analysis 2017

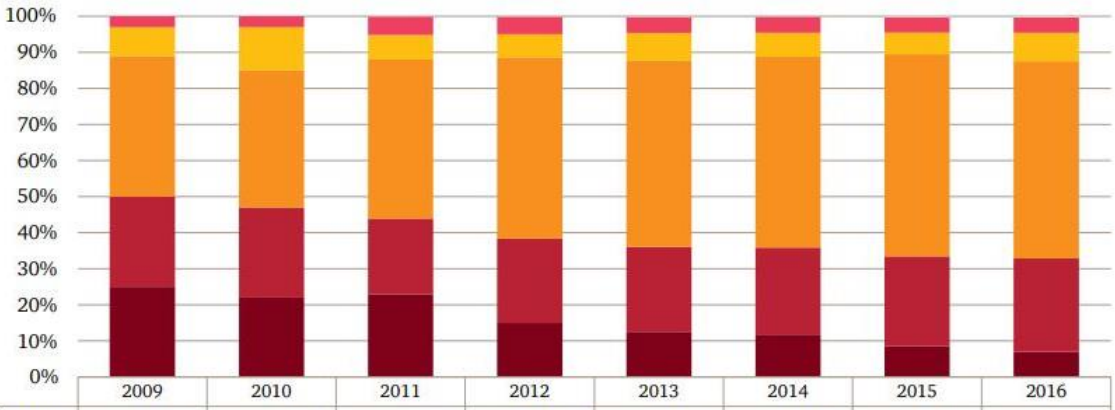
Transformation of materials

Since 1906, hydropower (Pembangkit Listrik Tenaga Air – PLTA) has been officially used as a primary resource for producing electricity. The first hydropower was located in Cikapundung River, West Java Province (capacity 800 kW). There were two regional managements, in Bandung and Cianjur, West Java Province. The significant implementation of hydropower in this province shows a historical link to the past electricity systems. The implementation is primarily because the morphology and river resources of the area allow the exploration and development of the turbine in the first place.

The trends to use renewable resources (other than hydropower) started to emerge at the end of the 1990s initiated by international funding like JICA and GTZ in collaboration with local NGOs. However, the adoption to increase the share of renewable energy was firstly in the era of SBY (served in the year 2009-2014) with the targets of mixed energy (increasing the renewable energy share). The strategies also include greenhouse gases reduction plan. At the end of 2014, there were efforts to settle the policy on geothermal power plant development.

However, the major national system is highly dependent on conventional resources like fossil fuel and coal. It has begun since NIEM operated its business on oil exploration. In Figure 11 we can see the recapitualtion of resources use for electricity production in Indonesia. The use of coal resources tend to increase from 2010 forward, until reached more that 50% share in 2016 from 38% in 2010. It means although the oil share is decreasing, the system was replaced by coal rather than other resources. Besides hydro and geothermal, the share of other NRE is really small for only 0.24% in 2016. In this sense, the majority of the system is never changing towards new resources. The infrastructures that already embedded in the system is hard to break because of the consideration that it will be expensive and need significant shifts in many aspects.

Figure 11. Resources mix year 2011-2016



	2009	2010	2011	2012	2013	2014	2015	2016
Other NRE	0.00%	0.00%	0.07%	0.11%	0.16%	0.11%	0.20%	0.24%
Geothermal	3.00%	3.00%	5.13%	4.85%	4.42%	4.44%	4.34%	4.33%
Hydro	8.00%	12.00%	6.80%	6.39%	7.73%	6.70%	5.93%	7.88%
Coal	39.00%	38.00%	44.06%	50.27%	51.58%	52.87%	56.06%	54.69%
Gas	25.00%	25.00%	21.00%	23.41%	23.56%	24.07%	24.89%	25.89%
Oil	25.00%	22.00%	22.95%	14.97%	12.54%	11.81%	8.58%	6.97%

Source: LAKIN DJK 2016, PWC analysis 2017

4.2. Electricity Governance in Indonesia

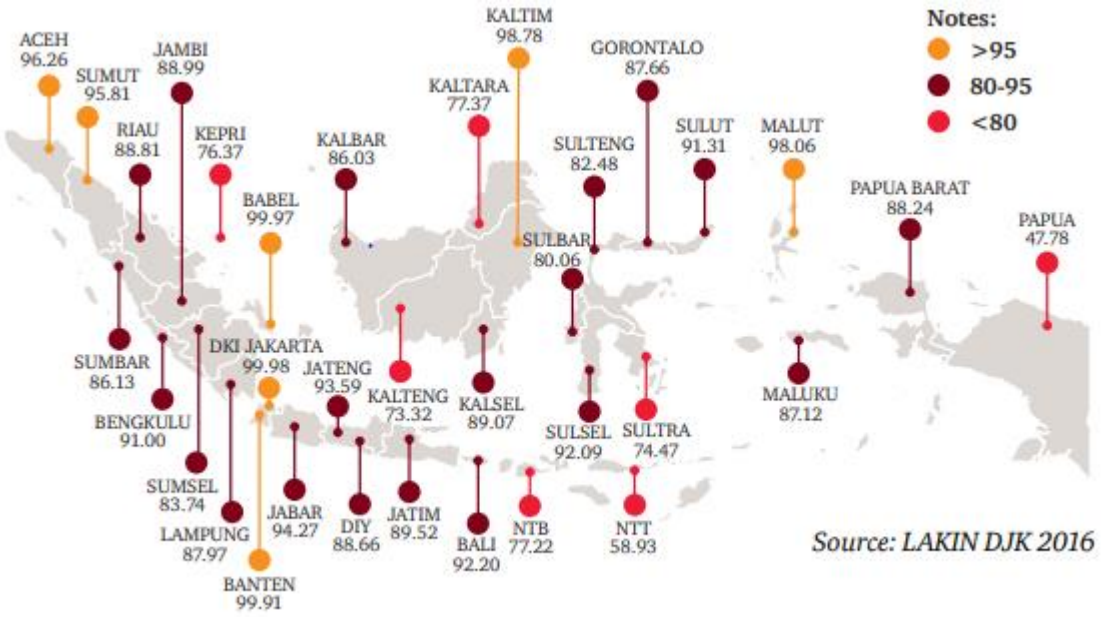
4.2.1. National Electricity Company (PLN)

The electricity sector production and distribution are mainly managed by a state-owned company, National Electricity Company (Perusahaan Listrik Negara – PLN). PLN is founded in 1945 at the same time as the Independence Day of Indonesia. PLN originated from *Nederlandsche Indische Electriciteit Maatschappij* (NIEM) in the era of the Netherlands colonialization. In 1909, *Algemeene Nederlandsche Indische Electriciteit Maatschappij* (ANIEM) was founded and developed as private electricity company. This company had owned 40% of the nations' electricity supply. In the same year, the gas company *Nederlandsche Indische Gas Maatschappij* (NIGM) was developed to generate an efficient management system. ANIEM's electricity deployment can be seen to determine today's distribution areas of PLN. However, the management system was not centralised like the current system, since ANIEM applied decentralisation of production and supply through the development of independent subsidiary companies. These companies were mainly located in Java, Bali, and Kalimantan. This system was considered effective to distribute electricity to such a scattered archipelagic region. However, during the colonialization of Japan, this system was disrupted and changed. In 942, the Japanese government was centralised the electricity management with three distribution areas: West Java, Central Java, and East Java. Until in the 1945, the independent government of Indonesia established the Electricity and Gas Administration (PLN – origin) with the responsibility to manage the electricity system. PLN first task after independence was not easy. PLN had to collect the unclear ownership status of most power plant while the experience and capacity to manage the field were still insufficient.

PLN as a state-owned company implements monopoly and hierarchical systems with the aim to 'protect and ensure the rights of the people' (the Law No. 30 the Year 2009 on Electricity). Since the first deployment in 1945, PLN way of managing the electricity is hardly changing which implies a vertically hierarchical structure. This structure focuses on the command and control system. PLN has eight unit groups vary in distribution, transmission, supply, electricity generation, region, project, and supporting system. These groups are divided based on the specific tasks and areas. Unit of transmission and distribution which are the most prominent system are located in Java and Bali. It implies the centralistic system in the regional distribution. Since Java is

the agglomeration of government, business, and population growth, or some may also argue that Sumatera also a part of 'the centre'. While other big islands like Kalimantan, Sulawesi, and Papua are the area of electricity generation (production) and regional unit. In this sense, electricity production in the peripheral areas needs to be transported first to central transmission to then distribute to regional units. As a result, this complicated system has created disparity in access. It can be seen from electrification rate throughout the country that most are centralised in Java, Bali, and Sumatera (Figure 12).

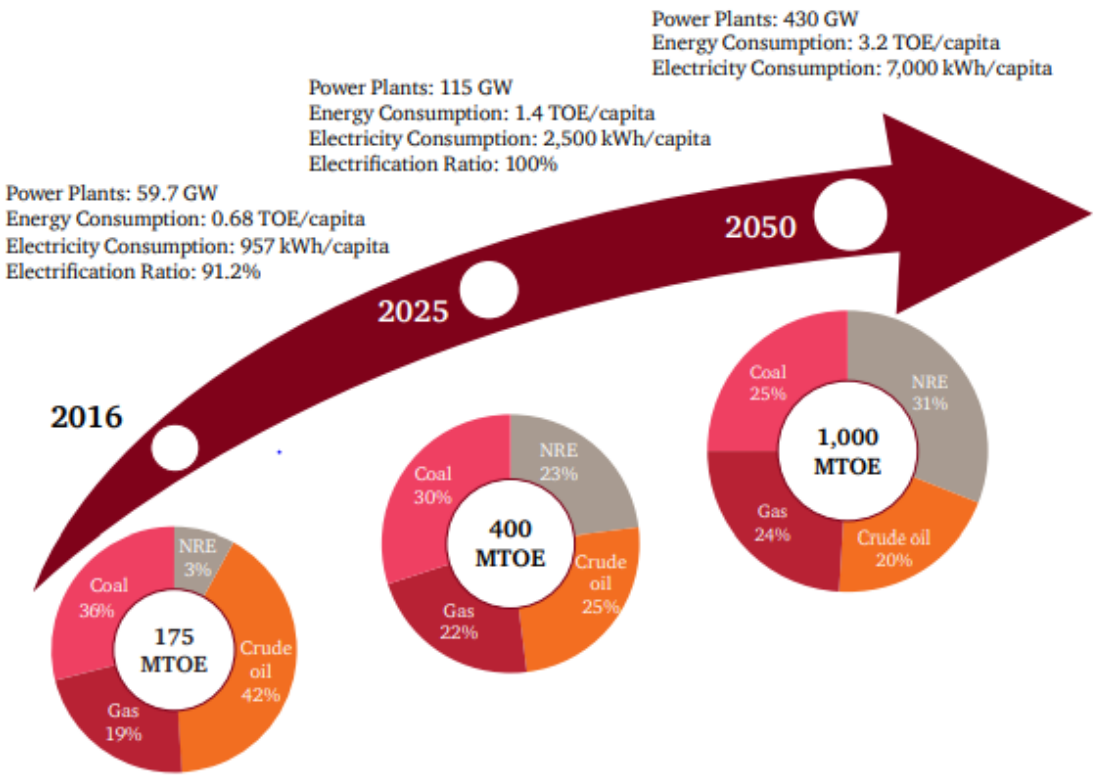
Figure 12. Electrification rate



Source: LAKIN DJK 2016, PwC 2017

Although the government claims to support the development of renewable energy, a danger of lock-in has shown in the system. The challenge is when the system stuck in old solutions, the government always copes with the demand by maintaining the use of fossil fuels. In Figure 13, we can see that the percentage of coal, gas, and fossil fuels are remained to be the majority of the future system. This complicated since the transmission and distributional system already materialised in infrastructure and organisational system, even before this country independence. However, a radical change in the resources like renewable will open opportunity to change the inefficient transmission and distribution system. To do so, Indonesia should improve not only the infrastructure system but also policy and organisational constellation to answer this challenge.

Figure 13. Primary energy mix target



Source: BP Statistical Review of World Energy 2017, PwC Analysis 2017

For the last decade, the ability to provide resources from inside the country also in decline along with the rapid increase of energy demand. Beforehand, Indonesia as a resource-rich country had exported its oil and was a former member of the Organization of Petroleum Exporter Country (OPEC). With the exploitation and increasing demand, Indonesia became a net importer of oil in 2006. Now, the nation seems so compelling to utilise its coal reserves, which is estimated to have 104.76 billion thermal coal resources (Gunningham, 2013).

The performance of PLN showed that the underlying system cannot grow according to the spirit of global competition, the demand of decentralisation, and the distorted energy pricing regulation (Nugroho, Thamrin, & Hardjakoesoema, 2004). PLN has entangled in enormous debt while also carrying the burden to protect heavy subsidies. The debt also became a consideration to unbundle the system in the Law No. 20 the Year 2002 until this law was called off. However, the nation still tries to empower private sectors. In recent years, Indonesia has been inviting private parties through the scheme of Independent Power Producer (IPP). Most of the vast renewable energy project like geothermal use the IPP Scheme. PLN also allows IPP to sell the electricity from small-scale renewable energy. The involvement of IPP is also aimed to meet the increasing demand every year. The electricity supply development within five years (2016-2019) requires funding of around 1,019 trillion rupiah (PLN 2016). For years, the funding from national budget (APBN) and PLN budget (APLN) always has a gap between the needs and compliance.

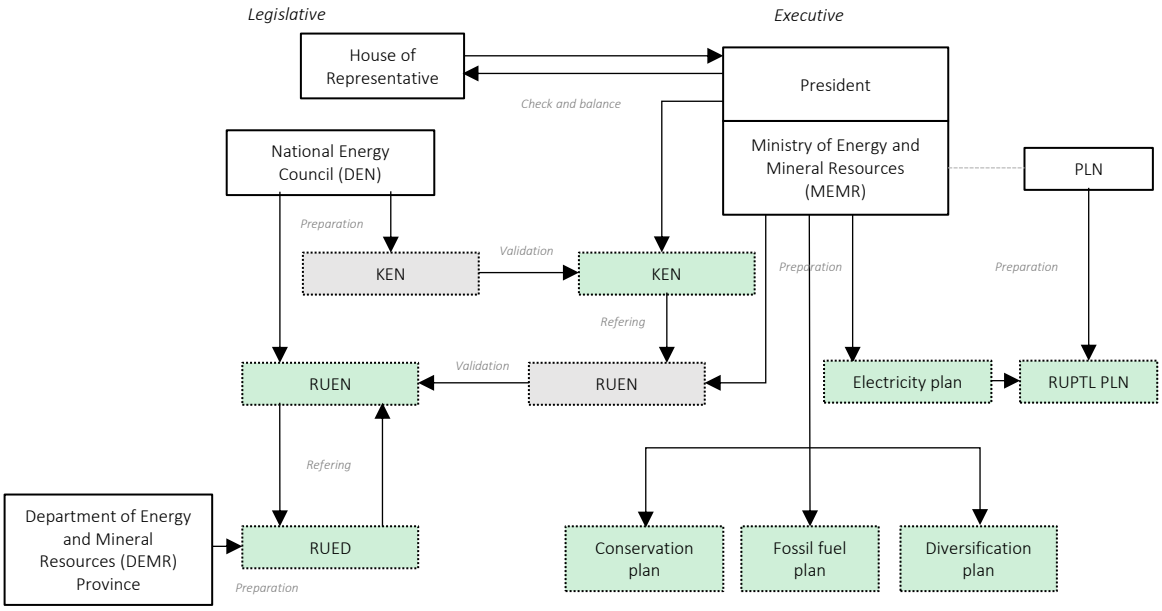
It is crucial to be noted that the shift from hierarchical state-owned company to the involvement of private parties have happened in parallel with the decentralisation and the emergence of local initiative. Although

we can witness that the electricity supply remain centralised in PLN, the shift of government's role has resulted in multi-level and multi-actors' governance network.

4.2.2. National Government

The Ministry of Energy and Mineral Resources (MEMR) is the leading body responsible for policy-making and regulator for PLN. MEMR role is to regulate the electricity production at the regional level. Under the MEMR, there is a Directorate General of New and Renewable Energy and Energy Conservation (EBTKE) with specific tasks to implement the policies in the field of renewable energy. EBTKE also provides guidance and evaluation of the implementation of renewable energy and conservation. As the coordinating body, the large-scale projects are controlled under the supervision of MEMR. Most of the projects are still dependent on the funding of national budget (APBN) which makes the MEMR role remains strong. In Figure 14 we can see the position of MEMR and its relationship with other state-actors. It also shows the policy products based on each actor responsibility.

Figure 14. Overview of state-actors' position in the energy sector



4.2.3. West Java Province

Since the decentralisation of government tasks, regional authorities are responsible for designing policy and strategy related to renewable energy. Based on Law No. 23 the Year 2014 on decentralisation, responsibility for electricity affairs at the local level is also granted to the provincial government. Also, the governor has a role in defining the business area that has not been managed by PLN. PLN is mainly responsible for the large-scale network (high-voltage). While for projects under 1 MW is under the supervision of the provincial government.

Department of Energy and Mineral Resources, West Java Province (DEMR Provinsi Jawa Barat)

DEMR West Java Province is responsible for management and permits for energy and electricity businesses at the provincial level. Permission affairs consists of building permits, facilitation, small-scale infrastructure, and regulation. Beforehand, the energy tasks are placed at the municipality level. This change is intended to make the management of energy system more efficient since it usually cross-administrative boundaries. However, this shift also constrained by the lack of closure with local aspects. Moreover, the province is also challenged regarding the emergence of stakeholders at the local level like energy initiatives, private parties, and NGOs. These trends require the province to reform the planning regime. Until recently, West Java Province's government has designed several programs to carry out its functions (several programs can be

seen in Appendix 1). These programs are indicated in General Plan of Regional Energy (RUED) to achieve the vision of 'Green Province' (Figure 15).

Figure 15. West Java Province: Smart Planning and Green Province

Source: Personal documentation, 2018

Regional Development Planning Board, West Java Province (Bappeda Provinsi Jawa Barat)

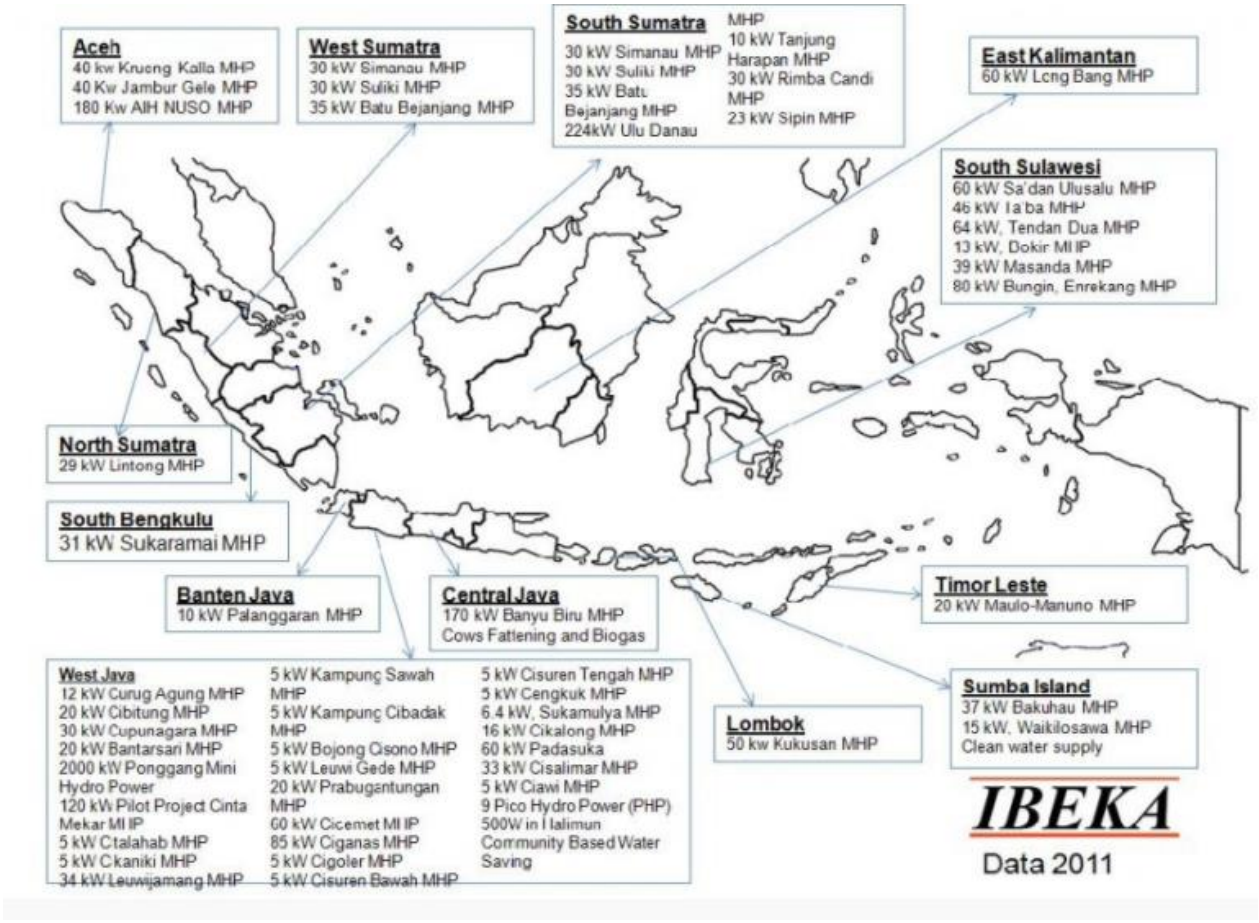
Bappeda West Java Province is responsible for the planning and budgeting at the provincial level. In the yearly plan of West Java Province (RKP), there are two prioritise activities related to renewable energy. The achievement measurement will be checked in 2019 with the indicator of SBM (setara barrel minyak – barrels of oil equivalent). The program held by the province is mainly to facilitate unelectrified areas to connect with PLN's grid.

4.2.4. NGO: IBEKA

In 1978, a group of college students from Institut Teknologi Bandung (ITB) created a foundation called 'Mandiri Foundation' to incorporate student activities since the soldiers occupied the university during the authoritarian regime of Soeharto. The Mandiri Foundation is later becoming the forerunner of IBEKA. An international organisation, GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit – now is GIZ) in 1989 offered collaboration to Mandiri Foundation to learn micro-hydro technology in Swiss.

In 1992, IBEKA was founded as a not-for-profit organisation, who implements community programs in several villages in West Java Province, Indonesia. The organisation has the expertise to implement hydroelectric power plant using community-based empowerment scheme in rural and isolated areas across Indonesia. As a pioneer in micro-hydro and now also other projects like biogas and tidal power plant, IBEKA's projects have reached various villages across the country. Most of them are located in West Java Province (See Figure 16)

Figure 16. IBEKA's project map



Source: IBEKA, 2011

4.2.5. Community: Kasepuhan Ciptagelar

Kasepuhan Ciptagelar is a community of indigenous people located in Halimun Mountain, West Java Province (Figure 17). The Kasepuhan oversees approximately 48,000 local people from 568 kampongs. Since 1368, Kasepuhan has existed and ruled by an elder called 'Abah'. The structure of Kasepuhan is like a cabinet of seven ministries (*rorokan*). Following the increasing needs in a modern world, the number of rorokan increase to 16 cabinets with respectively specific affairs. Kasepuhan has their own rules and believes to be followed by the people. The law called 'Kabendon' is binding rules but has no direct punishment. The people believed that the law was in effect and whoever violated would be exposed to some 'curse'. Therefore, the people are bound by the law and with the awareness to follow the law.

In Kasepuhan Ciptagelar, 80% of the areas are forest while 10% is rice paddy fields. Although most are working in paddy fields, they are not allowed to sell their rice outside Kasepuhan. They have 800 granaries to support the people needs. As a result, the villages are sovereign with food up to three years after harvesting although they can only reap once a year.

Figure 17. Ciptagelar's houses and rice field

Source: West Java Province Documentation, 2016

Kasepuhan has the responsibility to protect the land, forest, and water. They are indigenous people as the 'guardians of custody', their deposit is the mountain haze nature. With this close relationship with nature, they have the principle that 'may add but may not reduce'. In essence, this principle is aimed to protect the environment. For instance, they cannot take anything from land and forest except it can be grown again. The electricity project that can be implemented is water turbine, micro-hydro because the character is not harming the nature but adding the function to the flowing water.

The development of micro hydro in Kasepuhan has a long history. In 1985, the community independently developed a waterwheel with a capacity of 3000 watts. The waterwheel material is wooden, and the power is used to light the village. In 1997, the Japanese embassy in Indonesia through JICA provided 50 kVA of T14 micro hydro engine located in Cicemet Village. The installation of machine and cable occurred in 1998. It is one of the most significant community collaboration (gotong royong) in Indonesia which was involving up to 2000 people (Figure 18).

Figure 18. *Gotong royong* for a hydropower project in Kasepuhan Ciptagelar in 1998

Source: Documentation of CiptagelarTV 1998

Since the development in 1998, IBEKA always assists the development of turbines in Kasepuhan Ciptagelar. Three years after that, UNDP gave grants of a machine for 110 kVA located in Ciptarasa and Signarasa Village. In 2006, with a grant from Bank Mandiri Persero and facilitation from West Java Province, Kasepuhan Ciptagelar received 50 kVA micro hydro in Cibadak. The last one in 2014 was developed in Situmurni I and II with the grant from a Korean NGO, KOICA.

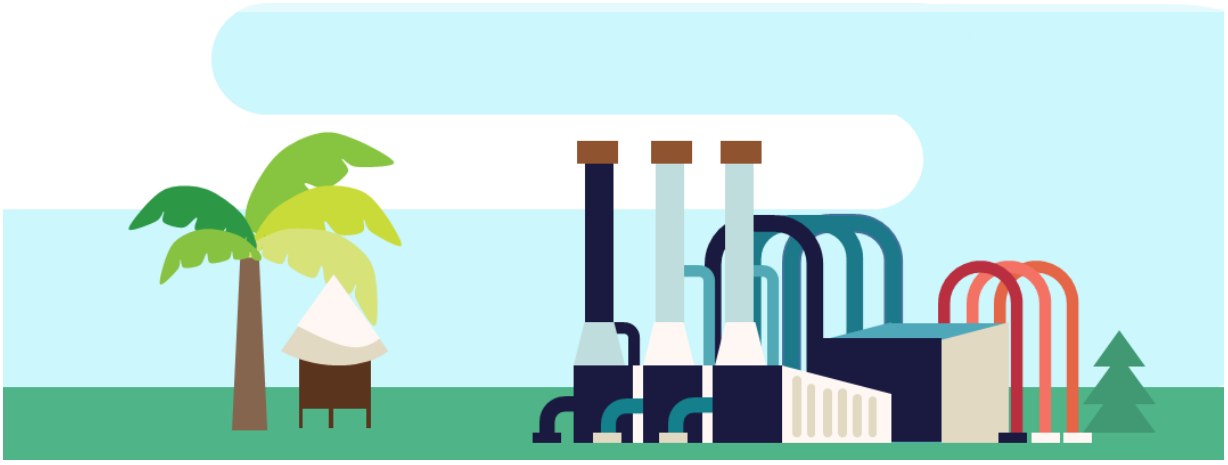
4.3. Findings

In short, there are several findings from the previous analysis on historical dynamics and governance of Indonesia's electricity sector in a transition view:

- The transition of energy in Indonesia can be seen still in the pre-development phase because several changes of views, policies, and initiatives are occurring but still under the threshold. These changes hardly reform the conventional practice to keep using fossil fuels and coals. Several policies and programs related to renewable energy have initiated since the 2000s along with the target to increase the share of renewable energy in the nation's energy mix. The target that set (23% in 2025) can be seen moderate considering the availability of resources. In addition, conventional sources still outweigh the renewable resources in the daily practices of the regime level. While at the niche level, several initiatives are emerged to use renewable energy, especially in the isolated and rural areas. The characteristics of these initiatives are small scale, off-grid, and bottom-up process.
- Unlike the large-scale electricity project that still tends to be centralistic with particular involvement of private parties (IPP), the shift of government to governance takes place in small scale renewable energy initiatives. These initiatives involving the local community, NGOs, international funding organisation, and sometimes the provincial and the national government.
- The decentralisation process has made the energy affairs as regional affairs. However, the withdrawal of energy affairs from municipality to the province can be seen as an attempt to centralize the coordination. Although it can also be seen to apply a 'hybrid' mixture which is central the guidance as a robust foundation for the decentralised approach (Zuidema, 2016). Here the role of national government is getting more central in budgeting and implementing large-scale projects. The problem is the role division seem to be immature with limited bottom-up process facilitation at the local level.

/05

Institutional Arrangement



5. Institutional Arrangement

This chapter starts with the discussion of national and provincial policy. Followed by the investigation of actors' role and perception towards different management styles. After that, actors' constellation is discussed using the framework of power relationships between actors. The last section acknowledges the barriers and opportunities from the institutional arrangement.

5.1. Policy analysis

In Indonesia, the energy policy has the highest position to regulate and plan the nation's energy provision. It also includes the nation's vision towards renewable energy. This section specifically discusses the renewable energy and electricity policies which are the government's formal rules in the electricity sector. We divide the policy into the national and provincial level. Then continue with the analysis of a complex 'energy trilemma': energy security, climate change, and energy poverty that these policies are addressing.

National policy

Regulation related to renewable energy at the national level is under the general law of energy and electricity (the scheme of the policies and the stakeholders who produce it can be seen in Figure 14). The Law No. 30 the Year 2009, for instance, is generally explained how electricity project should be implemented with the principle of regional autonomy. Although this law is not explicitly addressing renewable energy, we include it in the analysis because of the influence to the RE plant implementation. The national regulations are needed to give vision and legitimation to implement the projects of renewable energy (the recapitulation of national policies can be seen in Appendix 2). Following the commitment to increase the share of RE in national energy system, the government enacts the cumulative targets to achieve renewable energy in the National Energy Policy (KEN). The vision of KEN indicates the themes of energy trilemma.

> "To ensure the *energy independence* and national *energy security* to support *sustainable* national development."
>
> National Energy Policy (KEN)

In KEN there are several strategies to achieve the vision of smaller energy elasticity. It indicates to meet the future energy demand which is related to the energy security target. The strategy to increase electrification ratio is overlapped to address energy demand and energy poverty issue which means to provide electricity to all areas. As the derivation of this strategy, the energy poverty concern is planned to be achieved through rural or isolated areas electricity program (e.g. Indonesia Bright Program, province's rural electricity program). The climate change themes also implicitly covered by the target to reduce the use of fossil fuels, reduce coal, and raise the implementation of renewable energy.

The derivation to meet the future demand can be seen in RUPTL PLN which is the general plan of the supply system that is provided by PLN. RUPTL is the one that directly linked with the target of 35,000 MW. The target of RUPTL is predominantly coal for about 54.4%. However, the government also has legal commitment to reducing GHG as opposed to the coal provision. To reduce the use of fossil fuels, the KEN and RUEN include the strategy to increase the use of new and renewable energy (NRE). However, Indonesia does not have a national regulation that explicitly supporting renewable energy in general. Although there are several ministerial regulations to regulate the operationalisation of a specific type of renewable energy like geothermal energy (Law No. 21 the Year 2014 on Geothermal). This regulation is enacted to expedite the plan of 7.2 GW geothermal sources from the total 45.1 GW of NRE in 2025. It is the second largest share after the predominant source, hydropower, which is 18 GW.

Based on the percentage of share, we can say that there are two types of large project namely geothermal and hydropower. While the other resources like wind, photovolotaic, biomass, and microhydro are usually referred in policy documents as 'other renewable energy' or 'small-scale renewable energy', which has small amount of share. Only in specific program, these RE types are mentioned clearly. In this sense, different supporting mechanisms for these small-scale RE technologies has not been provided yet. While the barriers

for different technologies are appeared to be different. Also, they are located in different areas, depend on local resources.

The general policy for reducing GHG (RAN-GRK) is enacted in the era of the previous president, SBY. RAN-GRK is action plan and working document which provide the basis for various ministries and local governments for mitigation actions. The limitation of RAN-GRK is although the targets are mentioned, it does not have an actual measurement to reduce the emission (Bappenas, 2011). Also, there is still problem to translate the targets to other sectors. Non-environmental sectors tend to avoid these targets because they have their own objectives. For instance, in RAN-GRK there is the program to enforce national industries to reduce their emissions through industrial ministry. But, this program is non-binding to the other ministries, thus, there is no integration to check the achievement. Eventually, there is no assessment and evaluation mechanism to review the achievement of the targets.

Meeting the future demand and addressing the energy poverty seem to be an overarching objective. However, without a clear derivation to the implementation in isolated and rural areas, the targets are mainly supporting the future demand of urbanised areas. Whereas, several targets related to unelectrified areas also need to be given priority. In 2016, MEMR launched Indonesia Bright Program (Program Indonesia Terang - PIT) with the aim to electrify isolated, peripheral, and small islands across Indonesia. The ministry states that PIT is part of 35,000 MW national program (MEMR, 2016). PIT starts from the eastern part of Indonesia like Papua and Maluku to give priority to areas with the lowest electrification rates and gradually shifts to the western part. Most of the plans are off-grid power plant. In other words, unelectrified areas in the western part will be the responsibility of the provincial government rather than the national government. However, the division about this matter is unclear in the regulation.

Provincial policy

The primary policies in this analysis are RPJMD, RTRW, RUED, and RAD-GRK (See the summary in Appendix 3) which represent different focus of program in the province. RPJMD and RTRW of West Java Province are general plans that gives direction to the province for future development. It indicates that the province can conduct a strategic plan. Therefore, analysing these two will give acknowledgement whether the urgency of new and renewable energy (NRE) is included in the general plan. Programs that stated in the RPJMD will be included in the budgeting system so the commitment of the government can be seen in this plan.

Several strategies related to accessibility to the electricity sector, implementation of NRE, and conservation are already enacted in the RPJMD. It shows that the government has considered the renewable energy as a specific program that needs to be enforced in the plan. Nonetheless, in the RPJMD there are no clear explanation of the types of NRE that will be developed. The unclear reference of NRE plan means that the commitment to building and budgeting the plant is still limited. We also analysed the RPJMD strategy and policy direction to see if any program supports mitigation guidelines described in the corresponding RAD-GRK document. It is appeared that the programs are too general and not clearly integrated with the mitigation plan.

This problem also occurs in the spatial plan. Spatial consideration is crucial given renewable energy plants have the characteristic of scattered, depend on local resources, and therefore, need spaces. In the RTRW, spatial plan of West Java Province, several NRE projects are stated with a specific location. However, most of them are geothermal, waste power, gas and hydropower sources. While the implementation of the small scales renewable like micro-hydro, biogas, photovoltaic, and wind are stated without a specific location.

West Java Province is currently processing the development of RUED as the derivation of RUEN. The Government Regulation No. 22 the Year 2017 on RUEN provides guidelines for the development of Provincial General Energy Plan (Rencana Umum Energi Daerah – RUED). RUED will give direction to the regional energy development. Minister of Energy and Mineral Resources (MEMR) explained that the overall principle is to achieve affordable, long-term, and sustainable energy (MEMR, 2017).

The design of energy plan in West Java Province has the vision of:

> "Fulfillment of energy needs in West Java Province that supports economic growth with the utilisation of renewable energy as the main strategy to achieve West Java Green Province."
>
> Draft of West Java RUED

This vision indicates a statement to transition the energy system to renewable energy resources. Four missions to achieve this are listed as availability, affordability, accessibility, and acceptability. The government also states the implementation of the local wisdom of West Java: "leuweung rusak, caina beak, jelema balangsak" which means the plan and implementation of energy must ensure the environmental protection.

The government of West Java Province uses the variable of government engagement (GE), and sustainable development (SD) result in four scenarios to approach RUED :

- Low GE High SD
  Scenario 'Jabar Hejo' focuses on achieving Green Province through the enhancement of community participation to reduce GHG
- High GE High SD
  Scenario 'Kahoyong Pamarentah' focuses on economic growth by the rise of energy supply and demand
- High GE Low SD
  Scenario 'Ngreuksak Lemah Cai' which indicates degradation of the environment. Government focus on economic growth. While carbon emission to be solved without government's intervention
- Low GE Low SD
  Scenario 'Rereongan Wargi Sadaya' which based on community participation to ensure environmental quality.

The inclusion of government engagement and sustainable development indicate two things. First, the government considers the importance to balance people's participation and government's intervention. Second, the government also include sustainable development as the prioritisation of ecological concern. However, the government should also include the specific indicator to assess the condition since high and low seems still vague. Also, the specific strategies, programs, and framework to do it in different dimensions need to be stated explicitly.

The current RUED in West Java Province is now still in progress. The preparation of technical materials is finished and ready to be ratified as the provincial regulation. However, the process is already late from the MEMR mandate to finish in March 2018. This plan retreats from the target of the Minister, Ignasius Jonan, who wants the preparation of RUED completed before 2018 (Tirto.id, 2017). At the provincial level, local potential sources of emission are enlisted to be the basis of RAD-GRK. As an integral part of RAN-GRK, RAD-GRK follows the overall target and mitigation strategies to be the baseline to develop the action plan. In West Java Province, RAD-GRK was enacted in 2012. The energy sector is one of the main activities in this plan. The evaluation from the RAD-GRK indicator is no clear indicators for each activity. Therefore, it is merely an overall checklist. The targets are not stated explicitly to be overarching with other energy projects.

Table 10 presents the summary of formal rules assesment. We can see a clear pattern of a centralised policy-making but limited coordination. The national stakeholders (national government and PLN) are responsible to safeguard energy security target. However, the role division in the other objectives seem unclear and overlapped. Also, policies that should set targets and mechanisms for assessing and evaluating the achievements are also limited and less sensitive to local condition.

Table 10. Analysis of formal institutional arrangement

	General Activities	Energy security	Climate change	Energy poverty
Strategic	National: develop national target and vision (RUEN) Provincial: develop provincial target and program (RUED)	National: megaproject of 35,000 MW (RUPTL PLN) Provincial: -	National: develop a strategic plan (RAN GRK) Provincial: develop a strategic plan (RAD GRK)	National: 'Indonesia Bright Program.' Provincial: rural electricity project (included in RUED)
Evaluation	Top-down problem structuring No overarching vision	Mostly coal and fossil fuels	Top-down and uniform target The latest presidential regulation was in 2011	Limited to the eastern part of Indonesia
Tactical	Provincial: collaborate with PLN, other sectors, and community	PLN: Electricity Plan (along with 35,000 MW) RUPTL PLN, PLN and IPP scheme	Provincial: collaborate with other sectors to achieve the target	Facilitate demand for local community
Evaluation	Top-down agenda Limited data Limited budgeting capacity No actual location for RE in the spatial plan The completion of the plan delayed	Top-down target Mainly technical	Merely check-list from different sectors The latest governor regulation was in 2012	Limited data Limited budgeting capacity
Reflexive	National: checking the derivation of RUEN to RUED Provincial: ensuring derivatives from national and adapting to the local context	National: Meeting the future demand Provincial: -	National: checking the decreasing amount of CO2 emission at the national level Provincial: checking the decreasing amount of CO2 emission at the provincial level	National: ensuring the achievement of the target (97% electrification rate in 2019 and 100% in 2025) Provincial: evaluating rural electricity project

	General Activities	Energy security	Climate change	Energy poverty
Evaluation	RUED late preparation	The gap between budget and future needs	No measurement and monitoring mechanism for sectors	No overarching target with other priorities Limited sensitivity to local condition

To see the problems of the regulation mechanism deeper, we mapped several related policies (See Table 11 and the explanation in Appendix 4). Problems are not only occurred on one level of policy, but also different levels. The most common problem is the policies are obsolete and unclear, therefore, need update and further explanation. For example, renewable energy projects in RPJMD and RTRWP should be enlisted in detail including the financing mechanism and its location. Moreover, there are also several conflicted regulations, which means the reference and coordination in the policy-making process need to be clarified. For instance, RE detailed targets in RUEN and RUPTL are different, in which the RUPTL's target is lower than in RUEN. It means the implementation plan will not achieve the commitment from the higher regulation.

Table 11. Map of RE related policy

	KEN	RUEN	RUKN	RUPTL PLN	RAN-GRK	RPJMD	RTRWP	RAD-GRK	RUED
KEN									
RUKN				Conflicted					
RUEN				Conflicted					
RUPTL PLN									
RAN-GRK				Conflicted	Need update				
RPJMD						Need update			
RTRWP							Need update		
RAD-GRK								Need update	
RUED									Need to be enacted

5.2. Actors role and perception

In this section, we provide analysis towards the management styles from different stakeholders; the MEMR, West Java Provincial government, IBEKA, and Kasepuhan Ciptagelar. The analysis includes the actors' activities and perception towards the energy transition. After that, we examine each management style they performed.

Government

The government actors consist of the national ministry and the provincial government. Ministry of Energy and Mineral Resources (MEMR) is predominantly covered the strategic level in the constellation of actors. MEMR creates the National General Energy Plan (Rencana Umum Energi Nasional - RUEN) as a national

strategic plan (discussed in Chapter 5.1). The provincial government is mainly responsible in tactical, operational, and reflexive activities, although there is also a strategic role as explained in the previous section.

The Ministry of Energy and Mineral Resources (Kementerian Energi dan Sumber Daya Mineral – MEMR)

The interview is conducted with The Directorate-General of New and Renewable Energy and Energy Conservation (EBTKE) under the MEMR. Their responsibility is to organise, formulate, and implement policies in the field of geothermal, bioenergy, NRE, and energy conservation. The written law (Law on decentralisation) implies the national government like MEMR is mainly responsible for a strategic role, there is also policy derivation that implies the tactical and operational activities. The tactical role can be seen in the coalition building and steering the projects development.

The directorate is also responsible for supporting and intervening the fulfilment of energy for people in the 4T zones (remote, underdeveloped, front and border areas). These areas are considered difficult to reach by PLN and economically not feasible. EBTKE is authorized to use the national budget for developing the infrastructure of renewable energy like photovoltaic and hydropower in these areas. In other words, MEMR also performs several operational activities by leading the implementation of power plants in unattractive locations for investment.

> "Since 2011, EBTKE has implemented more than 600 units PLTS (photovoltaic) central and more than 70 units PLTMH (micro hydro) in 33 provinces with focus more in the eastern part of Indonesia." (ER)

The development in the 4T areas is prioritised to the most underdeveloped part to achieve the target of electrification ratio of 100% in 2025. However, the determination of this work area is done unilaterally by the central government. This may also cause confusion in the regions as the national government authorities reach project development which is contrary to the decentralisation policy.

EBTKE is mainly working in the resources scope or upstream sector. The work is horizontally coordinating with Directorate of Electricity which is partnering with PLN. While the vertical division in authority requires a bottom-up process from the provincial and local government. To implement programs, the government should refer to guideline documents; RUEN at the national level and RUED at the provincial level.

> "The supply of electricity from renewable energy funded by APBN (national budgeting), whether implemented directly by EBTKE or through regional transfers to Provincial APBD (regional budgeting). The process is bottom-up. Local Government can submit proposed development of RE to the central government based on the region potentials." (ER)

EBTKE argues that several problems at the local level also hinder the development of renewable energy infrastructure. For instance, the acceptance of local people.

> " There is a need to do socialisation and education to minimise the people resistance on renewable energy." (ER)

Moreover, EBTKE explains the challenges related to business aspects like hard to find businesses to invest in Eastern part of Indonesia, limitation of technology availability that still needs to be imported, and limitation of a soft loan in the country. The last challenge that they explain is related to the land use permit system. This land use conflict usually occurs on the geothermal power plants that overlap with conservation forest area. In general, EBTKE is paying attention to the relationship with community acceptance, business feasibility, and land use problems. They have been trying to address the investment problem in the rural areas through policy incentives.

> "We provide regulation on investment at the local level by enacting MEMR Regulation No. 38 the Year 2016 about the Acceleration of Electricity Project in Rural Areas."

These perceived challenges indicate the concern of national government to the operational matters. Despite the perceived challenges, we rather argue that the problems lay on the decision-making which seems to be decided centrally without involving consideration of regional characteristics. For example, targeting does not have a specific direction for a particular area. Although there is a prioritisation to a specific area, the decision

to implement the project in these areas still decided in a top-down orientation. To sum up the national government's role (Table 12), the government has failed to integrate the target, so the effort has been made separately. The importance of integrating targets is not only to increase program cohesion but also to reduce the externality between targets. It also implies that the national government has performed limited coordination capacities to delegate tasks to the provincial government.

Table 12. Analysis of National Government's role*

	Activities	Energy security	Climate change	Energy poverty
Strategic	Organize policies related to NRE and energy conservation	The target of electrification ratio of 100% in 2025	Energy conservation, target of lowering GHG emission of 29% in 2030	Prioritize the development of 4T
Evaluation	Top-down problem structuring	No overarching objective with other sectors	No overarching objective with other sectors	Top-down problem structuring
Tactical	Coordinate with provincial government and PLN	Coordinate with PLN	Coordinate with provincial government	Coordinate with provincial government
Evaluation	Limited coordination and strategy to collaborate	Low business and investment attractiveness Limited national technology innovation	No overarching project relating to this objective at the local level	No clear line of coordination to implement project at the local level
Operational	Develop infrastructure of renewable energy using national budgeting			
Evaluation	Unclear role division	Land use problems	-	Community acceptance

**the reflexive assessment has been covered in the national policy evaluation.*

Department of Energy and Mineral Resources, West Java Province (Dinas ESDM Provinsi Jawa Barat - DEMR)

The interviewees from DEMR were asked about their role in renewable energy development and its strategy to address energy trilemma. The first perceived challenge is stated as the availability of data. After the delegation of responsibility from municipality to province, not all the data are incorporated in the province.

> "Some (data) are still missing during the change from municipality to the province. In practice, province often uses projection data that questionable in accuracy." (AG)

The data accuracy problem also appears in how the data have been presented. For instance, if electricity network bypasses the village, it can be declared that the village is powered by electricity. However, bypassed is not enough since it is not always connected to the houses. Therefore, the data in 2013 that states all the villages already powered may not be good enough to illustrate the actual condition. West Java Provincial

government notes there are 100 villages (kampung) that still has no light. Not to mention there are still villages with low electricity services.

The next challenge is the policy-making and planning process. As explained before about RUED and RUEN relationship, West Java Province has set the target based on 23% national target. They also feel that the target can also be higher, but the mandate is not clear. Thus, to keep it secure so the target can be achieved, the government choose a lower target. It indicates that without explicit supervision from above regarding the target, the province will just set a lower target which covered the opportunity for being ambitious.

> "We just set the target that we can achieve. It is also confusing for us because the national government does not give direction. While maybe the province can achieve even more." (AG)

The mechanism to compose RUED is felt difficult by the province. Since RUEN as a guidance cannot display the actual condition. It seems that the mandate to develop RUED highlights the spirit of bottom-up but without a clear target. This arrangement results in an ambiguous target and limited monitoring process.

Moreover, they contend that the national plan of 35,000 MW hinders the development of renewable energy at the local scale since most of the plan is large scale and fossil fuel or coal-based. In this sense, the province is questioning the central government determination to increase the renewable energy mix. This consideration indicates the limitation of coordination with national level to agree on future plans.

> "RUED becomes a question because the province's authority is limited. The energy balance, for instance, we cannot merely arrange all at once." (TU)

Responding to villages demand is also the provincial's agency responsibility. However, this role is still limited due to the availability of data and the large scope of area which makes it hard to respond the demand effectively.

> "We are limited to gather data from local because there are so many villages..... We still don't have the efficient mechanism to retrieve inputs from local people." (TU)

Bureaucracy and administration problems also limit the government's respond.

> "It is a problem that we cannot ask the local people to create a proposal. However, our systems require that. So, we the province try to facilitate that.... but still not all of them are reached."

Furthermore, the targets for each region are generalized although the actual demands are varied. Therefore, it will meet the problems with the local conditions. For example, PLN with the facilitation of provincial government places several power plants and distribute electricity to a certain village. Even though the supply is not facing problems, the villagers cannot afford the electricity price.

> "In DEMR we have three or four principles.....; availability, affordability, accessibility, and acceptability. Moreover, we need to ensure all are fulfilled. It is hard because some may inherent to the local such as affordability. Farmers, for example, they cannot afford the bills, especially traditional farmers, indigenous that rarely use money..... However, not all areas are like that, so it has to be different approach" (AG)

Regional Development Planning Board, West Java Province (Bappeda Provinsi Jawa Barat)

The Bappeda roles in the project are mainly in the planning process and coordinating with DEMR regarding the implementation of the programs. The list of renewable energy project in the regional plan (RPJMD and RTRW) are based on the potential resources data from DEMR. Hydropower and micro hydro are the most common since many of its rivers are morphologically suitable. Several small-scale projects like biogas, pilot projects of solar panel, and small wind power plants have been incorporated in the plan. Whereas, the large-scale powerplant like geothermal is the responsibility of central government and PLN.

> "Here the provincial government has limited space to implement the project. Most of the large scale is at the national level. Now the province is only a connector and facilitator. Although to capture the demand (from local) is still difficult." (YU)

Similar to DEMR, Bappeda also states that capturing demand from local people is still the main problems in the policy-making process. Moreover, to propose funding for renewable energy to national budget is not an easy process because of the project scale is restricted. While using the provincial budget is also limited. Therefore, the government do not have the authority to apply for funds in the maintenance of powerplant.

> "However, the problem with PLN is they only develop into areas with clear economic benefits. In fact, there are still villages with low capacity to buy electricity. For these areas become the responsibility of provincial government." (YU)

In 2018, West Java Province already achieved the target of 250,000 SBM. The target for RKP Province 2019 has not been decided yet. However, this target is not ambitious enough since the national government does not set the target.

While RAN-GRK is under the supervision of Bappenas, RAD GRK is the responsibility of Bappeda as a coordinating body in the province. However, the existing targets are too general and less synchronous with other recent provincial programs. Also, an attempt to renew the plan is still waiting for the mandate from central government.

> "These RAD targets are still hard to check. I guess because the indicator is also unclear... The latest is in 2012; we wait for the mandate from the national level to renew the action plan." (YU)

Table 13 shows the overall analysis of West Java Provincial Government. In general, the provincial government role shows a pattern of limited collaboration and facilitation capacities. In addition, there is a lack of consideration in developing target to achieve higher RE share.

Table 13. Analysis of West Java Provincial Government's role*

	Activities	Energy security	Climate change	Energy poverty
Tactical	Collaborate with other stakeholders	Collaborate with PLN to do facilitation	Collaborate with other sectors for the preparation of RAD-GRK	Collaborate with the local community to implement rural electricity program
Evaluation	Limited with state actors	No overarching programs Hierarchical	Merely check-list from different sectors	Top-down Limited data collection The province has limited budgeting capacity
Operational	Facilitation and mediating with the local community	Facilitating and mediating the instalment process at the local area	Implementing two programs in relevance to RIKEN (energy conservation action plan in 2011)	Opening access to areas that have not been reached by PLN

Evaluation	Data limitation No mechanism to involve the community	Implementation is mainly the PLN's role Hard to retrieve data from the local level	No update to the current program No specification of each NRE program	Hard to capture local demand Data limitation Limited project execution
Reflexive	Checking the target achievements	Checking the achievement of the target (250,000 sbm)	Checking the decreasing amount of CO_2 emission	Checking the achievement of the target: accessibility and affordability
Evaluation	Lack of targets consideration	Focus on consumption (demand side) No ambitious target	GHG reduction target remains vague and general	No clear target Limited adaptation and learning process at the local level

**the strategic assessment has been covered in the provincial policy evaluation.*

NGO

The not-for-profit People Centred Economic and Business Institute (Institut Bisnis dan Ekonomi Kerakyatan, IBEKA)

NGO's role particularly focuses on the tactical, operational, and reflexive part. In the tactical activities, IBEKA takes the role as an intermediary organisation which has positioned itself between the government and community. However, as a novelty base organization, its position in practice is relatively closer to the community. In 1995, they did a micro-hydro project in collaboration with local people in Cileles Village, West Java Province. The funding came from Exim Bank loan scheme with the credit for about seven years. Three years after the social enterprise was running smoothly, PLN came in with a cheaper price electricity. In this case, PLN was destroying the community business until it got bankrupt. Learning from this experience, the chiefs of IBEKA, Pak Iskandar and Ibu Tri Mumpuni lobbied the Ministry of Energy and Mineral Resources at that time, Kuntoro Mangkusubroto. This lobbying for ten years helped to change the law. Since then, if there is a local project, PLN must buy electricity from the locals.

> "We asked the ministry at that time to change the regulation. PLN should benefit society rather than compete with them." (IS)

IBEKA implements two types of a scheme to finance the development: off-grid and grid connected. The choice of scheme is to depend on the characteristic of community and place. The off-grid scheme is using the grant funding scheme, and the operation will be financed with the independent money collection from the community. While with the grid-connected scheme, the grants using the scheme of loan and equity investment. The community enterprise was built to manage the financing system. The income for the community enterprise comes from the electricity sales to PLN. The inhabitants pay PLN for the electricity tariffs. Here IBEKA plays the role as the connector the local electricity grid to the PLN.

> "Off-grid or not really depends to local condition. We do not want to impose something that does not fit with the local people." (IS)

At the operational level, IBEKA introduces an approach that views technology as a tool within a community. Approaching community is not only to support social and economy but also to consider techno-anthropology

aspect. Techno-anthropology is a combination of technological and scientific culture embedded in the area, also meaningful insight and knowledge behind the daily activities.

> 'Technology is a tool..... Do not think socio-economically, but techno-anthropology. Technology can be diluted in everyday life if you know how to attach that with people's daily life. For example, planting rice is a hereditary science." (IS)

In other words, the organisation has developed an approach that explores the lives of rural inhabitants to make the project sustainable. Mutual learning with the community in the implementation is the key success factor.

IBEKA often considers the way the community value environment and adapts that to their framework. Villagers are close to nature because their livelihood depends on the environmental condition. IBEKA adds technologies that support their relationship with the environment, for example, replacing kerosene lamps with LEDs.

> "Making the villagers aware of this (environmental consideration) is not difficult, unlike the urban community. Even they are very protective to the environment." (IS)

IBEKA also believes that the development in rural areas cannot be the same with a cost-benefit approach since the community affordability will be different. What works in a rural area is a trust system. Therefore, digging the ties of trust becomes essential than making the community as a business object.

> "Renewable energy has the characteristics of small-scale, scattered, and different forms. It also depends heavily on the local resources. In this sense, developing renewable energy should be closer to the resources' areas." (IS)

Efforts to adapt with the local condition is shown in how IBEKA applies the lesson from local people collaboration (*gotong-royong*) to do their daily activities. This collaboration is based on the ability of local people themselves and to fulfil their own demand.

> "If we just bring the technology and install it, local people will only be spectators. It certainly will not be sustainable that way." (IS)

However, the social capital in each village may differ. Thus, how they approach the people to be involved in the project can be varied depends on the local condition. In general, the IBEKA's project implementation stages include:

(1) Survey the location: mapping potentials and assessing preliminary condition like activities, economy, social ties, culture, and demographic condition
(2) Live in the location: the officers from IBEKA live in to develop a relationship with local people and research the condition further. It can take one to two years depending on the villages' condition. The research that they use is based on techno-anthropology, so it involves thorough learning about the culture. The output will also be used as an opportunity to develop the approach
(3) Develop a partnership with the community: exploring the main activities and connecting that to the demand for electricity. The officers start to discuss the opportunity to develop the power plant with the community. The local people determine the potential site for development. The demand should come from the people, the officers here are only facilitators and fulfil the community's demand
(4) Develop the projects together with the community (Figure 19): IBEKA sets the condition that they 'learn' together. Human resources are the key in this step; the centre is the people. The physical technology is the tools, and its construction is participatory with as many local people as possible. They start to survey the topography (detail engineering design) with the local people as the technology officers
(5) Create management system to maintain and sustain the project: in parallel with the previous step, IBEKA with the community develop the plan of management scheme, structure, and electricity tariffs
(6) Supervision: until the technology has installed, IBEKA stays to supervise until the technology, and financial scheme are running

Figure 19. IBEKA's project implementation

Source: IBEKA, 2013

The time required to do such a process is also not short, minimum of 1.5 years. Rather than seeing a long process as a problem, the challenges are related to the coordination with the authorities and conflicting with the law and regulation.

> "Community self-help is crucial. However, the government cannot understand... Miscommunication often occurs between government and local community." (IS)

For instance, the regulation of land use for renewable energy purpose in local community. They feel that the regulation is often disturbed the process and inefficient.

> "RUPTL, Government Regulation, and Laws should be adjusted as well. Until now, we question..... Why to process a permit for a piece of land should require a permission letter from Jakarta (the capital city). If indeed the government wants to improve electrification for local people, this (administrative process) supposed to be simplified." (IS)

Here IBEKA argues that a small and marginal community should not be charged with superficial administrative matters.

> "Government responsibility is a regulator, not an implementor, not investor. They should support to let the people independent.... Subsidies will only kill people." (IS)

In general, IBEKA's role shows a compelling example of NGO approach to local community (Table 14). IBEKA's strategies have proven to be useful to sustain RE projects in rural and isolated areas. However, there is limited collaboration and integration with state actors.

Table 14. Analysis of IBEKA's role

	Activities	Energy security	Climate change	Energy poverty
Tactical	Collaborating with different parties to install renewable energy for the local community	Connecting grid with PLN when necessary	Opening options with the local community to use environmentally friendly energy Connecting with local wisdom to protect the environment	Empowering local community and implementing the project together with the community Connecting electricity to economic activities

Evaluation	Limited collaboration with state actors	Still have conflicting objectives with PLN at the local level	-	Some schemes dependent on external funding
Operational	Mobilizing local actors to do survey site and installing the technology	Network instalment MoU and agreement with PLN	Applying RE power plant Shifting to environmentally friendly technology such as LED lamps	Training local community with the technology Developing community enterprise, community funding scheme, and management mechanism
Evaluation	Miscommunication with the government Administrative requirement inhibits the process			
Reflexive	Learning and experimenting in the field while implementing the project Applying cross-learning between areas/villages			
Evaluation	-			

Community

Kasepuhan Ciptagelar

At the local community, the management styles that they applied is mainly at the operational level and a fraction of reflexive activity. A local community is the niche level where the project and innovation take place. Thus, the success factor of a project also can be valued at this level.

Kasepuhan Ciptagelar has implemented renewable energy for about 20 years. They choose renewable energy because they have a close relationship with nature. Therefore, they only want to implement energy that does not disturb nature.

> "We made it from the water resources. The community is obligated to keep the forest. It produces water. The electricity itself is generated from this process. The principle of the ancestors are *we may added, but we cannot reduce*. For example, farming tradition cannot be changed. However, adding electricity to the community to support people activities can be accepted." (AB)

Their activities also transform from only receiving the technology and installing it in 1998 to gradually involving more local people who develop their expertise in micro hydro.

> "We divide the work, so there are designers, technicians, and maintenance. These experts have long worked with IBEKA until they also become IBEKA's technicians in other projects in Lombok, Sumba, and North Sumatera." (YO)

Following the technical skill, the local people independently regulate the use of electricity in their village. The electricity purpose divided into two types in Kasepuhan Ciptagelar, for Kasepuhan and for the community. For Kasepuhan means that the electricity is used in daylight to support economic activities like rice processing and handicraft. While at night, the electricity connected to households for lighting, refrigerator, and other entertainment activities like TV and gadget.

In 2012, PLN asked Abah (the community leader) to buy all the turbines, but it was refused. Abah has his reason that the people should independently own the turbines. Therefore, the feeling of togetherness (*gotong-royong*) remains. The locals also do not mind since the price charged is quite affordable at 500 rupiahs per watt. As for the extensive damage to the equipment, the people usually discuss the payment to be equally shared by the consumers. If it is not enough, the representatives of the community will ask IBEKA to look for outside funding.

> "My house that becomes the centre of multimedia only pay 100,000 rupiahs ($7) each month. It is already the complete device that uses its electricity. Approximately people only pay less than 30,000 rupiahs ($2)." (YO)

This payment arrangement is considered fair by the community though without a metering system in every house. In this sense, the binding is the trust system within the community.

Currently, the turbine in Cicemet is not operating anymore because of its already too old. The electricity is now mainly supplied by Cibadak, Situmurni I, and II. The supply from Cibadak is located 2.5 km length from the villages using cable. However, with arrangements involving discussion (*musyawarah*), the community can handle the supply fairly.

> "The installation always involves the community. So, every problem is always discussed together in the community meeting." (YO)

The challenge is when the turbine like in Cicemet cannot operate anymore and to buy a new one is too expensive for the people. Another challenge is they feel that making proposals for funding, for instance, is not their expertise.

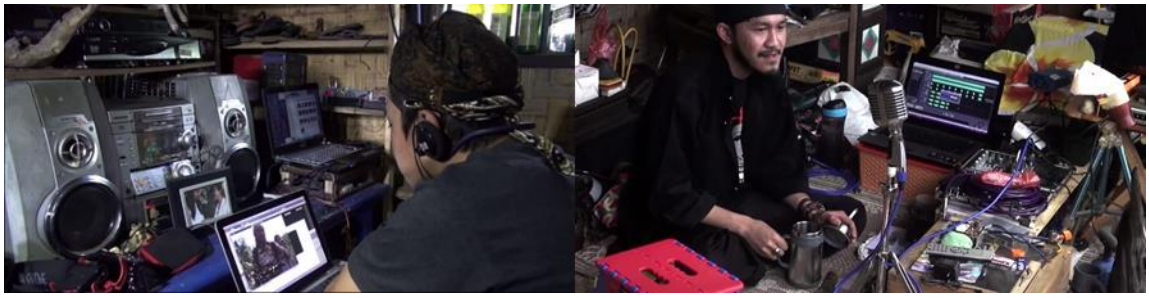
> "If we have to propose, it is out of our leagues, since we are just villagers. The provincial government is helping with the proposal... (Until now) still no results from the proposal" (YO)

Related to the government, West Java Provincial Government has visited Kasepuhan Ciptagelar for several times. However, they feel that "most of the time the government is coming with an established program to be collaborated, but it is not from the community demand." (YO)

There are also some small solar cells in some houses in Ciptagelar. The implementation of solar cells can be seen as a creative and innovative process because they use former solar panels and install it by themselves.

> "The solar cells are from picking up used goods and then modified to be installed and utilised by some houses. It also used to support our local television channel (Figure 20)" (YO)

Figure 20. CigaTV Ciptagelar's Local Television Channel



Source: Watchdoc Documentary, 2016

Overall, Kasepuhan Ciptagelar shows a successful implementation of renewable energy power plant (Analysis resume can be seen in Table 15). This condition is supported by the basic value to only use environmentally friendly source of energy, while also equipped with strong trust system, culture of collaboration, and willingness to learning and experimenting. The evaluation is in the community's limited ability to access capital. It is also implies, although self-organize, the community action is still highly dependent on outside guidance and capital resource.

Table 15. Analysis of Kasepuhan Ciptagelar community's role

	Activities	Energy security	Climate change	Energy poverty
Operational	Project instalment Community mobilization and involvement Experimenting with the project implementation	Exploring other renewable energy sources for future demand	Implementing micro hydro because the characteristic does not disturb nature	Implementing micro hydro as an option to electricity sources
Evaluation	Limited ability to access capital	Still, depend on outside funding Limited ability to make a proposal	-	Limited investment funding
Reflexive	Continuous learning with micro hydro and other options of RE (advancing the technology)	-	Experimenting with other environmentally friendly energy sources	Adapting the management strategy to split the funding asymmetrically based on a trust system
Evaluation	No recording of the project feasibility that can be used to further development			

5.3. Actors' power relations

This section examines the power relations between actors. The pattern of relationship between them can add to the barriers and opportunities in the institutional arrangement (Chapter 6).

Synergetic dynamics

The optimal synergies can be seen in the relationship between NGO and the local community. Here IBEKA has the position of supporting and enabling the community without losing the community independency to sustain the project. This feeling is also mutual because the community, Kasepuhan Ciptagelar, finds it helpful and builds trust to IBEKA.

Table 16. Synergetic dynamics

	Excerption	Meaning
Supporting	"We here facilitate. However, it is what needed by the community. So, they can sustain to implement the power plant. Otherwise, it will only stall." (IS)	Facilitating the implementation
	"Our local people also trained with IBEKA while also help them to develop micro hydro in other villages." (YO)	Training technical skills
Enabling	"We try to facilitate the need of the community. Like to PLN and also finding funding for the installation." (IS)	Facilitating the community needs
	"IBEKA has helped the process of instalment, also in 2011 in Sukamulya" (AB)	Helping community to install the power plant

Need for coordination

The relationship between national government and the provincial government still needs more coordination. The national government tries to support the decentralisation process, so then they give the province independence to decide the targets. However, the province perceives that the target is unclear. Related to the budgeting system, the provincial government feels restricted because they cannot provide or use the funds to do appropriate facilitation. Moreover, the national and provincial government exhibit miscommunication related to the role division. The national government range of work is too wide according to the provincial government, thus, limiting the authority of the provincial government. While the national government argues that they need to take this responsibility mainly to accelerate the process in the Eastern part of Indonesia which has a weak performance to do facilitation.

Table 17. Need for coordination

	Excerption	Meaning
Supporting	"The process is bottom-up. Local Government can submit proposed development of RE to the central government based on the region potentials" (ER)	Bottom-up facilitation to the provincial government
	"The national government has given freedom to the province to decide the target." (TU)	Freedom to the provincial government

Disrupting	"...However, the result is a lower target and unclear coordination" (TU)	Missing coordination and lower target at provincial level
	"Our budgeting ability is limited" (AG)	Missing coordination in budgeting responsibility
	"We only can handle under the 1 MW... It limits our space to approach community." (YU)	Missing coordination in the scope of the project

Need for collaboration

There is a need for a better collaboration between the provincial government and the local community. Provincial government tries to enable the process to apply RE in the local community while several bureaucratic and administrative things are restricting the process. The process also implies a top-down solution because the government already compose the program rather than responding to the local demand. In the government side, the availability of data about local condition also restricts the process to approach the locals.

Table 18. Need for collaboration

	Excerption	**Meaning**
Supporting	"The provincial government is helping with the proposal..." (YO)	Helping administrative process
	"...most of the time government is coming with their established program (related to RE) to collaborate." (YO)	Implementing RE program in the local community
Restricting	"RUPTL, Government Regulation, and Laws should be adjusted as well. Until now, we question... Why process permit a piece of land should require a permission letter from Jakarta (the capital city). If indeed the government wants to improve electrification for local people, this (administrative process) supposed to be simplified." (IS)	Complicated permit system
	"If we have to propose, it is out of our leagues, since we are just villagers." (YO)	Complicated administrative requirement
	"(Until now) still no results from the proposal." (YO)	Complicated administrative process
	"..... (the program from the government) not from the community demand." (YO)	Top-down program
	"If they (government) has developed the program that allows them to ask for funding. It will fail. They cannot expect this marginal community to do that." (IS)	Complicated administrative process

Antagonistic dynamics

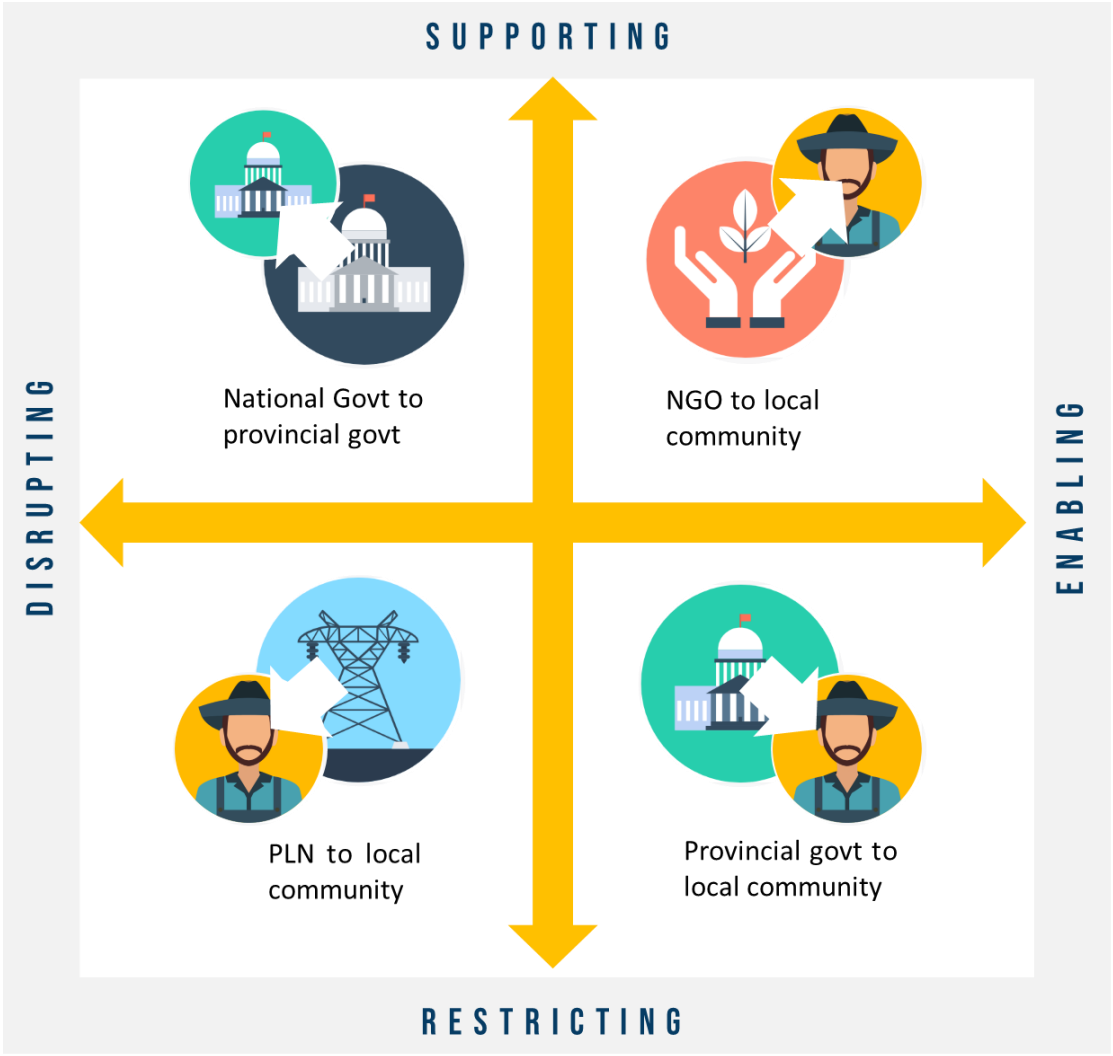
PLN's project is mainly incorporating a technical and business-like approach while at the local level what is worked is a social and cultural approach. PLN has the responsibility to fulfil the electricity infrastructure in all areas accross country. PLN cannot only consider resources and demand without pay attention to a local social system. Eventually, this lack of consideration is resulting in disrupting and restricting activities at the local level.

Table 19. Antagonistic dynamic

	Excerption	Meaning
Disrupting	"Isolated systems using the deterministic method, the planning process is using minimum resources which need o be more than one first and second largest unit." (Page II-10, RUPTL PLN)	The consideration is mainly technical, thus, may result in a project that conflicts with the local community believe and social system
	"The development of power plant in isolated areas still need fossil fuels. May shift to LNG, biomass, and other technology. The potential technology is PLTMG dual fuel or RE that can be hybrid with diesel." (Page II-5, RUPTL PLN) "Electricity supply from PLN until 2026 still dominated by the fossil fuel power plant, especially coal..." (II-26, RUPTL PLN)	Most of the projects are still rely on non-RE priorities (fossil fuel, gas, diesel, and coal).
	"How they (PLN) approach is mainly just to install and without a further relationship with local people. The people will only be a spectator." (IS)	Technical and business-like relationship with the local community
Restricting	The administrative requirement related to transmission and distribution system (The IPP and community requirement in Law No. 30/2009)	Complicated administrative requirement
	"The local people may not have the affordability to pay for PLN's fare." (AG)	

Power relations in West Java Province are a complicated network, influenced by the dominant centralistic mode of the national government and PLN. These state actors determine major project development and its bureauchratic and administrative structure. It should be recognised that the power action of PLN is influenced by a long history of centralised monopoly in electricity sector. This path dependency is hard to change because it has been institutionalised in the system. In Figure 21 we can see the suboptimal power relations happen with state-actors which arranged by formal rules. While the synergetic relation take place in the relation between NGO and local community which are non-state actors. In this sense, altering disrupting and restricting actions require a change of the formal rules of the game.

Figure 21. Actors' power relations



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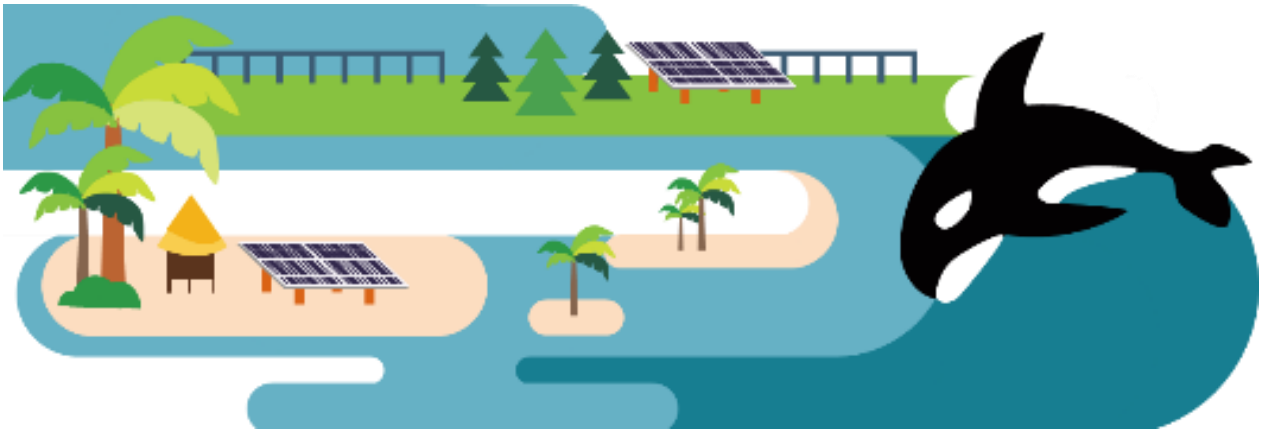
Barriers and Opportunities



6. Barriers and Opportunities to Managing Renewable Energy Transition

Chapter 6 summarises the barriers and opportunities based on the analysis in the previous sections. Several barriers and opportunities are discussed by examining management styles, stakeholders' perceptions, and power relations between stakeholders. Some identified barriers are policy and administrative barriers, decentralisation barriers, collaboration barriers, and participation barriers. A distinction also made in opportunities which include policy reform, asymmetric decentralisation, social and cultural approach, and execute pilot projects and exhibit a cross-learning mechanism.

6.1. Barriers

Policy and administrative barriers

Transition to renewable energy is a complicated system change that needs a firm legal basis (Loorbach, 2010). In Indonesia, the policy related to renewable energy is limited since the policy materials that specifically support the implementation are still not settled.

> "The policies are still not complete. We have been reviewing all the laws and regulations related to RE, but you can calculate by yourself, there are only a few of them. Of course if we compare it to the policy related to conventional sources." (AG)

Although there are some ministrial regulations addressing renewable energy, the implementations are often defeated by conventional resources. It can be seen from the electricity plan that most of the projects are using coal and fossil fuels. Also, the policy that addressing a specific type of renewable energy is only the geothermal one. Whereas different technologies require different supporting mechanisms. Also, it needs a specific direction in the local level to be sensitive on locally based resources.

The policy barrier is also happening at the provincial level. In the provincial spatial plan, the specific location of most of the RE plan are not stated explicitly. Furthermore, government's policy to reducing GHG also can be considered merely checklist rather than real monitoring.

> "It is still hard to measure because the implementation comes from different sectors which may also have different main objectives." (YU)

These aspects make us questioning the government's commitment to realise the energy mix's target in 2025 and mitigate climate change through the reduction of GHG. At the local level, especially in the isolated and unelectrified areas, we can also witness the barriers related to the policy. For instance, the provincial government of West Java seems to be aware of this condition although they cannot seem to do much to solve the problems.

> "DEMR has limited capacity to do something; the decision is on the national government. However, we have the feeling that the government is not committed fully to shift towards renewable energy. You may check the 35,000 MW plan." (AG)

The nation's commitment to increase the electrification rate is not corroborated with adequate supports in the policy and administrative process. The permit for a local isolated community still needs to be done at the provincial level. This administrative requirement may hinder the development if there is no further assistance from outside party. Administrative processes like written proposals also too complicated for the local community. Here the government needs to find a mechanism to expedite electricity servicen in rural areas without eliminating the community's independence.

> "The government should be a regulator, not an implementor or investor. It should support so that people can develop their energy, then if there is more can be sold to PLN again...Position itself according to its capacity seems so hard." (IS)

Climate change concern is also not in the central of electricity plan but rather a peripheral objective. Environment consideration is neglected in the face of mega-projects which are aiming for energy security. Overall, the policy support on fulfilling future demand is not balanced with adequate supports to addressing energy poverty or climate change issues.

Decentralisation barrier

This barrier occurs from an attempt to apply decentralization of powers. The national government tries to implement decentralization principles by giving freedom to the provincial government in conducting the target.

> "We conducted a bottom-up process, so the province can develop on their own." (ER)

As a result, the province tends to set lower target than they may could achieve. Here the provincial government realises that they could achieve more, but they just unmotivated because there is no clear direction to do so. Additionally, the enactment of RUED that should be at the provincial level has overdue from the schedule.

> "...inefficient in a way that national government created RUEN. Then they asked the province to make RUED. So, they can use the target of RUED as the basis to enact the next RUEN. However, they are not quite setting the direction...." (AG)

Other than the vague target, the budgeting and scoping of the project's responsibility are still unclear. The provincial government (since the Law Number 23 the Year 2014) has been mandated to hold the responsibility of energy from the previously municipal government. In practice, the provincial government has a limited budgeting capacity to implement RE. In addition, the process to apply for national funding is hindered by limited project's scope.

> "We only have the right to do in power plant under 1 MW. It is so limited compared to those that are conducted by the national government." (AG)

However, the national government claims that they set the condition that the provincial also the local government can apply funding to national budgeting (APBN).

> "Provincial and local government can add the renewable energy project infrastructure in their region to APBN based on local resources." (ER)

Although the capacity and roles have been divided through the law of decentralisation and electricity, the confusion between different levels still occur. We indicate that the confusion may result from miscommunication and lack of coordination. It is because from the interview, the national and provincial government seems to have an opposing argument. Moreover, the government tends to centralise the process by pulling the responsibility to the province. The national government is not entirely losing their roles in implementation, which is also caused a role confusion according to the provincial government. In general, the energy and electricity sector has been partly decentralised. Rather than applying 'hybrid mixture' as a robust basis (Zuidema, 2016), this partial decentralisation tends to result in role confusion and miscommunication.

Finally, there is also a lack of monitoring and evaluation from a higher level to ensure the implementation and achievement of the targets. The current implementation of decentralisation makes it hard to apply check and balance between different levels of government because the authority to do so is not clearly divided. It should not be only check-lists but a whole story about how the process is going. Therefore, it can be essential lessons for subsequent implementation.

Collaboration barrier

The collaboration barriers are generated from the miscommunication between stakeholders that should collaborate to implement the projects. For instance, between provincial government and PLN. The role division is provincial government should be the facilitator and connector between community and PLN. In practice, it is not easy for the provincial government to gather information from the local community. They have not found a mechanism to retrieve data and connect it to PLN for implementation.

> "Still hard for us to retrieve data from villages. PLN also sometimes merely install without consulting to the province. We cannot do survey all the time." (AG)

Another challenge is the provincial government has their own program in renewable energy that rarely collaborate with PLN or other stakeholders. It resulted in the fragmented project at the local level. If they are willing to collaborate, each stakeholder capacity can be performed simultaneously to optimize the projects. Involving non-sate actors also can be beneficial for implementation of RE projects. For example, collaborating NGOs to bridge the communication with local community or businesses to apply an innovative technology.

Participation barrier

The decision-making process from the national to the provincial level only involves state-actors. Thus, the participation from the local community and other non-state actors remain limited. The provincial government has realised that participation can deliver a better program that needed by the people. However, the actual implementation is restricted by the lack of funds to conduct surveys. While it may be easier to survey the closest administrative authority, the process of gathering data from local government is also restricted by unclear authority. It is mainly because the local government do not have responsibility in the energy sector anymore.

> "The social acceptance from the community is still the problems to implement RE project." (ER)

The statement from MEMR shows that the problems are occurring while it could be avoided through adequate participation process. The government should listen and analyse community even before the feasibility survey. However, the information gathering should be delegated at the local government level which is closer to the affected community.

> "The government cannot understand that they need to include the people and let them independent to make the problem sustain. Moreover, they should implement the project only if the people want it." (IS)

The state-centric process also worsens by the fact that the government does not have actual information about the local condition.

> "What we use is most of the time approximation. Sometimes it makes us worry in preparing the plan documents." (AG)

Although the quality of information is really matter to the future plan, the government seems to limit itself by not taking actions toward this recurring problem. This information can be gathered through stakeholders of the communities if only the government is willing to collect contacts. For instance, in Ciptagelar, the locals oftenly gather and discuss about the local issues (Figure 22). The provincial government can assign the local government to collect aspiration.

Figure 22. Community discussion and gathering in Ciptagelar

Source: AntaraFoto, 2015

Implementation barrier

The first problem to implement the RE project is that PLN is focusing on the demand side in conducting the project plan. In fact, the demand forecast is not always applied at the local level since the rural inhabitant's consumption and affordability on electricity tends to vary. The trends show that the affordability in rural areas are low. Therefore, the electricity bills become burden for local community. If they stop to pay, PLN will cut out the access. Eventually, the electricity networks become futile investments. Secondly, technology innovations that come from national or local companies are still limited. As a result, the cost to implement a renewable energy power plant is not cheap.

> "To encourage local businesses is yet our main challenge." (ER)

The third implementation barrier is to invest a renewable energy power plant in the villages in which the community still depends heavily on outside funding. In the case of Kasepuhan Ciptagelar, most of the power plants are coming from outside grants. Although the maintenance costs are paid using the collective money, when the reparation cost is too expensive, they are looking for external funds. Also, rural and isolated areas have a low investment attractiveness. So, develop a project with a similar measure that PLN usually applied would not work since the affordability is different. This consideration is captured by the MEMR, so they enacted policy to accelerate the power plant development in 4T areas. However, this approach is too simplified to accomodate the demand and the need of local people.

> "PLN or national or provincial government cannot merely apply projects without taking into account local culture. Until now, they have not been changing the way to approach local community." (IS)

6.2. Opportunities

Policy reform

Starting to generate a bundle of policy related to different types of renewable energy can be a window of opportunity to activate the transition agenda. The nation has the resource potentials, but the strategy to explore them is still limited. However, the absent of policy on RE can be an opportunity to kickstart a progressive change towards a new system. At least, the new energy policy statement that incorporates RE resources as the main strategy can set the framework within which the actors operate.

> "Compared to other types of energy, only a few policies related to RE. There should be policies on zoning energy for example. Like in West Java Province, almost all resources are available and potential to be explored." (AG)

Supporting policies at the national level for RE are not only providing legitimacy to implement RE, but also generate incentives for the RE deployment. It means that the government should consider to generate specific mechanisms for different technologies. These mechanisms can address different type of barriers while also enforce research and development on specific technologies.

At the provincial level, the strategy of government engagement and sustainable development in West Java's RUED can be potential to approach the energy programs. These new and innovative ideas in the policy-making are crucial to shift regime's perspective and agenda towards renewable energy. Here the additional means should be developed to track down the energy programs' progress. The next one is reforming the target to achieve RE. The target should come from the actual condition at the local level. So, the strategy to achieve that can be integrated with the potential resources in the area. Another opportunity is to create an overarching objective and program. Currently, the three challenges of energy security, climate change and energy poverty are still fragmented. Thus, they are in danger of conflicting with each other. However, conducting clear integration would help to anticipate externalities and combine constructing capacities between stakeholders.

Asymmetric decentralisation

The national government can potentially safeguard the transition process. However, the asymmetric approach can be applied to ranging the approaches they make. The national roles should not reach out to the local project if it is not necessary. First, crucial to ensure the target conducted by the provincial government is based on the direction of national government. Here the opportunity lays on the capacities to manage the transition at the provincial level. There should be not only minimum target but also ranges to achieve based on the province's achievement.

> "Even though clear that we tend to set a lower target to ensure it could be achieved." (YU)

Second, the provincial government should have more scope to apply if they have the capacity to do so. In this sense, the national government should ensure that the location and budgeting are specified for RE programs. Within the limitation to funding RE projects, the province may optimise its function through the formation of community groups or citizens' initiatives. At least, the provincial government can involve and accommodate input from local initiatives.

> "Province has a position to facilitate the creation of community at the local level. However, until now we haven't implemented that." (YU)

However, the province needs to take steps beyond facilitative action because of the region's central role in the transition. The provincial government should be more innovative in conducting stimulus for the development of RE plants at the local level. The mechanism should consider a transitional period for instance every year the performance will be evaluate. For the areas with low performance, the government at the higher level should adapt to get involved based on identified problems. Finally, the national government should apply monitoring mechanism. Only check-list is not enough, it should be measured whether the province already achieves the target. Therefore, the national government can adapt to ensure the province's management quality and accordingly rise the target.

Social and cultural approach

The opportunity to sustain an RE project at the local level can be done through a considerable social and cultural approach. As illustrated in the case study, social and cultural ties become an important aspect to activate and sustain RE projects. Here the government task is to reduce the miscommunication occur around the local project by firstly consulting to the local people.

> "The last 2-3 years government often come to Kasepuhan. However, I think they are often hindered by the bureaucracy to give aid based on our demand." (YO)

The local community is not an object of development. Therefore, they should be involved since the beginning of the project. The technical measurement alone is not enough to sustain the project. Thus, the PLN or government who are installing the project must ensure the community's acceptance from the beginning. Collaborating with NGOs like IBEKA would be beneficial to bridge the relationship between the PLN or government with the local community. They could combine their capacities to ensure optimal solution for the local community. For instance, IBEKA uses a techno-anthropocentric approach that potentially applied to other rural community. This approach includes mutual learning process which will result in mutual trust between the community and outside party.

> "There should be different laws for small communities with large companies. The playing field should be made different between the local community-scale energy in rural areas with urban or large companies." (IS)

Execute pilot projects and exhibit a cross-learning mechanism

The problems in implementation are mainly related to acceptance, technology, and business feasibility. Conducting pilot projects will potentially open the door of investment by presenting the project's feasibility.

> "West Java Province is potential to be a centre of excellence. The utilisation of natural resources for RE can be developed with the help of universities and research institutions that are also assembled in the region." (AG)

> "We need to show the project's feasibility to enhance investment at the local level." (ER)

Figure 23. IBEKA's project construction with local people in Ciptagelar

Source: Marissa, 2013

This approach can give the opportunity to the local and national companies to experiment and innovate their technology. Developing pilot projects also provides a chance for the community to understand and adapt to new technology in their environment (Figure 23). Another learning opportunity that should be encouraged is a mechanism to do cross-learning. Taking lessons from IBEKA's approach, state actors could also exhibit cross-learning process based on the previous projects. The government can establish a more sophisticated guideline to learn from each other. However, they need to be aware that every case is often different. The cross-learning process should start with the similar place and community characteristic. Continue with learning from mistakes, what went wrong in the previous choice should be evaluated. Moreover, sharing best practices could be beneficial to introduce feasibility and positive impacts of the projects.

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Conclusion and Recommendation

7. Conclusion and recommendation

This chapter explains the conclusion and recommendation of this study. Connections are made between the theoretical concepts (Chapter 2) and results from the analysis (Chapter 4 and 5). Following sections explain the challenges, opportunities and suggestion for future study. Finally, the reflection on the research process is described in the last section.

7.1. Conclusion

- *What are the conditions to manage renewable energy transition from the theoretical perspective?*
  As a long-term process (approximately 25 years) evolving through a non-linear trajectory, a transition is a complex process that is difficult to manage (Loorbach, 2010). Therefore, it is crucial to organize a small-scale intervention focus on this long-term radical change. Based on several studies on energy transition, three main components have been used in this study namely multi-phase, multi-level actors, and transition management. Van der Brugge (2005) argues that the evolution of the system can be seen from the S-curve, although the reality is more complex than the curve. To examine the phase of transition, we can analyse the historical dynamics that explains the current stage of transition. The second factor, the multi-level actors, underlines the importance to include stakeholders from different levels of landscape, regime, and niche (Geels & Schot, 2007). In this sense, the multi-level arrangement is also crucial in the shift of public sector management from government to governance. It is relevant that energy problem includes multiple stakeholders from the multiple derivations of the energy sector (Rotmans & Loorbach, 2008). Third, the governance in multi-level frameworks applies a range of management styles, which can be classified as strategic, tactical, operational, and reflexive (Loorbach, 2010). In the case of Indonesia, we incorporate Gunningham's (2013) study that developing country particularly facing the challenges of energy trilemma, i.e., multiple objectives of energy security, climate change, and energy poverty. By connecting the transition management concept and energy trilemma, we can examine the specific capacities performed to address these objectives. Lastly, we combine these transition concepts with the institutional perspective to provide principles in designing the institution and structure the components as multi-level governance, management styles, and power relations between actors (Alexander, 2005; González & Healey, 2005; Healey, 2006).

- *How does the historical dynamics of the electricity project influence the renewable energy transition in Indonesia?*
  The analysis on the historical dynamics of electricity project in Indonesia shows that the transition is still in the pre-development phase because the system has not much changed since the PLN was established. The changes are occurring under the threshold because the use of fossil fuels and coals are still the majority of the 35,000 MW megaproject. However, we can see the shift on several policies related to renewable energy that has been initiated since the 2000s. This shift is followed by the target to increase the share of renewable energy in the nation's energy mix, although the target can still be considered as moderate. Several initiatives emerged to use renewable energy in the isolated and rural areas. The characteristics of these initiatives are small scale, off-grid, and imply a bottom-up process. In these small scale renewable energy initiatives, we can witness that the shift of government to governance is occurring. On one hand, these initiatives involve the local community, NGOs, international funding organisation, provincial, and sometimes the national government. On the other hand, the large-scale electricity project remains centralistic with the spark of private parties (IPP) involvement. In addition, the withdrawal of energy affairs from municipality to the province can also be said as an attempt to again centralize the process.

- *Who are the actors in the renewable energy transition in West Java Province?*
  The actors are defined based on the division of responsibility at the landscape, regime, and niche level (Geels & Schot, 2007) with the adjustment to the local context. At the landscape level, there are the national government and state-owned electricity company (PLN). The MEMR, especially EBTKE is the one who is mainly responsible for the strategic task at the national level. PLN has the authority to control and manage the electricity production and distribution across the country. Since the case study focuses on West Java Province, the regime level is the provincial government of West Java. Here, there are two primary stakeholders, DEMR as the coordinator and facilitator of renewable energy affairs and Bappeda as the planning body. Finally, the niche level is represented by the NGO and local community within the area of West Java Province. IBEKA has been chosen as one of the pioneer NGOs and Kasepuhan Ciptagelar as the best practice of RE implementation.

- *How does the electricity related policy influence the renewable energy transition in West Java Province?*
  At the strategic level, all aspects of energy trilemma are addressed in the national policy and program. However, most are still conducting target in a top-down manner, which results in a uniform target for all areas, while different areas have their own unique local conditions. The state-actors tend to decide the target on their own without the overarching objective, even when the objects that they address overlapped one another. The province and PLN are conducting policies at the tactical level. Here, the province supervises the target by specifying the national guidance, in which they argue that the guidance from the national government is unclear. Additionally, there are also the problems with the content such as the data limitation, no actual location in the spatial plan, and the completion of the plan is also delayed. Another policy is the one conducted by PLN, in which the target is more top-down and the approach that they used is mainly technical. Related to the reflection part, the national government can be potential as an agent of check and balance. However, the monitoring mechanisms have not worked properly. For instance, there is no measurement and monitoring mechanism for the sectors, no imposing alternative scenario to learn, and no actual data is retrieved from the lower level. Overall, the national and provincial policies are still limited to enforce and nudge the transition.

- *How do the actors in national, provincial, and local level role and perception influence the renewable energy transition in West Java Province?*
  The national government, MEMR, has a strategic role in organizing policies related to NRE and energy conservation. At the tactical level, the MEMR has to cooperate with the province and PLN. Here, MEMR also contributes to the operational level by developing the infrastructure of RE, particularly in 4T areas. In this sense, the national role touches up the local level. The national reflexive part is discussed in the formal institution part, in which it shows the limitation of the monitoring mechanism to ensure for target achievement. MEMR mentioned several problems such as community acceptance, business feasibility, and land use problems. However, there are also several limitations related to the MEMR coordination capacities and centralistic approach. The next one, the provincial government responsibility is ranging from tactical to reflexive activities. The problems that they face are related to the limitation of data, participation, facilitation, and mediation mechanisms. Between the national and the provincial government, there is a discoordination particularly on the authority and role division.
  The non-state stakeholder at the local community level who is mediating the implementation of RE is IBEKA. IBEKA's role is collaborating, communicating, and mobilising local actors to install and manage RE on their own. They argue that the government and PLN should change their approach to understand the need of the local community. Their experiences show that PLN's technical and centralised manner could

be a danger for a local project. The community, Kasepuhan Ciptagelar, also supports the statement of IBEKA. They also have a close, supportive relationship towards IBEKA. Kasepuhan Ciptagelar is an example of how RE power plant can be implemented and sustained. Moreover, there is a synergetic relationship between Kasepuhan Cipategelar and IBEKA. Although they still face problems such as dependency on outside funding, their experience can be useful to be learned and give input to government's approach.

- *What are the barriers and opportunities to manage the renewable energy transition in West Java Province?*

  There are five main barriers that this study analysed namely policy and administrative and, decentralization, participation, collaboration, and implementation barriers. The barriers to policy and administration are related to Loorbach's (2010) study that addresses the importance of policy although this type of formal arrangement is the hardest one to change. To address this, approaches from transition management should be seen as a complementary rather than conflicting with long-term strategies enacted by the regime (Rotmans, Kemp, & Asselt, 2001). The problem with Indonesia's RE policy is its peripheral position to conventional sources policy and restrictive administrative requirement to implement RE project at the local level. The next barrier is the decentralisation challenge, as Zuidema (2016) addresses that there has to be balance between the centralised and decentralised approaches. In this case, the hybrid position needs to be made clear to avoid miscommunication in the process. From the analysis, we still found unclear role division and limited coordination. The participation process is also crucial to ensure opening opportunities for innovation from niche level (González & Healey, 2005). The challenge is that there is no optimal mechanism available to enable participation process. Also, there is no update on the participatory approach and the decision making is still state-centric. Moreover, collaboration is needed to ensure that the stakeholders facilitate changes in the others (O'Brien & Sygna, 2013). In this case, the stakeholders are going on their own rather than opening up for interaction. As the government rarely includes the social and cultural considerations, González and Healey (2005) suggest that optimising cultural background and strategic interactions is crucial to open opportunity for innovation. Finally, in the implementation process, it is essential to acknowledge the capacities for the buffering and amplifying the system when it undergoes a disturbance (Duit & Galaz, 2008). The barrier is on the capacities performed to address such implementation is still fragmented and have not performed adequately. The projects design is still top-down, which results in fragmented realisation. Also, the government shows limited monitoring attempts to ensure the performance and inform adaptation.

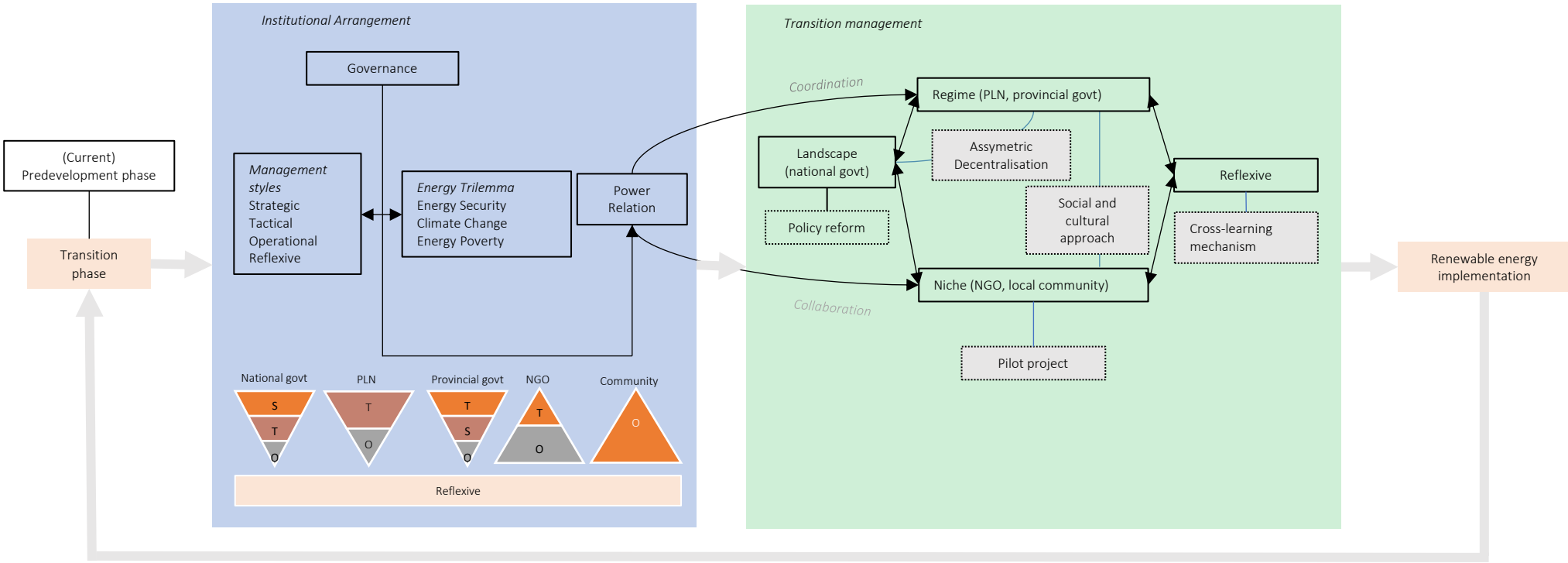
  On the other hand, there are also opportunities that potentially optimise the solutions for inevitable transition challenges. These opportunities are summarised into four, among others policy reform, asymmetric decentralisation, social and cultural approach, and the execution of the pilot project and cross-learning mechanism. Conducting specific policy, a clear target, and overarching objective can also provide a basis to transform towards a new system. Meanwhile, to sustain an RE project at the local level is by reducing miscommunication through both social and cultural approaches. These approaches can promote synergies facilitation to local community and open ways to collaborate with local non-governmental organisations to facilitate projects. Related to the implementation, conducting pilot projects can create opportunity for investment by performing the feasibility of the projects. It gives opportunity to local companies and self-organizing communities to experiment and enhance innovation. Finally, a cross-learning process can be done through sharing best practice of feasibility and a positive impact of the project.

The main research question: "*How does the institutional arrangement in the electricity sector influence renewable energy transition in West Java Province?"* is partly addressed from the previous explanation. To

answer this question, the conceptual model has been further developed (Figure 24). It shows how the transition towards renewable energy in West Java Province can be managed. In general, the current institutional arrangement in Indonesia is not well equipped to manage renewable energy transition. Therefore, there is a need to reform the institutional arrangement, which is a part of a critical reflexivity process (Alexander, 2005). After that, the concept of multi-stage, multi-level, and transition management have been useful to structure the transition analysis in this study (Kemp, Loorbach, & Rotmans, 2005; van der Brugge, Rotmans, & Loorbach, 2005; Loorbach, 2010). Here, we specify the analysis to ensure the concept of management styles from Loorbach (2010) is performed to address three main problems: energy security, climate change, and energy poverty (Gunningham, 2013). Related to the energy security challenge, the state-actors conducted a siloed target to meet the future demand. As a result, the mega-project to achieve the energy security target is conflicting with the target of climate change, because most of the projects are using fossil fuels and coals. With the course to overcome climate change, we found that the target is merely a check-list rather than an attempt to achieve environmental goals. Lafferty & Hovden (2003) examine that environmental objective needs to be given a principle priority in the policy. It means, the government cannot only balance the approach because environmental damage is irreversible. Lastly, the effort to reduce energy poverty is considered to be shallow. The analysis shows that the government approach has limited sensitivity to the local context. In West Java Province, it is also worsened by inadequate information on the local condition. As a result, state-actors' efforts are often less on target. Moreover, we examine the four management styles from different actors. We conclude that the management styles should be incorporated collaboratively and performed with different degree based on the stakeholders' positions and capacities (the division can be seen in the triangles in Figure 24). There are constraints to change the overall structure, but we still can make adjustments. For instance, the national and provincial government both perform strategic, tactical, operational, and reflexive activities. However, the role of creating vision and target (strategic) should be mostly fulfilled by the national government, while the collaboration and facilitation efforts (tactical) need to be covered by the provincial government.

In general, the case has taught us that in an on-going transition, if we are not careful to put the short-term goals and strategies in the institutional design, we can perform actions (enact policy, plan, and implement project) that do not contribute to the desirable change.

Figure 24. A conceptual model for managing the transiti



7.2. Lessons

Several lessons are drawn from the transition theory that has been used in this study. First, there is a different aspect to be considered in managing transition in developing country like energy poverty concern. Since most of the studies in transition are home-grown in developed countries, there are several contextual aspects that needs to be adapted to create a useful framework. In this study, we do it by combining with the energy concerns that are typical in developing countries. It has been proven to be useful in the analysis because several barriers and opportunities are captured. Also, it is beneficial to acknowledge the possibility of externalities between different objectives. Thus, these externalities need to be mitigated by creating overarching vision or program. Second, this study adds the practical link to the existing literatures on transition. It explains the multiplicity of stakeholders in the energy transition research. We argue that to nudge a transition, the decision-makers need to understand that a sphere (arena) transition consists of multiple capacities from various actors within the society. Rather than competing capacities, it is more optimal to combine the capacities and work together. However, how the capacities are combined need to be adjusted with local circumstances. For instance, we tried to combine with different degree of management styles, so the stakeholders' domains are less likely to overlap and compete with each other (Figure 24). Third, we try to incorporate power analysis to find the barriers that occur between stakeholders by elaborating Avelino's (2011) study on the power relations in a transition process. Meadowcroft (2009) emphasizes that the commendation of transition management to reform a regime needs to include the power and political dimension in a transition. The results show how the relations between stakeholders look like in real life, while also give recommendation to improve the network.

7.2.1. Lessons for planning theory

Specific for planning theory, this study contributes to the understanding of how different management styles in the institutional arrangement influences the transition to renewable energy. Planning theory has acknowledged the complexity of planning problems, in which it views the futures as multiple and influenced by many aspects in a complex open system (Byrne, 2003). Transition theory also understands highly uncertain futures, while a system is shifting towards a new equilibrium. Planning theory has a whole spectrum from technical rational to communicative rational (de Roo, 2016). Viewed in this way, it is possible to consider what is needed to achieve desirable transition outcome at given points along the spectrum. This study has found that transition thinking contributes to the planning realm by making clear the connection between the planning problems and how to approach them to achieve the transition outcome. Here, energy problems are planning problems. It is more relevant to planning realms considering the spatial visibility from renewable energy systems. The condition from this case study shows that it is not only 'visible', but also scattered, small, and strongly driven by local ownership in the rural areas which are previously unelectrified. What makes this case study unique is the spatial aspect of fragmented area, which is influential to shape how the roles and relations of stakeholders should be. Niche level allows renewable energy to thrive although it is disconnected to the wider network. It shows that although a regime is a crucial aspect in a transition, regime's roles are not the critical point where the transition can move from pre-development phase. The project will not be sustainable when it is initiated by the government (regime), because it can restrict the community's ability to be independent. Niche level in this case is crucial to ignite the transition to a new system. Meanwhile, the regime should be a supporting actor to create the condition.

7.2.2. Lessons for planners

In the prescriptive context, this study can be valuable for planners to evaluate institutional arrangement towards the transition in West Java Province. The barriers and opportunities from multi-level governance perspective are presented by examining conflicting objectives among them. By explicitly referring to the

barriers and opportunities, planners can learn to reform its decision-making process. Also, the evaluation of the policy content can be beneficial to improve the formal framework. The planners need to acknowledge that to achieve a long-term transition vision, they should consider logical pathway by creating short term goals. Moreover, this case study can give lessons to other areas since the analysis also includes national government and state-owned companies that could resonate with other cases in Indonesia. The NGO, IBEKA, has also reached out villages across the country. Therefore, their experience may also be practical to be implemented. Although the local community characteristic is different in other areas, the case of Kasepuhan Ciptagelar is an excellent example to present a successful case. In this sense, other regions could also learn from their experience.

7.3. Recommendation

It was explained that several stakeholders have their unique capacities related to their role and position. Chapter 6 also explained the opportunities that will be used to structure the recommendation.

First, the national and provincial government needs to perform a policy reform. Enacting policy is the government's crucial capacity to provide legal basis and enforce the transition. There is a need to generate specific policies for renewable energy and redesign the target to addressing energy trilemma. Second, the national government can safeguard the transition process by implementing asymmetric decentralisation. The approach of national government needs to consider the management capacity of provincial government. In this sense, the national government needs to apply a different approach to a different province. The third recommendation is the government has to reduce the miscommunication around the local project by consulting to the local people. Applying social and cultural approach is suggested both for state and non-state actors that want to collaborate with the local community. The last one is the actors in RE transition need to execute pilot projects and exhibit cross-learning mechanism. For further RE transition in Indonesia, the recommendation regards the prioritisation of the RE implementation and overarching objectives to achieve this is not yet completed by the national government. There is a need for strong political commitment to make it happen.

The theoretical concept that has been developed in chapter three has proven to comprehend the analysis of institutional arrangement in the transition process. Nonetheless, there is still a lack of in-depth consideration of the complexity of the issue. The use of a complex adaptive system can be useful to analyse and conceptualise the empirical problems (Duit & Galaz, 2008). Moreover, this study is trying to comprehend all the levels in shaping the institutional arrangement. However, focusing on one level and study in-depth is strongly suggested. Contributing to the debate on the strategy to align various policies, a critical examination on the time span of the policy and plan in the energy sector can be an interesting discussion. For instance, the Indonesia's policy time spans are usually long-term which hypotheticaly makes it hard to cope up with changes. It can be relevant to the transition to renewable energy system which needs a continuous reflexivity and learning process, which implies changes will always occur along the process. Also, time is crucial in this matter as this study found that the time completion of related policies are not in harmony. Thus, the rules are overlapped with each other. Related to the method used, a cultural approach at the local level may give an exciting addition to further study. Niche level is the most appropriate to use a cultural approach because it represents specific area of innovation. For instance, using a phenomenology approach in the survey process to explore the experience of people in the transition can highlight the crucial aspects in a niche case.

7.4. Reflection

7.4.1. Transition to renewable energy

Starting with the theoretical framework of this research, transition theory has been chosen as a theoretical basis. I was using transition theory in my bachelor's thesis, so I found it useful to extrapolate my framework in the beginning. However, courses I took in Master of Environmental and Infrastructure Planning have supported to deepen my knowledge of transition towards renewable energy. Transition theory provides a framework for managing changes to a new system. From the experience of this study, transition theory has

been appropriate to structure the condition for transition towards renewable energy. Different stages of transition are included to show how a transition can orient development. It also makes clear the actors' involvement which are structuring a transition. At the core of transition management is a challenge to avoid lock-in situation by incorporating different management styles.

However, a transition tends to focus on long-term goals which often leads to poorly defined practical goals. Also, there is a tendency to conduct an unclear goal. For example, transition to renewable energy. Whether a renewable energy system is a goal, or the main goal is to reduce greenhouse gases. It is hardly explained explicitly in the framework of transition. Whereas in practice, there is a danger that different objectives provide externality to the other objectives. In this sense, defining the transition goals can help to ground the theory to an empirical case. To structure the strategy to achieve the goals, Loorbach's (2010) four management styles are incorporated in this study. It has shown that these management styles are still general to explain how those can address such challenges. It can be more relevant to analyse empirical cases by explicitly explaining the objectives and connecting them with the management styles. This study also found that not all the capacities need to be incorporated by each actor. For instance, combining the management styles from transition theory and the energy trilemma (Gunningham, 2013) turned out to be useful to frame and position different aspects. It is rather beneficial to combine different capacity by providing area for different stakeholders to work together. This framework has also proven to be useful in explaining the gap between stakeholders.

7.4.2. Case Selection

In the beginning, I was planned to select a case in a specific municipality or district. Nonetheless, it is not a representative case since the authority of energy is now located at the provincial level. Selecting the province is another problem considering the characteristics that will be useful for the analysis. Eastern part of Indonesia may be a compelling case for stalled projects and give deeper understanding on what went wrong. I instead select a province with 'institutional thickness'. Therefore, I could analyse its multi-level stakeholder setting. Additionally, I also want to gather not only barriers but also opportunities that could be learned for future development. It turned out to work in the survey process because the stakeholders have an understanding of the issues in the transition process to renewable energy. Nevertheless, further study in underdeveloped areas is strongly suggested.

7.4.3. Institutional Context

Indonesia has a complicated formal institutional structure. In the process, I experience struggle to structure and relate the policy to the three issues. For instance, regarding climate change efforts, the policy is the product of the previous president. Thus, it is neglecting the political aspect to explain the cause is merely in the current institutional setting. It is also hard to retrieve informal institution in practice. How the practice works may not explicitly explained by the stakeholders. However, there is a benefit to understanding the informal institution based on the formal institution. Eventually, I could examine the way they manage things by specify the perception towards specific policies.

7.4.4. Interview

Several interviews are conducted directly while several others are interviewed through Skype or WhatsApp calls. Interviews with governments took more waiting time and scheduling. I need to send a letter of consent first to be processed. However, once the administrative process is done, all of the interviewees are cooperative. There is a time difference between the Netherlands and Indonesia, but I can can schedule the time that worked for both of us. Interviews with NGO and community are more flexible than with state actors. The interviews are conducted in Bahasa Indonesia which helps interviews to explain fully and openly.

7.4.5. Analysis

The policy document analysis is a challenge since I gather the documents from online sources. I found it also hard to sorting relevant policies. However, during the interview, ensuring the documents with the interviewees give acknowledgement to deepen the analysis. For example, RUED document has not finished yet, so I cannot analyse the provincial energy plan in the beginning. However, during the interview, the

interviewee gives me access to the drafting materials. Moreover, processing the interview result was taking quite some time because the recordings were more than one hour each.

To end my reflection section, this following verse can illustrate the nation's noble mission.

> *"Earth, water and natural resources contained therein are controlled by the State and used for the greatest prosperity of the people."*
> *National Constitution of Republic Indonesia, Article 33, Paragraph 3*

This article is obligatory to be learned by heart during my elementary school. We believe that our resources must be used for the greatest prosperity of the people. However, this research has taught me alot about the hurdles to achieve the constitutional mandate. The first thing that motivates me was finding out the fact that there are so many areas in Indonesia, my home country, that are still without electricity. I have known this as numbers but experiencing it by myself during the survey gives me different realisation. The next one is the feeling of disappointment when I realised that the government officials have very limited room to do something about the energy issues, particularly on energy poverty. Also, because coal will fill most of our nation's future energy plan. I know it is so hard to make others understand how severe the conventional energy plan will be in the future. However, knowing that the implementation of renewable energy really has the potential to tackle such trilemma was a relief. The case of Kasepuhan Ciptagelar is a vibrant social and cultural knowledge that I cannot explain fully in this study. I believe that the local community can be the key to launch the energy transition in Indonesia. This system could sustain at the local level, but with major 'homework' to be done.

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9. Appendix

Appendix 1.

Programs to support renewable energy development in West Java Province:

- Bio-gas Village (Kampung Biogas)

Since 2008, West Java Province government together with local people has developed bio-gas in villages near upstream Citarum River. The springs of Citarum River are located in Situ Cisanti. Less than 1 kilometre from Situ Cisanti, a reservoir of 7 springs forming Citarum River, cattle pens pour cow waste into this stream. In one of the villages, Tarumajaya, the pens produce about 10 tons of cow waste every day. According to the data from North Bandung Breeders Cooperative (KPSBU), there are at least 7,000 farmers with a total of 29,000 cows in Lembang and surrounding areas. In total, the cows waste can be up to 400 tons a day. The development of biogas is based on the potential of the region. The government coordinates several agencies such as livestock and energy agencies. The funds for the instalment comes from the provincial budget. However, to make the biogas project continuous and sustain is still a challenge. Another challenge is management weakness due to the lack of post-installation assistance. Moreover, the production of cow manure in the future cannot be predicted because the number of cows may reduce due to the decline of business conditions.

- Solar rooftop program

This program was started last year to initiate the implementation of solar rooftops in the government office buildings. The Department of Energy and Mineral Resources was the first office to install the solar rooftop. Other departments will follow this program under the program titled 'West Java: Green Province'.

Appendix 2.

National policies related to energy trilemma.

Table A 1. National policy overview

Policy	Content
Law of the Republic of Indonesia Number 30 the Year 2009 on Electricity	The provision of electricity is controlled by the state which means National Government and Regional Governments based on the principle of regional autonomy. The implementation of electricity supply business will be the responsibility of the state-owned company (BUMN) and local-owned company (BUMD).
Government Regulation Number 79 of 2014 on National Energy Policy (KEN)	The National Energy Policy (KEN) has the objective of directing efforts in realising the security of domestic energy supply including the provision and utilisation, while KEN targets are as follows: 1. Achieving smaller energy elasticity in 2025 2. Achieving electrification ratio of 85% by 2015 and close to 100% by 2020 3. The realisation of energy targets with details: a. The role of new energy and renewable energy is at least 23% by 2025 and at least 31% by 2050 if its economically feasible b. Oil usage becomes less than 25% by 2025 c. Coal minimum 30% in 2025 and 20% by 2050 d. Natural gas at least 22% in 2025 and 24% by 2050.

	These targets are achieved through key policies and supporting policies, namely: 1. Main Policy a. Provision of energy b. Energy development priorities c. Utilization of national energy resources d. National energy reserves 2. Supporting Policy a. Energy conservation, energy resource conservation, and energy diversification b. Environment and work safety c. Price determination, subsidies, and energy incentives d. Development and strengthen infrastructure, access to communities, and the energy industry e. Research, development, and application of energy technologies.
Presidential Regulation Number 22 the Year 2017 on National Energy Plan (RUEN)	RUEN is a general plan to achieve the energy vision of KEN. The targets of energy mix are the same with KEN. RUEN has three indicators related to current national energy condition: a. Socio-economic indicator – the underlying assumption related to the people social and economic condition b. Energy indicator – resources condition, electrification ratio, and electricity consumption c. Ecological indicator – greenhouse gases emission Based on these three indicators, the government designs activities for new and renewable energy as follow: a. Establish separate NRE businesses that assigned by the government b. Apply and improve feed-in tariff of the power plant c. Prepare guidelines for the energy subsidies provision with an allocated budget from APBD d. Budgeting the construction of NRE for unelectrified villages e. Assign the national budgeting bodies to finance NRE development f. Developing small electricity system based on NRE in isolated areas.
National Electricity Plan 2015-2034 (RUKN – draft)	RUKN is a general plan of electricity based on the vision of KEN. RUKN tergets of energy mix of power generation are as follow: a. Coal 50%; NRE 25%; gas 24%; and oil 1%. b. For RE plants, the target is to achieve 45 GW by 2025, with hydropower holds the largest share (21 GW), followed by geothermal, solar photovoltaic, biomass, ocean and wind.
National Power Supply Plan of PLN 2018-2027 (RUPTL PLN)	PLN's targets for 2027 are listed: a. Power plant development target is 56,024 MW b. Energy share: coal 54.4%; NRE 23%; gas 22,2%; and oil 0.4%

	Procurement plan: 35 projects by PLN with a total capacity of 10,681 MW and 74 projects by private / Independent Power Producer (IPP) with a total capacity of 25,904 MW.
Decree of the Minister of Energy and Mineral Resources Number: 2682 K / 21 / MEM / 2008 on the National Electricity General Plan (RUKN) 2008-2027	Development in the field of electricity should avoid damage and degradation of ecosystems. Law No. 23/1997 on Environmental Management and Government Regulation No. 27/1999 on Environmental Impact Analysis (AMDAL) requires that project proponents harmonise building activities about the environment. Diversification of the use of primary energy of fossil fuels to non-fossil fuels for power generation is a medium or long-term program in a region.
Presidential Regulation Number 61 the Year 2011 on National Action Plan for Reducing Green House Gases (RAN-GRK)	Proposes mitigation actions in five prioritised areas: agriculture, forestry and peatland, energy and transportation, industry, and waste management). RAN GRK requires the development of regional action plan (RAD GRK) in which RAN GRK and RAD GRK are an integral part. The coordination of RAN GRK is using NAMAs (Nationally Appropriate Mitigation Actions) framework. The overall target is to achieve the emission reduction targets of -26% (independently) and -41% (with international support) in 2020 coordinated by National Planning Ministry (BAPPENAS).

Appendix 3.

Provincial policies related to energy trilemma.

Table A2. Provincial policy overview

Policy	Content
Medium-term Development Plan of West Java Province (RPJMD) the Year 2013-2018	Strategies on energy sector: 1. Increasing accessibility to electricity 2. Developing new and renewable energy and energy conservation 3. Increasing the implementation of rehabilitation and ecological conservation 4. Reducing the burden of environmental pollution and disaster risk
Regional Spatial Plan of West Java Province (RTRW) the Year 2009-2029	Energy and electricity infrastructure planning: 1. Development of electrical installation and distribution for increasing electrification to every area 2. Development of renewable energy including geothermal, hydro energy, photovoltaic, wind, and bioenergy 3. Development of non-renewable energy including fossil fuels, gas, and coal to increase energy supply Implementation plan. Example from Planning Area (WP) of Bodebekpunjur:

	1. Geothermal in Awi Bengkok and Salak Mountain, Kabupaten Bogor 2. Waste power generation in Kabupaten Bogor, Kabupaten Bekasi, Kota Bekasi, Kota Bogor, and Kota Depok 3. Gas pipelines in Kota Bogor, Kota Depok, Kabupaten Bekasi, and Kota Bekasi 4. Development of micro hydro, photovoltaic, wind energy, and bio-energy 5. Natural gas in Kabupaten Bekasi 6. Energy independent village program
General Plan of Regional Energy of West Java Province (RUED – draft)	With the vision to: 'Fulfillment of energy needs in West Java Province that supports economic growth with the utilisation of renewable energy as major resources to achieve West Java Green Province.' Four missions: availability, affordability, accessibility, and acceptability.
West Java Governor Regulation Number 56 the Year 2012 on Regional Action Plan for Reducing Greenhouse Gases (RAD GRK)	Activities for the action plan include: agriculture, forestry, energy, transportation, industry, and waste and wastewater. Emission reduction target in energy is 3.18 million ton of CO2 in 2020. Using the framework of RIKEN (Central Guidance of National Energy Policy) with two programs: 1. Conversion of kerosene to LPG for households and commercials 2. Implementation of renewable energy based on hydropower, photovoltaic, biofuel, biomass, biogas, and geothermal.

Appendix 4.

Policy Gap

Conflicted

1. RUEN and RUPTL PLN

NRE Targets	RUEN	RUPTL PLN 2018-2027
Hydro-power	17.98 GW	8.3 GW
Thermal power plant	7.2 GW	4.6 GW
Others	Microhydro (PLTMh) 3 GW Solar PV (PLTS) 6.5 GW Wind (PLTB) 2.8 GW Others 3.1 GW	2.1 GW

2. RUKN and RUPTL PLN

Targets	RUKN	RUPTL PLN 2018-2027
Coal	50%	54.4%

Targets	RUKN	RUPTL PLN 2018-2027
New and Renewable Energy	25%	23%

3. RAN-GRK and RUPTL PLN

RAN-GRK	RUPTL PLN 2018-2027
Reduction of coal usage in energy system	Coal percentage is planned to be 54.4% (from the total project of 56 GW) in 2027

Need update

Regulation	Evaluation
RAN-GRK	The materials in RAN-GRK were enacted in 2011 and need to be aligned with the recent government strategic plan. Since the GHG emissions mostly come from area-based sector, RAN-GRK should be developed with the sensitivity to the areas condition. It can be done by providing different target to different areas. Specific to the energy sector, current RAN-GRK majorly focuses on shifting and improving (i.e. RE plants implementation, energy management in industries), but limited to avoiding or restricting (i.e. reducing fossil fuels usage, reducing diesel or coal power plants)
RPJMD	In the derivation of 'Development of new and renewable energy power plant', only two programs enlisted as coaching program. The government should be more clear to explain where and how they will do the facilitation process.
RTRWP	Small-scale RE plants are written as 'Development of micro hydro, photovoltaic, wind energy, and bio-energy' without referring to the actual locations. For energy poverty objective, the programs are mostly written as 'Energy independent village program' with no location lists where it will be built.
RAD-GRK	Need to be equipped with reference emission level (REL) which is guided to each region No clear monitoring mechanism to achieve the targets Need revision on the mitigation programs which should be aligned with the recent regional plan

Appendix 5.

Interview Guideline

Stakeholders	Question	Research Subquestion	Link to Management style	Topic
National Government	Apa peranan EBTKE dalam mendukung pengembangan energi terbarukan dalam sistem ketenagalistrikan di Indonesia khususnya dalam skala lokal di daerah rural/isolated? Bagaimana sejarah pengembangannya?	2,3	Strategic	Target and strategy to support electricity, especially in rural and isolated areas Hostory of development
	Bagaimana pembagian kewenangan dalam pengembangan energi terbarukan untuk sistem ketenagalistikan di Kementerian ESDM?	3,4	Strategic, Tactical	Role division to RE electricity development related to energy trilemma
	Apakah menjadi kewenangan Dirjen EBTKE ataukah Dirjen Ketenagalistrikan?	3,4	Tactical	Role division and collaboration with other sectors (horizontal)
	Bagaimana pembagian kewenangan dalam pengembangan energi terbarukan untuk sistem ketenagalistikan antar instansi pemerintah pusat dan daerah?	3,4	Tactical	Role division and coordination with provincial government (vertical)
	Hambatan apa saja yang dialami dalam mengembangkan energi terbarukan di daerah rural/isolated dari aspek teknologi, anggaran, dan regulasi (lahan dan perizinan)?	4,5,6	Operational, reflexive	Implementation, monitoring, and evaluation related to technology, funding, and regulation
	Bagaimana strategi pemerintah dalam mendukung komunitas lokal agar dapat berkontribusi dalam mengembangkan energi terbarukan di Indonesia?	5,6	Operational, reflexive	Relation with local community and target assessment

Provincial Government	Bagaimana penentuan target dan pengembangan energi baru dan terbarukan di Provinsi Jawa Barat?	3,5	Strategic	Strategy and program to support electricity, especially in rural and isolated areas
	Apa saja keunggulan dan hambatan yang dihadapi dalam mengembangkan energi terbarukan di Provinsi Jawa Barat?	2,3,5	Strategic, Tactical	History of development
	Program apa saja yang sudah dikerjakan oleh Provinsi Jawa Barat? Bagaimana jalannya program tersebut?	3,4	Operational, Reflexive	Program and evaluation
	Apakah ada wilayah di Provinsi Jawa Barat yang menjadi percontohan untuk pengembangan energi baru dan terbarukan? Mengapa menjadi percontohan?	3,4	Tactical, Operational	Collaboration with community
	Hambatan apa saja yang dialami dalam mengembangkan energi terbarukan di daerah rural/isolated dari aspek teknologi, finansial, dan regulasi di Provinsi Jawa Barat?	4,5,6	Operational, reflexive	Implementation, monitoring, and evaluation related to technology, funding, and regulation
	Bagaimana caranya mengakomodir kebutuhan teknologi energi terbarukan di Provinsi Jawa Barat?	5,6	Operational, reflexive	Implementation related to program and evaluation
	Bagaimana cara mengakomodir kebutuhan dana dalam pengembangan energi terbarukan di Provinsi Jawa Barat?	4,5,6	Operational, reflexive	Implementation related to funding and evaluation
	Bagaimana pemerintah provinsi berkontribusi terhadap ekonomi dan sosial melalui pengembangan energi terbarukan?	5,6	Strategic, operational, reflexive	Target for RE development and monitoring mechanism
	Apa harapan kedepannya dalam mengembangkan energi terbarukan di Indonesia?	5,6	Operational, reflexive	Opportunity for future development
IBEKA	Bagaimana sejarah terbentuknya IBEKA? Kenapa memilih bergerak di EBT? Sekarang kegiatannya apa?	2,5	Tactical, operational	History of development, perception about RE

	Proyek IBEKA dimana saja? Bagaimana cara memilih lokasinya?	5	Operational	Approach to develop RE
	Pada tahun 1990, belum ada aturan bahwa PLN harus membeli listrik dari EBT. Bagaimana prosesnya agar bisa melobby aturan tersebut?	3,5	Tactical	Collaboration and coalition with other parties
	Bagaimana caranya agar Pemerintah dapat menyesuaikan aturan untuk mengakomodir kepentingan IPP (NGO) untuk menyalurkan listrik ke masyarakat? Apakah lebih baik sistem off-grid atau grid PLN?	3,5	Tactical	Relationship with state-actors
	Apakah ada perizinan khusus dalam penyediaan listrik swadaya? Apakah PLN harus tahu? Manakah yang lebih baik, di support Pemerintah atau tidak?	5,6	Tactical, operational	Implementation related to administrative requirement
	Terkait dengan hasil penjualan listrik, apakah hasil tersebut dikelola oleh koperasi saja? Ataukah ada sistem lain yang lebih baik agar pemberdayaan energi di suatu desa terus berkelanjutan?	5,6	Operational	Approach to collaborate with community
	Mengapa EBT power plant yang dibangun oleh PLN banyak yang mangkrak dari pada EBT power plant yang dibangun oleh swadaya?	5	Operational, reflexive	Approach to sustain RE project, learning mechanism
	Bagaimana tanggapan Bapak tentang mekanisme penerapan EBT yang dilakukan pemerintah? subsidi EBT? Apakah ada yang dapat dikolaborasikan?	5,6	Tactical, operational, reflexive	Perception about current collaboration and opportunity to develop in the future
Kasepuhan Ciptagelar	Bagaimana sejarah Kasepuhan Ciptagelar ini?	2	Operational	History of development
	Bagaimana awal listrik mulai masuk ke Kasepuhan Ciptagelar? (penyedia teknologi, waktu, dan lokasi)	2,3,5	Operational	History, actor involvement, and initial perception about RE

	Bagaimana menghimpun masyarakat untuk ikut serta dalam pemasangan pembangkit?	5	Operational	Process to implement RE projects
	Bagaimana pengelolaan pembangkit pasca pemasangan?	5	Operational	Approach to sustain RE projects
	Apakah ada perizinan khusus dalam penyediaan listrik swadaya? Apakah PLN harus tahu? Manakah yang lebih baik, di support Pemerintah atau tidak?	5,6	Operational	Implementation, administrative, and permit mechanism
	Terkait dengan kebutuhan listrik, digunakan untuk kegiatan apa saja oleh masyarakat? Bagaimana pembagian beban per rumah tangga atau aktivitas produktif lainnya?	5	Operational	Benefits of RE projects to community activities
	Bagaimana cara melibatkan masyarakat agar tetap berkelanjutan? (menghindari mangkrak atau kerusakan)	5,6	Operational	Involvement of community members
	Bagaimana selama ini manajemen dan pengelolaan keuangan untuk EBT dilaksanakan?	5,6	Operational	Funding mechanism
	Bagaimana tanggapan Bapak tentang penggunaan energi terbarukan sendiri di desa seperti Kasepuhan Ciptagelar ini? Apakah dapat diterapkan di desa lainnya?	5	Operational, Reflexive	Learning mechanism
	Bagaimana saran dan harapan Bapak ke depannya? Adakah pihak yang dibutuhkan kerjasamanya menurut Bapak? (Misal PLN, pemerintah, atau swasta)	5,6	Operational, Reflexive	Opportunity for future development